Ref #	Cycle #	Topic	Citation	SORT Grade or Source	Fulltext or Citation Link	Abstract	Comments by Reviewer
Cycle 1: Disability due to osteoarthritis despite conservative therapy							
1	I/A	Appropriateness Criteria	Riddle DL, Jiranek WA, Hayes CW. Using a validated algorithm to judge the appropriateness of total knee arthroplasty in the United States: a multi-center longitudinal cohort study. Arthritis Rheumatol. 2014 Aug;66(8):2134-43. PMID: 24974958	2/B	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4190177/	Objective: We used a modified version of validated appropriateness criteria to determine the prevalence rates of total knee arthroplasty (TKA) surgeries that were classified as appropriate, inconclusive or inappropriate. Based on prior evidence, we hypothesized that the prevalence of TKA surgeries classified as inappropriate would approximate 20%. Methods: The appropriateness classification system was adapted for use on persons undergoing TKA in the Osteoarthritis Initiative dataset. A variety of pre-operative data were used including WOMAC Pain and Physical Function scores, radiographic and knee motion and laxity measures and age. Prevalence rates for classifications of appropriate, inconclusive and inappropriate were calculated. Results: Data from 205 persons with TKA were examined. The prevalence rate was 44.0% (95%CI= 37, 51) for classifications of appropriate, 21.7% (95%CI = 16, 28) for inconclusive classifications and 34.3% (95%CI =27, 41) for inappropriate classifications. Conclusion: Approximately a third of TKA surgeries were judged to be inappropriate. Variation in the characteristics of persons undergoing TKA was extensive. These data support the need for consensus development of criteria for patient selection among practitioners in the US treating potential TKA candidates. Among the important issues, consensus development needs to address variation in patient characteristics and the relative importance of pre-operative status and subsequent outcome.	Study applies appropriateness criteria previously developed by Escobar and colleagues to estimate "appropriate" total knee arthroplasty in US. Study has a population perspective and does not include patient comorbidities in an assessment of appropriateness. --> Estimates that a substantial proportion of patients have "inappropriate" TKR.
2	I/A	Appropriateness Criteria	Ferket BS, Feldman Z, Zhou J, Oei EH, Bierma-Zeinstra SM, Mazumdar M. Impact of total knee replacement practice: cost effectiveness analysis of data from the Osteoarthritis Initiative. BMJ. 2017 Mar 28;356:j1131 PMID: 28351833	2/B	http://www.bmj.com/content/356/bmj.j1131.long	Objectives To evaluate the impact of total knee replacement on quality of life in people with knee osteoarthritis and to estimate associated differences in lifetime costs and quality adjusted life years (QALYs) according to use by level of symptoms. Design Marginal structural modeling and cost effectiveness analysis based on lifetime predictions for total knee replacement and death from population based cohort data. Setting Data from two studies-Osteoarthritis Initiative (OAI) and the Multicenter Osteoarthritis Study (MOST)-within the US health system.Participants 4498 participants with or at high risk for knee osteoarthritis aged 45-79 from the OAI with no previous knee replacement (confirmed by baseline radiography) followed up for nine years. Validation cohort comprised 2907 patients from MOST with two year follow-up.Intervention Scenarios ranging from current practice, defined as total knee replacement practice as performed in the OAI (with procedural rates estimated by a prediction model), to practice limited to patients with severe symptoms to no surgery.Main outcome measures Generic (SF-12) and osteoarthritis specific quality of life measured over 96 months, model based QALYs, costs, and incremental cost effectiveness ratios over a lifetime horizon.Results In the OAI, total knee replacement showed improvements in quality of life with small absolute changes when averaged across levels of confounding variables: 1.70 (95% uncertainty interval 0.26 to 3.57) for SF-12 physical component summary (PCS); -10.69 (-13.39 to -8.01) for Western Ontario and McMaster Universities arthritis index (WOMAC); and 9.16 (6.35 to 12.49) for knee injury and osteoarthritis outcome score (KOOS) quality of life subscale. These improvements became larger with decreasing functional status at baseline. Provision of total knee replacement to patients with SF-12 PCS scores <35 was the optimal scenario given a cost effectiveness threshold of $200 000/QALY, with cost savings of $6974 ($5789 to $8269) and a minimal loss of 0.008 (-0.056 to 0.043) QALYs compared with current practice. These findings were reproduced among patients with knee osteoarthritis from the MOST cohort and were robust against various scenarios including increased rates of total knee replacement and mortality and inclusion of non-healthcare costs but were sensitive to increased deterioration in quality of life without surgery. In a threshold analysis, total knee replacement would become cost effective in patients with SF-12 PCS scores ≤40 if the associated hospital admission costs fell below $14 000 given a cost effectiveness threshold of $200 000/QALY.Conclusion Current practice of total knee replacement as performed in a recent US cohort of patients with knee osteoarthritis had minimal effects on quality of life and QALYs at the group level. If the procedure were restricted to more severely affected patients, its effectiveness would rise, with practice becoming economically more attractive than its current use.	"Marginal structural modeling and cost effectiveness analysis based on lifetime predictions for total knee replacement and death from population based cohort data." Study indicated that efficiency of surgical interventions was greatest with more severely affected patients. --> Knee arthroplasty provides an increasing outcome/cost ratio in patients as severity of disability increases.
3	I / A / 1	Documentation of Disability; HOOS/KOOS	Davis AM. Perruccio AV. Canizares M. Hawker GA. Roos EM. Maillefert JF. Lohmander LS. Comparative, validity and responsiveness of the HOOS-PS and KOOS-PS to the WOMAC physical function subscale in total joint replacement for osteoarthritis. Osteoarthritis & Cartilage. 17(7):843-7, 2009 Jul. PMID:19215728	2/B	http://www.sciencedirect.com/science/article/pii/S106345840900017X	Abstract: OBJECTIVE: To evaluate the internal consistency of the Hip disability and Osteoarthritis Outcome Score-Physical Function Short-form (HOOS-PS) and the Knee injury and Osteoarthritis Outcome Score-Physical Function Short-form (KOOS-PS) in total hip replacement (THR) and total knee (TKR) replacement. Construct validity and responsiveness were compared to the Western Ontario McMaster Universities' Osteoarthritis Index (WOMAC) Likert 3.0 physical function (PF) subscale and the PF excluding the items in the short measures (PF-exclusions). METHODS: Participants completed the full HOOS or KOOS, measures of fatigue, anxiety, depression and the Chronic Pain Grade (CPG) pre-surgery and the HOOS or KOOS 6 months post-surgery. Internal consistency for the HOOS-PS and KOOS-PS was calculated using Cronbach's alpha. For construct validity, it was hypothesized that correlations between the HOOS-PS or KOOS-PS and PF and PF-exclusions with fatigue, CPG, anxiety and depression and HOOS/KOOS pain scales would differ by magnitudes of <0.1. Standardized response means (SRMs) were calculated for the HOOS-PS, KOOS-PS, PF and PF-exclusions and hypothesized to be >1. RESULTS: The THR group (n=201) had a mean age of 62.3 years; 53.2% were female. The TKR group (n=248) had a mean age of 64.5 years; 63.7% were female. Cronbach's alpha was 0.79 and 0.89 for the HOOS-PS and KOOS-PS, respectively, confirming that the measures represented a homogeneous construct. The correlation of the HOOS-PS to the PF and PF-exclusions was 0.90 and 0.86, respectively; r=0.90 (PF) and r=0.85 (PF-exclusions) for the KOOS-PS. The results supported the construct validity hypotheses. For THR, the SRM was 1.5, 1.7 and 1.7 for the HOOS-PS, PF and PF-exclusions; for TKR, the SRM was 1.4, 1.5 and 1.7, respectively. CONCLUSIONS: The short HOOS-PS and KOOS-PS represent homogenous short measures of PF with similar construct validity and responsiveness to the 17-item PF. The HOOS-PS and KOOS-PS are parsimonious, valid and responsive for evaluating PF in THR and TKR.	Validation study for short form of HOOS and KOOS. --> Supports validity of short form of these tools

4	I / A / 1	Documentation of Disability; HOOS/KOOS	Lyman S, Lee YY, Franklin PD, Li W, Mayman DJ, Padgett DE. Validation of the HOOS, JR: A Short-form Hip Replacement Survey. Clin Orthop Relat Res. 2016 Jun;474(6):1472-82. doi: 10.1007/s11999-016-4718-2. Epub 2016 Feb 29. PMID: 26926772	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Patient-reported outcome measures (PROMs) are increasingly in demand for outcomes evaluation by hospitals, administrators, and policymakers. However, assessing total hip arthroplasty (THA) through such instruments is challenging because most existing measures of hip health are lengthy and/or proprietary. QUESTIONS/PURPOSES: The objective of this study was to derive a patient-relevant short-form survey based on the Hip disability and Osteoarthritis Outcome Score (HOOS), focusing specifically on outcomes after THA. METHODS: We retrospectively evaluated patients with hip osteoarthritis who underwent primary unilateral THA and who had completed preoperative and 2-year postoperative PROMs using our hospital's hip replacement registry. The 2-year followup in this population was 81% (4308 of 5351 patients). Of these, 2371 completed every item on the HOOS before surgery and at 2 years, making them eligible for the formal item reduction analysis. Through semistructured interviews with 30 patients, we identified items in the HOOS deemed qualitatively most important to patients with hip osteoarthritis. The original HOOS has 40 items, the four quality-of-life items were excluded a priori, five were excluded for being redundant, and one was excluded based on patient-relevance surveys. The remaining 30 items were evaluated using Rasch modeling to yield a final six-item HOOS, Joint Replacement (HOOS, JR), representing a single construct of "hip health." We calculated HOOS, JR scores for the Hospital for Special Surgery (HSS) cohort and validated this new score for internal consistency, external validity (versus HOOS and WOMAC domains), responsiveness to THA, and floor and ceiling effects. Additional external validation was performed using calculated HOOS, JR scores in collaboration with the Function and Outcomes Research for Comparative Effectiveness in Total Joint Replacement (FORCE-TJR) nationally representative joint replacement registry (n = 910). RESULTS: The resulting six-item PROM (HOOS, JR) retained items only from the pain	This is a retrospective validity study comparing the full HOOS survey with an abbreviated form, HOOS Jr, in a cohort who underwent primary unilateral THA for osteoarthritis at a single medical center. The results of the abbreviated form correlated well with the longer instrument. --> This study supports the use of a 6 question abbreviated version emphasising pain and activities of daily living as a substitute of the longer 40 question survey.
5	I / A / 1	Documentation of Disability; HOOS/KOOS	Lyman S, Lee YY, Franklin PD, Li W, Cross MB, Padgett DE. Validation of the KOOS, JR: A Short-form Knee Arthroplasty Outcomes Survey. Clin Orthop Relat Res. 2016 Jun;474(6):1461-71. doi: 10.1007/s11999-016-4719-1. Epub 2016 Feb 29. PMID: 26926773	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Medicare is rapidly moving toward using patient-reported outcome measures (PROMs) for outcomes assessment and justification of orthopaedic and other procedures. Numerous measures have been developed to study knee osteoarthritis (OA); however, many of these surveys are long, disruptive to clinic flow, and result in incomplete data capture and/or low followup rates. The Knee injury and Osteoarthritis Outcome (KOOS) physical function short-form (KOOS-PS), while shorter, ignores pain, which is a primary concern of patients with advanced knee OA. QUESTIONS/PURPOSES: Our objective was to derive and validate a short-form survey focused on the patient with end-stage knee OA undergoing TKA. METHODS: Using our hospital's knee replacement registry, we retrospectively identified 2291 patients with knee OA who underwent primary unilateral TKA and had completed preoperative and 2-year postoperative PROMs. We assessed 30 items from the 42-item KOOS that were quantitatively most difficult for patients to perform before TKA and qualitatively most relevant to patients with end-stage knee OA. Rasch analysis identified the KOOS, JR, a seven-item instrument, representing a single dimension, which we define as "knee health" because it reflects aspects of pain, symptom severity, and activities of daily living (ADL) including movements or activities that are directly relevant and difficult for patients with advanced knee OA. We assessed the internal consistency, external validity (versus KOOS and WOMAC domains), responsiveness, and floor and ceiling effects of the KOOS, JR. External validation was performed using calculated KOOS, JR scores in collaboration with a nationally representative joint replacement registry, the Function and Outcomes Research for Comparative Effectiveness in Total Joint Replacement (FORCE-TJR). RESULTS: Internal consistency for the KOOS, JR was high (Person Separation Index, 0.84; and 0.85 [FORCE]), external validity against other validated knee surveys	This is a retrospective validity study comparing the full KOOS survey with an abbreviated form, KOOS Jr, in a cohort who THK for osteoarthritis at a single medical center. The results of the abbreviated form correlated well with the longer instrument. --> This study supports the use of a 7 question abbreviated version emphasising pain and activities of daily living as a substitute of the longer 42 question survey.

6	I / A/2	PROMIS-10/Patient Reported Outcomes	Cella D, Riley W, Stone A, Rothrock N, Reeve B, Yount S, Amtmann D, Bode R, Buysse D, Choi S, Cook K, Devellis R, DeWalt D, Fries JF, Gershon R, Hahn EA, Lai JS, Pilkonis P, Revicki D, Rose M, Weinfurt K, Hays R; PROMIS Cooperative Group. The Patient-Reported Outcomes Measurement Information System (PROMIS) developed and tested its first wave of adult self-reported health outcome item banks: 2005-2008. J Clin Epidemiol. 2010 Nov;63(11):1179-94. PMID: 20685078	1/B	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2965562/	OBJECTIVES: Patient-reported outcomes (PROs) are essential when evaluating many new treatments in health care; yet, current measures have been limited by a lack of precision, standardization, and comparability of scores across studies and diseases. The Patient-Reported Outcomes Measurement Information System (PROMIS) provides item banks that offer the potential for efficient (minimizes item number without compromising reliability), flexible (enables optional use of interchangeable items), and precise (has minimal error in estimate) measurement of commonly studied PROs. We report results from the first large-scale testing of PROMIS items. STUDY DESIGN AND SETTING: Fourteen item pools were tested in the U.S. general population and clinical groups using an online panel and clinic recruitment. A scale-setting subsample was created reflecting demographics proportional to the 2000 U.S. census. RESULTS: Using item-response theory (graded response model), 11 item banks were calibrated on a sample of 21,133, measuring components of self-reported physical, mental, and social health, along with a 10-item Global Health Scale. Short forms from each bank were developed and compared with the overall bank and with other well-validated and widely accepted ("legacy") measures. All item banks demonstrated good reliability across most of the score distributions. Construct validity was supported by moderate to strong correlations with legacy measures. CONCLUSION: PROMIS item banks and their short forms provide evidence that they are reliable and precise measures of generic symptoms and functional reports comparable to legacy instruments. Further testing will continue to validate and test PROMIS items and banks in diverse clinical populations.	Validation study comparing PROMIS methods to validated, existing measures of self reported physical, mental, and social health with good reliability. Test cohort reflected demographics proportional to US population, not individual subsets of population. --> Validates the PROMIS tool to measure patient-related outcomes.
7	I / A / 3	Lower Extremity Activity Scale	Saleh KJ, Mulhall KJ, Bershadsky B, Ghomrawi HM, White LE, Buyea CM, Krackow KA. Development and validation of a lower-extremity activity scale. Use for patients treated with revision total knee arthroplasty. J Bone Joint Surg Am. 2005 Sep;87(9):1985-94. PMID: 16140813	2/B	Please contact your local Library to obtain a copy of this article.	BACKGROUND: Valid outcome measurement tools are required to reliably demonstrate the effectiveness and clinical outcomes of lower-extremity arthroplasty. Having ascertained a lack of a practical and valid measure of the change in actual daily physical activity that occurs prior to and following lower-limb arthroplasty, we developed and validated a lower-extremity activity scale. METHODS: The eighteen-level self-administered scale was developed with the aid of content experts to ensure face validity. Validity and reliability were assessed with the use of (1) pedometer measurements of seventy subjects over seven days; (2) next-of-kin proxy measurements of the activity levels of ninety patients before they underwent lower-limb arthroplasty; and (3) application, and correlation with the Western Ontario and McMaster Universities Osteoarthritis Index scores, in a prospective seventeen-center clinical study of 297 consecutive patients undergoing revision total knee arthroplasty. In this latter study, demographic and comorbidity data were also collected. Univariate and bivariate correlations were performed, and a multivariate structured equation modeling approach was used to further test responsiveness, reliability, and validity of the lower-extremity activity scale. RESULTS: Pedometer readings correlated with the activity levels derived with the lower-extremity activity scale (r = 0.79). Of note was the finding that age, weight, and body mass index did not correlate well with the average number of steps per day (r = -0.32, -0.32, and -0.25, respectively). A significant correlation was found between the lower-extremity activity scores recorded by the patients and those reported by their next of kin (Pearson correlation, r = 0.715; p = 0.0001) and between the initial lower-extremity activity scores and two-week-retest scores (intraclass correlation = 0.9147; p < 0.0001), demonstrating the validity and reliability of the scale. The lower-extremity activity scale was responsive, accurately reflecting changes in the patient's	Single institution study of patients being evaluation for revision of total knee arthroplasty validating a 18 item questionaire for lower extremity activity with pedometer and assessments of activity by next of kin. --> Simple questionaire may be a useful adjunct to decision making in patients undergoing *revision* for total knee arthroplasty.
8	1 / A / 3	Numeric Pain Rating Scale	Ferreira-Valente MA, Pais-Ribeiro JL, Jensen MP. Validity of four pain intensity rating scales. Pain. 2011 Oct;152(10):2399-404. PMID: 21856077	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	The Visual Analogue Scale (VAS), Numerical Rating Scale (NRS), Verbal Rating Scale (VRS), and the Faces Pain Scale-Revised (FPS-R) are among the most commonly used measures of pain intensity in clinical and research settings. Although evidence supports their validity as measures of pain intensity, few studies have compared them with respect to the critical validity criteria of responsivity, and no experiment has directly compared all 4 measures in the same study. The current study compared the relative validity of VAS, NRS, VRS, and FPS-R for detecting differences in painful stimulus intensity and differences between men and women in response to experimentally induced pain. One hundred twenty-seven subjects underwent four 20-second cold pressor trials with temperature order counterbalanced across 1°C, 3°C, 5°C, and 7°C and rated pain intensity using all 4 scales. Results showed statistically significant differences in pain intensity between temperatures for each scale, with lower temperatures resulting in higher pain intensity. The order of responsivity was as follows: NRS, VAS, VRS, and FPS-R. However, there were relatively small differences in the responsivity between scales. A statistically significant sex main effect was also found for the NRS, VRS, and FPS-R. The findings are consistent with previous studies supporting the validity of each scale. The most support emerged for the NRS as being both (1) most responsive and (2) able to detect sex differences in pain intensity. The results also provide support for the validity of the scales for use in Portuguese samples.	Comparions of pain rating scales across four methods based on cold pressor trials. The Numerical Rating Scale was most responsive and sensitive to gender differences. --> Supports the conclusion that the Numerical Rating Scale was equivalent to other pain intensity rating scales.

9	I / B	Kellgren-Lawrence	Neogi T. Felson D. Niu J. Nevitt M. Lewis CE. Aliabadi P. Sack B. Torner J. Bradley L. Zhang Y. Association between radiographic features of knee osteoarthritis and pain: results from two cohort studies. BMJ. 339:b2844, 2009. PMID:19700505	1/A	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2730438/	OBJECTIVE: To examine the relation of radiographic features of osteoarthritis to knee pain in people with knees discordant for knee pain in two cohorts. DESIGN: Within person, knee matched, case-control study. SETTING AND PARTICIPANTS: Participants in the Multicenter Osteoarthritis (MOST) and Framingham Osteoarthritis studies who had knee radiographs and assessments of knee pain. MAIN OUTCOME MEASURES: Association of each pain measure (frequency, consistency, and severity) with radiographic osteoarthritis, as assessed by Kellgren and Lawrence grade (0-4) and osteophyte and joint space narrowing grades (0-3) among matched sets of two knees within individual participants whose knees were discordant for pain status. RESULTS: 696 people from MOST and 336 people from Framingham were included. Kellgren and Lawrence grades were strongly associated with frequent knee pain-for example, for Kellgren and Lawrence grade 4 v grade 0 the odds ratio for pain was 151 (95% confidence interval 43 to 526) in MOST and 73 (16 to 331) in Framingham (both P<0.001 for trend). Similar results were also seen for the relation of Kellgren and Lawrence scores to consistency and severity of knee pain. Joint space narrowing was more strongly associated with each pain measure than were osteophytes. CONCLUSIONS: Using a method that minimises between person confounding, this study found that radiographic osteoarthritis and individual radiographic features of osteoarthritis were strongly associated with knee pain.	A case control study correlating Kellgren-Lawrence grade on x-ray with pain for patients with osteoarthritis of the knee. --> Supports association between KL grade and symptomatic osteoarthritis
10	I / B	Kellgren-Lawrence	Reijman M. Hazes JM. Pols HA. Bernsen RM. Koes BW. Bierma-Zeinstra SM. Validity and reliability of three definitions of hip osteoarthritis: cross sectional and longitudinal approach. Annals of the Rheumatic Diseases. 63(11):1427-33, 2004 Nov. PMID: 15479891	2/B	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1754809/	OBJECTIVES: To compare the reliability and validity in a large open population of three frequently used radiological definitions of hip osteoarthritis (OA): Kellgren and Lawrence grade, minimal joint space (MJS), and Croft grade; and to investigate whether the validity of the three definitions of hip OA is sex dependent. METHODS: SUBJECTS: from the Rotterdam study (aged > or= 55 years, n = 3585) were evaluated. The inter-rater reliability was tested in a random set of 148 x rays. The validity was expressed as the ability to identify patients who show clinical symptoms of hip OA (construct validity) and as the ability to predict total hip replacement (THR) at follow up (predictive validity). RESULTS: Inter-rater reliability was similar for the Kellgren and Lawrence grade and MJS (kappa statistics 0.68 and 0.62, respectively) but lower for Croft's grade (kappa statistic, 0.51). The Kellgren and Lawrence grade and MJS showed the strongest associations with clinical symptoms of hip OA. Sex appeared to be an effect modifier for Kellgren and Lawrence and MJS definitions, women showing a stronger association between grading and symptoms than men. However, the sex dependency was attributed to differences in height between women and men. The Kellgren and Lawrence grade showed the highest predictive value for THR at follow up. CONCLUSIONS: Based on these findings, Kellgren and Lawrence still appears to be a useful OA definition for epidemiological studies focusing on the presence of hip OA.	Study compares three radiologic measures of hip osteoarthritis and clinical symptoms. --> Supports the utility of Kellgren-Lawrence grade on x-ray in assessing osteoarthritis of the hip.
11	I / B	Weight bearing radiograph	Rosenberg TD, Paulos LE, Parker RD, Coward DB, Scott SM. The forty-five-degree posteroanterior flexion weight-bearing radiograph of the knee. J Bone Joint Surg Am. 1988 Dec;70(10):1479-83. PMID: 3198672	2/B	Please contact your local Library to order a copy of this article.	Posteroanterior weight-bearing radiographs, made with the knee in 45 degrees of flexion, were compared with conventional radiographs for fifty-five patients who had surgical treatment for a lesion causing pain in one knee. Narrowing of the cartilage space of two millimeters or more was defined as indicative of major degeneration (grade III or IV). Comparison of the intraoperatively observed degeneration with the narrowing that was seen on the radiographs revealed that the posteroanterior weight-bearing radiographs that were made with the knee in 45 degrees of flexion were more accurate (p less than 0.01), more specific (no false-positives) (p less than 0.01), and more sensitive (fewer false-negatives) than the conventional extension weight-bearing anteroposterior radiographs.	This study of 55 patients undergoing arthroscopic surgery of the knee for pain relates conventional radiographs versus weight bearing radiographs with 45 degrees of flexion with visual findings of gross appearance cartilage change based on arthroscopy. Independent observer was blinded with respect to the method of xray examination prior to arthroscopy. Authors conclude that weight bearing films with 45 degrees of flexion were more accurate, specific, and sensitive than conventional xrays. --> This method of imaging does not replace standard xrays to diagnose osteoarthritis. The cohort did not include patients with arthroplasty for osteoarthritis and apparantly focused on arthroscopic surgery for meniscal disease. The study did not correlate pain or disability and degree of cartilage change. Authors do not recommend this imaging routinely but recommend its use in patients considered for meniscectomy.
12	I / C	Shared Decision Making	Arterburn D. Introducing decision aids at Group Health was linked to sharply lower hip and knee surgery rates and costs. Health Affairs, 2012, Sep; 31(9) 2094-104. PMID: 22949460	2/B	http://content.healthaffairs.org/content/31/9/2094.long	Decision aids are evidence-based sources of health information that can help patients make informed treatment decisions. However, little is known about how decision aids affect health care use when they are implemented outside of randomized controlled clinical trials. We conducted an observational study to examine the associations between introducing decision aids for hip and knee osteoarthritis and rates of joint replacement surgery and costs in a large health system in Washington State. Consistent with prior randomized trials, our introduction of decision aids was associated with 26 percent fewer hip replacement surgeries, 38 percent fewer knee replacements, and 12-21 percent lower costs over six months. These findings support the concept that patient decision aids for some health conditions, for which treatment decisions are highly sensitive to both patients' and physicians' preferences, may reduce rates of elective surgery and lower costs.	Observational study investigating the effect of use of a decision aid prior to arthroplasty in patients with osteoarthritis. --> Supports use of shared decision-making to avoid surgery that the patient with otherwise not choose.

13	I / D	Conservative Therapy	NICE CG177. Osteoarthritis: care and management. 2014	Tier-1 Source	https://www.nice.org.uk/guidance/cg177/chapter/1-Recommendations	Highly regarded British source of clinical recommendations based on robust evidence appraisal. Updated from citation above.	Update to NICE CG59 from 2008. --> Guide to conservative therapy for patients with osteoarthritis.
14	I / D	Conservative Therapy	Department of Veterans Affairs, Department of Defense. VA/DoD clinical practice guideline for the non-surgical management of hip and knee osteoarthritis.	Tier 1 source	http://www.healthquality.va.gov/guidelines/CD/OA/VADoDOACPGFINAL090214.pdf	Department of Defense publication: "The goal of this guideline is to assist primary care providers in developing a comprehensive care program for patients with OA in order to achieve maximum functionality and independence, as well as improve patient and family quality of life."	Federal agency guideline for non-surgical management of hip and knee osteoarthritis with good search and appraisal strategies. --> Broad clinical guideline
15	I / D /2	Conservative Therapy; Weight Loss	Christensen R, Bartels EM, Astrup A, Bliddal H. Effect of weight reduction in obese patients diagnosed with knee osteoarthritis:a systematic review and meta-analysis. Ann Rheum Dis. 2007 Apr; 66(4): 433-9. PMID: 17204567	2/B	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1856062/	This review aims to assess by meta-analysis of randomised controlled trials (RCTs) changes in pain and function when overweight patients with knee osteoarthritis (OA) achieve a weight loss. Systematic searches were performed and reference lists from the retrieved trials were searched. RCTs were enclosed in the systematic review if they explicitly stated diagnosis of knee OA and reported a weight change as the only difference in intervention from the control group. Outcome Measures for Arthritis Clinical Trials III outcome variables were considered for analysis. Effect size (ES) was calculated using RevMan, and meta-regression analyses were performed using weighted estimates from the random effects analyses. Among 35 potential trials identified, four RCTs including five intervention/control groups met our inclusion criteria and provided data from 454 patients. Pooled ES for pain and physical disability were 0.20 (95% CI 0 to 0.39) and 0.23 (0.04 to 0.42) at a weight reduction of 6.1 kg (4.7 to 7.6 kg). Meta-regression analysis showed that disability could be significantly improved when weight was reduced over 5.1%, or at the rate of >0.24% reduction per week. Clinical efficacy on pain reduction was present, although not predictable after weight loss. Meta-regression analysis indicated that physical disability of patients with knee OA and overweight diminished after a moderate weight reduction regime. The analysis supported that a weight loss of >5% should be achieved within a 20-week period--that is, 0.25% per week.	A meta analysis of 4 RCTs measured the effect of weight loss on pain and function related to osteoarthritis of the knee. --> Study supports that a weight loss of 5% or greater improves function. Effect on pain was less predictable.
16		Conservative Therapy; Weight Loss	American Academy of Orthopedic Surgeons. Treatment of osteoarthritis of the knee: evidence-based guideline, 2nd edition. Adopted by AAOS Board of Directors, 18 May 2013.	VM Tier-2 Source	http://www.aaos.org/research/guidelines/guidelineoaknee.asp	AAOS recommendation strength: "Moderate." "We suggest weight loss for patients with symptomatic osteoarthritis of the knee and a BMI ≥ 25." (see p. 19 Guideline)	Society guideline that includes broad recommendations for treatment of osteoarthritis of the knee. --> Supports weight loss as conservative therapy for patients with osteoarthritis of the knee.
17	I / D /2	Conservative Therapy; Physical Therapy; Exercise	Fransen M. McConnell S. Exercise for osteoarthritis of the knee. [Review] [116 refs]. Cochrane Database of Systematic Reviews. (4):CD004376, 2015. PMID: 25569281	1/A	http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004376.pub3/full	BACKGROUND: Knee osteoarthritis (OA) is a major public health issue because it causes chronic pain, reduces physical function and diminishes quality of life. Ageing of the population and increased global prevalence of obesity are anticipated to dramatically increase the prevalence of knee OA and its associated impairments. No cure for knee OA is known, but exercise therapy is among the dominant non-pharmacological interventions recommended by international guidelines. OBJECTIVES: To determine whether land-based therapeutic exercise is beneficial for people with knee OA in terms of reduced joint pain or improved physical function and quality of life. SEARCH METHODS: Five electronic databases were searched, up until May 2013. SELECTION CRITERIA: All randomised controlled trials (RCTs) randomly assigning individuals and comparing groups treated with some form of land-based therapeutic exercise (as opposed to exercise conducted in the water) with a non-exercise group or a non-treatment control group. DATA COLLECTION AND ANALYSIS: Three teams of two review authors independently extracted data, assessed risk of bias for each study and assessed the quality of the body of evidence for each outcome using the GRADE (Grades of Recommendation, Assessment, Development and Evaluation) approach. We conducted analyses on continuous outcomes (pain, physical function and quality of life) immediately after treatment and on dichotomous outcomes (proportion of study withdrawals) at the end of the study; we also conducted analyses on the sustained effects of exercise on pain and function (two to six months, and longer than six months). MAIN RESULTS: In total, we extracted data from 54 studies. Overall, 19 (20%) studies reported adequate random sequence generation and allocation concealment and adequately accounted for incomplete outcome data; we considered these studies to have an overall low risk of bias. Studies were largely free from selection bias, but research results may be vulnerable to performance and detection bias, as only four of the RCTs reported blinding of participants to treatment allocation, and, although most RCTs reported blinded outcome assessment, pain, physical function and quality of life were participant self-reported.High-quality evidence from 44 trials (3537 participants) indicates that exercise reduced pain (standardised mean difference (SMD) -0.49, 95% confidence interval (CI) -0.39 to -0.59) immediately after treatment. Pain was estimated at 44 points on a 0 to 100-point scale (0 indicated no pain) in the control group; exercise reduced pain by an equivalent of 12 points (95% CI 10 to 15 points). Moderate-quality evidence from 44 trials (3913 participants) showed that exercise improved physical function (SMD -0.52, 95% CI -0.39 to -0.64) immediately after treatment. Physical function was estimated at 38 points on a 0 to 100-point scale (0 indicated no loss of physical function) in the control group; exercise improved physical function by an equivalent of 10 points (95% CI 8 to 13 points). High-quality evidence from 13 studies (1073 participants) revealed that exercise improved quality of life (SMD 0.28, 95% CI 0.15 to 0.40) immediately after treatment. Quality of life was estimated at 43 points on a 0 to 100-point scale (100 indicated best quality of life) in the control group; exercise improved quality of life by an equivalent of 4 points (95% CI 2 to 5 points).High-quality evidence from 45	Replaces Cochrane Review (same title) from 2008. --> Supports exercise as conservative therapy for osteoarthritis of the knee.

18	I / D /2	Conservative Therapy; Physical Therapy; Exercise	Fransen M. McConnell S. Exercise for osteoarthritis of the hip. [Review]. Cochrane Database of Systematic Reviews. 2014 Apr 22; (4):CD007912. PMID: 24756895	1/A	http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007912.pub2/full	BACKGROUND: Current international treatment guidelines recommending therapeutic exercise for people with symptomatic hip osteoarthritis (OA) report are based on limited evidence. OBJECTIVES: To determine whether land-based therapeutic exercise is beneficial for people with hip OA in terms of reduced joint pain and improved physical function and quality of life. SEARCH METHODS: We searched five databases from inception up to February 2013. SELECTION CRITERIA: All randomised controlled trials (RCTs) recruiting people with hip OA and comparing some form of land-based therapeutic exercise (as opposed to exercises conducted in water) with a non-exercise group. DATA COLLECTION AND ANALYSIS: Four review authors independently selected studies for inclusion. We resolved disagreements through consensus. Two review authors independently extracted data, assessed risk of bias and the quality of the body of evidence for each outcome using the GRADE approach. We conducted analyses on continuous outcomes (pain, physical function and quality of life) and dichotomous outcomes (proportion of study withdrawals). MAIN RESULTS: We considered that seven of the 10 included RCTs had a low risk of bias. However, the results may be vulnerable to performance and detection bias as none of the RCTs were able to blind participants to treatment allocation and, while most RCTs reported blinded outcome assessment, pain, physical function and quality of life were participant self reported. One of the 10 RCTs was only reported as a conference abstract and did not provide sufficient data for the evaluation of bias risk.High-quality evidence from nine trials (549 participants) indicated that exercise reduced pain (standardised mean difference (SMD) -0.38, 95% confidence interval (CI) -0.55 to -0.20) and improved physical function (SMD -0.38, 95% CI -0.54 to -0.05) immediately after treatment. Pain and physical function were estimated to be 29 points on a 0- to 100-point scale (0 was no pain or loss of physical function) in the control group; exercise reduced pain by an equivalent of 8 points (95% CI 4 to 11 points; number needed to treat for an additional beneficial outcome (NNTB) 6) and improved physical function by an equivalent of 7 points (95% CI 1 to 12 points; NNTB 6). Only three small studies (183 participants) evaluated quality of life, with overall low quality evidence, with no benefit of exercise demonstrated (SMD -0.07, 95% CI -0.23 to 0.36). Quality of life was estimated to be 50 points on a norm-based mean (standard deviation (SD)) score of 50 (10) in the general population in the control group; exercise improved quality of life by 0 points. Moderate-quality evidence from seven trials (715 participants) indicated an increased likelihood of withdrawal from the exercise allocation (event rate 6%) compared with the control group (event rate 3%), but this difference was not significant (risk difference 1%; 95% CI -1% to 4%). Of the five studies reporting adverse events, each study reported only one or two events and all were related to increased pain attributed to the exercise programme.The reduction in pain was sustained at least three to six months after ceasing monitored treatment (five RCTs, 391 participants): pain (SMD -0.38, 95% CI -0.58 to -0.18). Pain was estimated to be 29 points on a 0- to 100-point scale (0 was no	Replaces Cochrane Review (same title) from 2009. -->Supports exercise as conservative therapy for osteoarthritis of the hip.
19	I / D /2	Conservative Therapy; Physical Therapy; Exercise	American Academy of Orthopedic Surgeons. Treatment of osteoarthritis of the knee: evidence-based guideline, 2nd edition. Adopted by AAOS Board of Directors, 18 May 2013.	VM Tier-2 Source	http://www.aaos.org/research/guidelines/guidelineoaknee.asp	AAOS recommendation strength: "Strong;" "We recommend that patients with symptomatic osteoarthritis of the knee participate in self-management programs, strengthening, low-impact aerobic exercises, and neuromuscular education; and engage in physical activity consistent with national guidelines." (see p. 19 Guideline)	Society guideline --> Supports strengthening exercise and physical therapy as conservative therapy for osteoarthritis of the knee.
20	I / D /2	Conservative Therapy; Exercise	Roddy E. et.al. Aerobic walking or strethening exercise for osteoarthritis: a systematic review. Ann Rheurm Dis, 2005 Apr; 64(4): 544-8. PMID: 15769914	1/A	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1755453/pdf/v064p00544.pdf	OBJECTIVE: To compare the efficacy of aerobic walking and home based quadriceps strengthening exercises in patients with knee osteoarthritis. METHODS: The Medline, Pubmed, EMBASE, CINAHL, and PEDro databases and the Cochrane controlled trials register were searched for randomised controlled trials (RCTs) of subjects with knee osteoarthritis comparing aerobic walking or home based quadriceps strengthening exercise with a non-exercise control group. Methodological quality of retrieved RCTs was assessed. Outcome data were abstracted for pain and self reported disability and the effect size calculated for each outcome. RCTs were grouped according to exercise mode and the data pooled using both fixed and random effects models. RESULTS: 35 RCTs were identified, 13 of which met inclusion criteria and provided data suitable for further analysis. Pooled effect sizes for pain were 0.52 for aerobic walking and 0.39 for quadriceps strengthening. For self reported disability, pooled effect sizes were 0.46 for aerobic walking and 0.32 for quadriceps strengthening. CONCLUSIONS: Both aerobic walking and home based quadriceps strengthening exercise reduce pain and disability from knee osteoarthritis but no difference between them was found on indirect comparison.	A meta analysis of 13 RCTs comparing aerobic walking or quadriceps strengthening exercises with controls. --> Strongly supports home-based aerobic or strengthening exercises to reduce pain in patients with osteoarthritis of the knee.
21	I / D /2	Conservative Therapy; Assistive Devices	Jones A, et.al. Impact of cane use on pain, function, general health and energy during gait in patients with knee osteoarthrtiis: a randomised controle trial. Ann Rheum Dis, 2012 Fe; 71(2): 172-9. PMID: 22128081	2/B	http://ard.bmj.com/content/71/2/172.full.pdf+html	OBJECTIVE: To assess the impact of daily cane use during gait in relation to pain, function, general health and energy expenditure among patients with knee osteoarthritis. METHOD: Sixty-four patients were randomly assigned to an experimental group (EG) or control group (CG). The EG used a cane every day for 2 months, whereas the CG did not use a cane in this period. The first outcome was pain and the second were function (Lequesne and WOMAC), general health (SF-36) and energy expenditure (gas analysis during the 6-minute walk test (6MWT) with and without a cane). Evaluations were performed at baseline, 30 and 60 days. RESULTS: The groups were homogeneous for all parameters at baseline. Compared with the CG, the EG significantly improved pain (ES 0.18), function - Lequesne (ES 0.13), some domains of SF-36 (role physical, ES 0.07 and bodily pain, ES 0.08) and distance on the 6MWT with the cane (ES 0.16). At the end of the 6MWT with the cane, the EG significantly improved energy expenditure (ES 0.21), carbon dioxide production (ES 0.12) and metabolic equivalents (ES 0.15) compared with the CG. CONCLUSION: A cane can be used to diminish pain, improve function and some aspects of quality of life in patients with knee osteoarthritis. The prescription of a cane should take into account the substantial increase in energy expenditure in the first month of use, whereas energy expenditure is no longer a factor for concern by the end of the second month due to adaptation to cane use. The trial was registered in clinicaltrials.gov (NCT00698412	An RCT of 64 patients with osteoarthritis of the knee comparing improvement in pain and function with or without the use of a cane. --> Supports use of cane to reduce pain and improve exercise performance in patients with osteoarthritis of the knee.
22	I / D /2	Conservative Therapy; Bracing	American Academy of Orthopedic Surgeons. Treatment of osteoarthritis of the knee: evidence-based guideline, 2nd edition. Adopted by AAOS Board of Directors, 18 May 2013.	VM Tier-2 Source	http://www.aaos.org/research/guidelines/guidelineoaknee.asp	AAOS recommendation strength: "Inconclusive." "We cannot recommend for or against." (see p. 19 Guideline)	Society guideline --> Evidence neither supports nor refutes use of bracing for patients with osteoarthritis of the knee.

23	I / D /2	Inappropriate Nonsurgical Care	Bedard NA, Dowdle SB, Anthony CA, DeMik DE, McHugh MA, Bozic KJ, Callaghan JJ. The AAHKS Clinical Research Award: What Are the Costs of Knee Osteoarthritis in the Year Prior to Total Knee Arthroplasty? J Arthroplasty. 2017 Sep;32(9S):S8-S10.e1. PMID: 28209276	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Despite American Academy of Orthopaedic Surgeons Clinical Practice Guidelines (CPGs) related to the non-arthroplasty management of osteoarthritis (OA) of the knee, non-recommended treatments remain in common use. We sought to determine the costs associated with non-arthroplasty management of knee OA in the year prior to total knee arthroplasty (TKA) and stratify them by CPG recommendation status. METHODS: The Humana database was reviewed from 2007 to 2015 for primary TKA patients. Costs for hyaluronic acid (HA) and corticosteroid injections, physical therapy, braces, wedge insoles, opioids, non-steroidal anti-inflammatories, and tramadol in the year prior to TKA were calculated. Cost was defined as reimbursement paid by the insurance provider. Costs were analyzed relative to the overall non-inpatient costs for knee OA and categorized based on CPG recommendations. RESULTS: In total 86,081 primary TKA patients were analyzed and 65.8% had at least one treatment in the year prior to TKA. Treatments analyzed made up 57.6% of the total non-inpatient cost of knee OA in the year prior to TKA. Only 3 of the 8 treatments studied have a strong recommendation for their use (physical therapy, non-steroidal anti-inflammatories, tramadol) and costs for these interventions represented 12.2% of non-inpatient knee OA cost. In contrast, 29.3% of the costs are due to HA injections alone, which are not supported by CPGs. CONCLUSION: In the year prior to TKA, over half of the non-inpatient costs associated with knee OA are from injections, therapy, prosthetics, and prescriptions. Approximately 30% of this is due to HA injections alone. If only interventions recommend by the CPG are utilized then costs associated with knee OA could be decreased by 45%.	A claims-based, retrospective cohort study of 86,081 patients undergoing primary total knee replacement, comparing recommended non-surgical therapies against specialty society guidelines. Substantial portion of interventions departed from the guideline. --> Authors conclude that "If only interventions recommend by the CPG are utilized then costs associated with knee OA could be decreased by 45%."
24	I / D /3	Conservative Therapy; Medications; NSAIDs vs. Acetaminophen	Machado GC, Maher CG, Ferreira PH, Pinheiro MB, Lin CW, Day RO, McLachlan AJ, Ferreira ML. Efficacy and safety of paracetamol for spinal pain and osteoarthritis: systematic review and meta-analysis of randomised placebo controlled trials. BMJ. 2015 Mar 31;350:h1225. PMID: 25828856	1/A	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4381278/	OBJECTIVE: To investigate the efficacy and safety of paracetamol (acetaminophen) in the management of spinal pain and osteoarthritis of the hip or knee. DESIGN: Systematic review and meta-analysis. DATA SOURCES: Medline, Embase, AMED, CINAHL, Web of Science, LILACS, International Pharmaceutical Abstracts, and Cochrane Central Register of Controlled Trials from inception to December 2014. ELIGIBILITY CRITERIA FOR SELECTING STUDIES: Randomised controlled trials comparing the efficacy and safety of paracetamol with placebo for spinal pain (neck or low back pain) and osteoarthritis of the hip or knee. DATA EXTRACTION: Two independent reviewers extracted data on pain, disability, and quality of life. Secondary outcomes were adverse effects, patient adherence, and use of rescue medication. Pain and disability scores were converted to a scale of 0 (no pain or disability) to 100 (worst possible pain or disability). We calculated weighted mean differences or risk ratios and 95% confidence intervals using a random effects model. The Cochrane Collaboration's tool was used for assessing risk of bias, and the GRADE approach was used to evaluate the quality of evidence and summarise conclusions. RESULTS: 12 reports (13 randomised trials) were included. There was "high quality" evidence that paracetamol is ineffective for reducing pain intensity (weighted mean difference -0.5, 95% confidence interval -2.9 to 1.9) and disability (0.4, -1.7 to 2.5) or improving quality of life (0.4, -0.9 to 1.7) in the short term in people with low back pain. For hip or knee osteoarthritis there was "high quality" evidence that paracetamol provides a significant, although not clinically important, effect on pain (-3.7, -5.5 to -1.9) and disability (-2.9, -4.9 to -0.9) in the short term. The number of patients reporting any adverse event (risk ratio 1.0, 95% confidence interval 0.9 to 1.1), any serious adverse event (1.2, 0.7 to 2.1), or withdrawn from the study because of adverse events (1.2, 0.9 to 1.5) was similar in the paracetamol and placebo groups. Patient adherence to treatment (1.0, 0.9 to 1.1) and use of rescue medication (0.7, 0.4 to 1.3) was also similar between groups. "High quality" evidence showed that patients taking paracetamol are nearly four times more likely to have abnormal results on liver function tests (3.8, 1.9 to 7.4), but the clinical importance of this effect is uncertain. CONCLUSIONS: Paracetamol is ineffective in the treatment of low back pain and provides minimal short term benefit for people with osteoarthritis. These results support the reconsideration of recommendations to use paracetamol for patients with low back pain and osteoarthritis of the hip or knee in clinical practice guidelines. SYSTEMATIC REVIEW REGISTRATION: PROSPERO registration number CRD42013006367.	Systematic review/meta analysis of 13 randomized trials finding that "there is 'high quality' evidence that paracetamol has a significant but small effect in patients with hip or knee osteoarthritis compared with placebo in the short term." Abnormal liver function tests are four times more common in patients taking paracetamol (acetaminophen). --> Study suggests minimal benefit in terms of pain and disablilty from paracetamol (acetaminophen) in patients with osteoarthritis.

25	I / D /3	Conservative Therapy; Medications; NSAIDs vs. Acetaminophen	Towheed TE, Maxwell L, Judd MG, Catton M, Hochberg MC, Wells G. Acetaminophen for osteoarthritis. Cochrane Database Syst Rev. 2006 Jan 25;(1):CD004257. PMID: 16437479	1/B	http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004257.pub2/abstract;jsessionid=261B8647DFA440D4A83FE45823A2853D.f03t04	BACKGROUND: Osteoarthritis (OA) is the most common form of arthritis. Published guidelines and expert opinion are divided over the relative role of acetaminophen (also called paracetamol or Tylenol) and non-steroidal anti-inflammatory drugs (NSAIDs) as first-line pharmacologic therapy. The comparative safety of acetaminophen and NSAIDs is also important to consider. This update to the original 2003 review includes nine additional RCTs. OBJECTIVES: To assess the efficacy and safety of acetaminophen versus placebo and versus NSAIDs (ibuprofen, diclofenac, arthrotec, celecoxib, naproxen, rofecoxib) for treating OA. SEARCH STRATEGY: We searched MEDLINE (up to July 2005), EMBASE (2002-July 2005), Cochrane Central Register of Controlled Trials (CENTRAL), ACP Journal Club, DARE, Cochrane Database of Systematic Reviews (all from 1994 to July 2005). Reference lists of identified RCTs and pertinent review articles were also hand searched. SELECTION CRITERIA: Published randomized controlled trials (RCTs) evaluating the efficacy and safety of acetaminophen alone in OA were considered for inclusion. DATA COLLECTION AND ANALYSIS: Pain, physical function and global assessment outcomes were reported. Results for continuous outcome measures were expressed as standardized mean differences (SMD). Dichotomous outcome measures were pooled using relative risk (RR) and the number needed to treat (NNT) was calculated. MAIN RESULTS: Fifteen RCTs involving 5986 participants were included in this review. Seven RCTs compared acetaminophen to placebo and ten RCTs compared acetaminophen to NSAIDs. In the placebo-controlled RCTs, acetaminophen was superior to placebo in five of the seven RCTs and had a similar safety profile. Compared to placebo, a pooled analysis of five trials of overall pain using multiple methods demonstrated a statistically significant reduction in pain (SMD -0.13, 95% CI -0.22 to -0.04), which is of questionable clinical significance. The relative percent improvement from baseline was 5% with an absolute change of 4 points on a 0 to 100 scale. The NNT to achieve an improvement in pain ranged from 4 to 16. In the comparator-controlled RCTs, acetaminophen was less effective overall than NSAIDs in terms of pain reduction, global assessments and in terms of improvements in functional status. No significant difference was found overall between the safety of acetaminophen and NSAIDs, although patients taking traditional NSAIDS were more likely to experience an adverse GI event (RR 1.47, (95% CI 1.08 to 2.00). 19% of patients in the traditional NSAID group versus 13% in the acetaminophen group experienced an adverse GI event. However, the median trial duration was only 6 weeks and it is difficult to assess adverse outcomes in a relatively short time period. AUTHORS' CONCLUSIONS: The evidence to date suggests that NSAIDs are superior to acetaminophen for improving knee and hip pain in people with OA. The size of the treatment effect was modest, and the median trial duration was only six weeks, therefore, additional considerations need to be factored in when making the decision between using acetaminophen or NSAIDs. In OA subjects with moderate-to-severe levels of pain, NSAIDs appear to be more effective than acetaminophen.	A systematic review from Cochrane comparing efficacy and safety of acetaminophen versus placebo and NSAIDs in patients with knee or hip pain. Median trial duration was 6 weeks. Data suggests NSAIDs were superior to acetaminophen for improving pain. Patients taking traditional NSAIDs were more likely to experience adverse GI events with NSAIDs versus acetominophen. --> Favors NSAIDs over acetaminophen for control of pain in patients with osteoarthritis. Also notes GI side effects with NSAIDs.
26	I / D /3	Conservative Therapy; Acetaminophen	American Academy of Orthopedic Surgeons. Treatment of osteoarthritis of the knee: evidence-based guideline, 2nd edition. Adopted by AAOS Board of Directors, 18 May 2013.	VM Tier-2 Source	http://www.aaos.org/research/guidelines/guidelineoaknee.asp	American Academy of Orthopedic Surgeons recommendation strength: "Inconclusive." "We are unable to recommend for or against the use of acetaminophen, opioids, or pain patches for patients with symptomatic osteoarthritis of the knee." (see p. 19 Guideline)	Society guideline --> Neither supports nor refutes the use of acetaminophen for pain in patients with osteoarthritis of the knee.
27	I / D /3	Conservative Therapy; Medications; Oral NSAIDs	Bjordal JM. Ljunggren AE. Klovning A. Slordal L. Non-steroidal anti-inflammatory drugs, including cyclo-oxygenase-2 inhibitors, in osteoarthritic knee pain: meta-analysis of randomised placebo controlled trials. [Review] [62 refs]. BMJ. 329(7478):1317, 2004 Dec 4. PMID: 15561731	2/B	http://www.bmj.com/content/329/7478/1317.pdf%2Bhtml	Abstract: OBJECTIVE: To estimate the analgesic efficacy of non-steroidal anti-inflammatory drugs (NSAIDs), including selective cyclo-oxygenase-2 inhibitors (coxibs), in patients with osteoarthritis of the knee. DESIGN: Systematic review and meta-analysis of randomised placebo controlled trials. STUDIES REVIEWED: 23 trials including 10 845 patients, median age of 62.5 years. 7807 patients received adequate doses of NSAIDs and 3038 received placebo. The mean weighted baseline pain score was 64.2 mm on 100 mm visual analogue scale (VAS), and average duration of symptoms was 8.2 years. MAIN OUTCOME MEASURE: Change in overall intensity of pain. RESULTS: Methodological quality of trials was acceptable, but 13 trials excluded patients before randomisation if they did not respond to NSAIDs. One trial provided long term data for pain that showed no significant effect of NSAIDs compared with placebo at one to four years. The pooled difference for pain on visual analogue scale in all included trials was 10.1 mm (95% confidence interval 7.4 to 12.8) or 15.6% better than placebo after 2-13 weeks. The results were heterogeneous, and the effect size for pain reduction was 0.32 (0.24 to 0.39) in a random effects model. In 10 trials that did not exclude non-responders to NSAID treatment the results were homogeneous, with an effect size for pain reduction of 0.23 (0.15 to 0.31). CONCLUSION: NSAIDs can reduce short term pain in osteoarthritis of the knee slightly better than placebo, but the current analysis does not support long term use of NSAIDs for this condition. As serious adverse effects are associated with oral NSAIDs, only limited use can be recommended. [References: 62]	A meta analysis of 23 RCTs of patients with osteoarthritis of the knee comparing NSAIDs to placebo in controlling pain. --> Recommends limited use of NSAIDs for pain relief for patients with osteoarthritis of the knee.
28	I / D /3	Conservative Therapy; NSAIDs	American Academy of Orthopedic Surgeons. Treatment of osteoarthritis of the knee: evidence-based guideline, 2nd edition. Adopted by AAOS Board of Directors, 18 May 2013.	VM Tier-2 Source	http://www.aaos.org/research/guidelines/guidelineoaknee.asp	AAOS recommendation strength: "Strong." "We recommend nonsteroidal anti-inflammatory drugs (NSAIDs; oral or topical) or Tramadol for patients with symptomatic osteoarthritis of the knee." (see p. 19 Guideline)	Society guideline --> Favors use of oral or topical NSAIDs for pain relief for patients with osteoarthritis of the knee.

29	I / D /3	Conservative Therapy; NSAIDs	da Costa BR, Reichenbach S, Keller N, Nartey L, Wandel S, Jüni P, Trelle S. Effectiveness of non-steroidal anti-inflammatory drugs for the treatment of pain in knee and hip osteoarthritis: a network meta-analysis. Lancet. 2016 May 21;387(10033):2093-105. Epub 2016 Mar 18. PMID: 26997557	1/A	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Non-steroidal anti-inflammatory drugs (NSAIDs) are the backbone of osteoarthritis pain management. We aimed to assess the effectiveness of different preparations and doses of NSAIDs on osteoarthritis pain in a network meta-analysis. METHODS: For this network meta-analysis, we considered randomised trials comparing any of the following interventions: NSAIDs, paracetamol, or placebo, for the treatment of osteoarthritis pain. We searched the Cochrane Central Register of Controlled Trials (CENTRAL) and the reference lists of relevant articles for trials published between Jan 1, 1980, and Feb 24, 2015, with at least 100 patients per group. The prespecified primary and secondary outcomes were pain and physical function, and were extracted in duplicate for up to seven timepoints after the start of treatment. We used an extension of multivariable Bayesian random effects models for mixed multiple treatment comparisons with a random effect at the level of trials. For the primary analysis, a random walk of first order was used to account for multiple follow-up outcome data within a trial. Preparations that used different total daily dose were considered separately in the analysis. To assess a potential dose-response relation, we used preparation-specific covariates assuming linearity on log relative dose. FINDINGS: We identified 8973 manuscripts from our search, of which 74 randomised trials with a total of 58,556 patients were included in this analysis. 23 nodes concerning seven different NSAIDs or paracetamol with specific daily dose of administration or placebo were considered. All preparations, irrespective of dose, improved point estimates of pain symptoms when compared with placebo. For six interventions (diclofenac 150 mg/day, etoricoxib 30 mg/day, 60 mg/day, and 90 mg/day, and rofecoxib 25 mg/day and 50 mg/day), the probability that the difference to placebo is at or below a prespecified minimum clinically important effect for pain reduction (effect size [ES] -0·37) was at least 95%. Among maximally approved daily doses, diclofenac 150 mg/day (ES -0·57, 95% credibility interval [CrI] -0·69 to -0·46) and etoricoxib 60 mg/day (ES -0·58, -0·73 to -0·43) had the highest probability to be the best intervention, both with 100% probability to reach the minimum clinically important difference. Treatment effects increased as drug dose increased, but corresponding tests for a linear dose effect were significant only for celecoxib (p=0·030), diclofenac (p=0·031), and naproxen (p=0·026). We found no evidence that treatment effects varied over the duration of treatment. Model fit was good, and between-trial heterogeneity and inconsistency were low in all analyses. All trials were deemed to have a low risk of bias for blinding of patients. Effect estimates did not change in sensitivity analyses with two additional statistical models and accounting for methodological quality criteria in meta-regression analysis. INTERPRETATION: On the basis of the available data, we see no role for single-agent paracetamol for the treatment of patients with osteoarthritis irrespective of dose. We provide sound evidence that diclofenac 150 mg/day is the most effective NSAID available at present, in terms of improving both pain and function. Nevertheless, in view of the safety profile of these drugs, physicians need to consider our results together with all known safety information when selecting the preparation and dose for individual patients.	Meta analysis of 74 carefully selected randomized trials including over 58000 patients. Search methodology complete. Studies included in meta analysis were 3 months or less in duration. --> Study identified no benefit from paracetamol. Diclofenac found to be the most effective NSAID. Authors caution on adverse reactions associate with NSAIDs.
30	I / D /3	Oral NSAID	Arfè A, Scotti L, Varas-Lorenzo C, Nicotra F, Zambon A, Kollhorst B, Schink T, Garbe E, Herings R, Straatman H, Schade R, Villa M, Lucchi S, Valkhoff V, Romio S, Thiessard F, Schuemie M, Pariente A, Sturkenboom M, Corrao G; Safety of Non-steroidal Anti-inflammatory Drugs (SOS) Project Consortium. Non-steroidal anti-inflammatory drugs and risk of heart failure in four European countries: nested case-control study. BMJ. 2016 Sep 28;354:i4857. PMID: 27682515	2/B	http://www.bmj.com/content/354/bmj.i4857.long	OBJECTIVES: To investigate the cardiovascular safety of non-steroidal anti-inflammatory drugs (NSAIDs) and estimate the risk of hospital admission for heart failure with use of individual NSAIDs. DESIGN: Nested case-control study. SETTING: Five population based healthcare databases from four European countries (the Netherlands, Italy, Germany, and the United Kingdom). PARTICIPANTS: Adult individuals (age ≥18 years) who started NSAID treatment in 2000-10. Overall, 92 163 hospital admissions for heart failure were identified and matched with 8 246 403 controls (matched via risk set sampling according to age, sex, year of cohort entry). MAIN OUTCOME MEASURE: Association between risk of hospital admission for heart failure and use of 27 individual NSAIDs, including 23 traditional NSAIDs and four selective COX 2 inhibitors. Associations were assessed by multivariable conditional logistic regression models. The dose-response relation between NSAID use and heart failure risk was also assessed. RESULTS: Current use of any NSAID (use in preceding 14 days) was found to be associated with a 19% increase of risk of hospital admission for heart failure (adjusted odds ratio 1.19; 95% confidence interval 1.17 to 1.22), compared with past use of any NSAIDs (use >183 days in the past). Risk of admission for heart failure increased for seven traditional NSAIDs (diclofenac, ibuprofen, indomethacin, ketorolac, naproxen, nimesulide, and piroxicam) and two COX 2 inhibitors (etoricoxib and rofecoxib). Odds ratios ranged from 1.16 (95% confidence interval 1.07 to 1.27) for naproxen to 1.83 (1.66 to 2.02) for ketorolac. Risk of heart failure doubled for diclofenac, etoricoxib, indomethacin, piroxicam, and rofecoxib used at very high doses (≥2 defined daily dose equivalents), although some confidence intervals were wide. Even medium doses (0.9-1.2 defined daily dose equivalents) of indomethacin and etoricoxib were associated with increased risk. There was no evidence that celecoxib increased the risk of admission for heart failure at commonly used doses. CONCLUSIONS: The risk of hospital admission for heart failure associated with current use of NSAIDs appears to vary between individual NSAIDs, and this effect is dose dependent. This risk is associated with the use of a large number of individual NSAIDs reported by this study, which could help to inform both clinicians and health regulators.	Case control study assessing the association between use of a variety of NSAIDs and hospital admission for heart failure. "Associations were assessed by multivariable conditional logistic regression models. The dose-response relation between NSAID use and heart failure risk was also assessed." --> Most NSAIDs are assoicated with congestive heart failure. "There was no evidence that celecoxib increased the risk of admission for heart failure at commonly used doses."

31	I / D /3	Conservative Therapy, Oral medications	Bannuru RR, Schmid CH, Kent DM, Vaysbrot EE, Wong JB, McAlindon TE. Comparative effectiveness of pharmacologic interventions for knee osteoarthritis: a systematic review and network meta-analysis. Ann Intern Med. 2015 Jan 6;162(1):46-54. doi: 10.7326/M14-1231. PMID: 25560713	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: The relative efficacy of available treatments of knee osteoarthritis (OA) must be determined for rational treatment algorithms to be formulated.PURPOSE: To examine the efficacy of treatments of primary knee OA using a network meta-analysis design, which estimates relative effects of all treatments against each other. DATA SOURCES: MEDLINE, EMBASE, Web of Science, Google Scholar, Cochrane Central Register of Controlled Trials from inception through 15 August 2014, and unpublished data. STUDY SELECTION: Randomized trials of adults with knee OA comparing 2 or more of the following: acetaminophen, diclofenac, ibuprofen, naproxen, celecoxib, intra-articular (IA) corticosteroids, IA hyaluronic acid, oral placebo, and IA placebo. DATA EXTRACTION: Two reviewers independently abstracted study data and assessed study quality. Standardized mean differences were calculated for pain, function, and stiffness at 3-month follow-up. DATA SYNTHESIS: Network meta-analysis was performed using a Bayesian random-effects model; 137 studies comprising 33,243 participants were identified. For pain, all interventions significantly outperformed oral placebo, with effect sizes from 0.63 (95% credible interval [CrI], 0.39 to 0.88) for the most efficacious treatment (hyaluronic acid) to 0.18 (CrI, 0.04 to 0.33) for the least efficacious treatment (acetaminophen). For function, all interventions except IA corticosteroids were significantly superior to oral placebo. For stiffness, most of the treatments did not significantly differ from one another. LIMITATION: Lack of long-term data, inadequate reporting of safety data, possible publication bias, and few head-to-head comparisons. CONCLUSION: This method allowed comparison of common treatments of knee OA according to their relative efficacy. Intra-articular treatments were superior to nonsteroidal anti-inflammatory drugs, possibly because of the integrated IA placebo effect. Small but robust differences were observed between active treatments. All treatments except acetaminophen showed clinically significant improvement from baseline pain. This information, along with the safety profiles and relative costs of included treatments, will be helpful for individualized patient care decisions.	Meta-analysis of randomized controlled trials rated as "moderate quality" evidence. Acetaminophen, diclofenac, ibuprofen, naproxen, celecoxib, intra-articular (IA) corticosteroids, IA hyaluronic acid, oral placebo, and IA placebo were compared. All medications outperformed placebo for pain. "All treatments except acetaminophen met the prespecified criteria for clinically significant improvement. Naproxen, ibuprofen, diclofenac, IA hyaluronic acid, and IA corticosteroids were statistically significantly superior to acetaminophen." Limitations of the article included short term studies and general lack of comparison of medications to each other. Unable to exclude IA placebo effect as reason for apparently superiority of IA vs oral treatments --> Citation supports the conclusion that a variety of medications used for osteoarthritis are superior to placebo and to acetaminophen in short term trials. NSAIDs were associated with more GI adverse events than placebo or acetaminophen.
32	I / D /3	Conservative Therapy; topical NSAID	Derry S, Conaghan P, Da Silva JA, Wiffen PJ, Moore RA. Topical NSAIDs for chronic musculoskeletal pain in adults. Cochrane Database Syst Rev. 2016 Apr 22;4:CD007400. PMID: 27103611	2/B	http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007400.pub3/abstract	BACKGROUND: Use of topical nonsteroidal anti-inflammatory drugs (NSAIDs) to treat chronic musculoskeletal conditions has become widely accepted because they can provide pain relief without associated systemic adverse events. This review is an update of 'Topical NSAIDs for chronic musculoskeletal pain in adults', originally published in Issue 9, 2012. OBJECTIVES: To review the evidence from randomised, double-blind, controlled trials on the efficacy and safety of topically applied NSAIDs for chronic musculoskeletal pain in adults. SEARCH METHODS: We searched the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, and our own in-house database; the date of the last search was February 2016. We also searched the references lists of included studies and reviews, and sought unpublished studies by asking personal contacts and searching online clinical trial registers and manufacturers' web sites. SELECTION CRITERIA: We included randomised, double-blind, active or inert carrier (placebo) controlled trials in which treatments were administered to adults with chronic musculoskeletal pain of moderate or severe intensity. Studies had to meet stringent quality criteria and there had to be at least 10 participants in each treatment arm, with application of treatment at least once daily. DATA COLLECTION AND ANALYSIS: Two review authors independently assessed studies for inclusion and extracted data. We used numbers of participants achieving each outcome to calculate risk ratio and numbers needed to treat (NNT) or harm (NNH) compared to carrier or other active treatment. We were particularly interested to compare different formulations (gel, cream, plaster) of individual NSAIDs. The primary outcome was 'clinical success', defined as at least a 50% reduction in pain, or an equivalent measure such as a 'very good' or 'excellent' global assessment of treatment, or 'none' or 'slight' pain on rest or movement, measured on a categorical scale. MAIN RESULTS: We identified five new studies for this update, which now has information from 10,631 participants in 39 studies, a 38% increase in participants from the earlier review; 33 studies compared a topical NSAID with carrier. All studies examined topical NSAIDs for treatment of osteoarthritis, and for pooled analyses studies were generally of moderate or high methodological quality, although we considered some at risk of bias from short duration and small size.In studies lasting 6 to 12 weeks, topical diclofenac and topical ketoprofen were significantly more effective than carrier for reducing pain; about 60% of participants had much reduced pain. With topical diclofenac, the NNT for clinical success in six trials (2343 participants) was 9.8 (95% confidence interval (CI) 7.1 to 16) (moderate quality evidence). With topical ketoprofen, the NNT for clinical success in four trials (2573 participants) was 6.9 (5.4 to 9.3) (moderate quality evidence). There was too little information for analysis of other individual topical NSAIDs compared with carrier. Few trials compared a topical NSAID to an oral NSAID, but overall they showed similar efficacy (low quality evidence). These efficacy results were almost completely derived from people with knee osteoarthritis.There was an increase in local adverse events (mostly mild skin reactions) with topical diclofenac compared with carrier or oral NSAIDs, but no increase with topical ketoprofen (moderate quality evidence). Reporting of systemic adverse events (such as	Systematic review of 39 studies and over 10000 patients from well regarded source. Poor quality evidence related to adverse reactions. --> Moderate-quality evidence for effectiveness (at 6-12 weeks) of topical non steriodal antinflamminatory agents for knee osteoarthritis, with very little data on adverse events.
33	I / D /3	Conservative Therapy; topical NSAID	Deng ZH, Zeng C, Yang Y, Li YS, Wei J, Yang T, Li H, Lei GH. Topical diclofenac therapy for osteoarthritis: a meta-analysis of randomized controlled trials. Clin Rheumatol. 2016 May;35(5):1253-61. PMID: 26242469	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	The objective of this study was to evaluate the efficacy and safety of topical diclofenac therapy for osteoarthritis (OA). A meta-analysis of randomized controlled trials was conducted. A comprehensive literature search, covering the databases of Medline, the Cochrane Central Register of Controlled Trials, and EMBASE, was conducted in September 2014 to identify the randomized controlled trials which adopted the topical diclofenac therapy for OA. A total of nine papers were included in this meta-analysis. Topical diclofenac appears to be effective in both pain relief (standard mean differences (SMD) = 0.40; 95 % confidence interval (CI) 0.19 to 0.62; P = 0.0003) and function improvement (SMD = 0.23; 95 % CI 0.03 to 0.43; P = 0.03) when compared with the control group. The sensitivity analysis and subgroup analysis showed that the result of pain intensity was stable and reliable, while the result of physical function improvement was vague. With respect to safety, topical diclofenac demonstrated a higher incidence of adverse events such as dry skin, rash, dermatitis, neck pain, and withdrawal. Topical diclofenac is effective in pain relief as a treatment of OA. It may also have a potential effect in function improvement, which needs further studies to be explored. Although, some adverse effects were observed in the application of topical diclofenac, none of them was serious.	Meta analysis of 9 RCTs with high heterogeneity --> Supports the use of topical diclofenac for osteoarthritis. Adverse reactions were not judged to be serious; the most common events were gastrointestinal, dermatologic, and headache.
34	I / D /3	Conservative Therapy; Intra-articular Corticosteroids	American Academy of Orthopedic Surgeons. Treatment of osteoarthritis of the knee: evidence-based guideline, 2nd edition. Adopted by AAOS Board of Directors, 18 May 2013.	Tier-2 Source	http://www.aaos.org/research/guidelines/guidelineoaknee.asp	AAOS recommendation strength: "Inconclusive." "We are unable to recommend for or against the use of intraarticular (IA) corticosteroids for patients with symptomatic osteoarthritis of the knee." (see p. 19 Guideline)	Society guideline --> Neither supports nor refutes the use of intrarticular corticosteroid injections for pain in patients with osteoarthritis of the knee.

35	I / D /3	Intraarticular injections	Bedard NA, Pugely AJ, Elkins JM, Duchman KR, Westermann RW, Liu SS, Gao Y, Callaghan JJ. The John N. Insall Award: Do Intraarticular Injections Increase the Risk of Infection After TKA? Clin Orthop Relat Res. 2017 Jan;475(1): 45-52. PMID: 26970991	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Infection after total knee arthroplasty (TKA) can result in disastrous consequences. Previous research regarding injections and risk of TKA infection have produced conflicting results and in general have been limited by small cohort size. QUESTIONS/PURPOSES: The purpose of this study was to evaluate if intraarticular injection before TKA increases the risk of postoperative infection and to identify if time between injection and TKA affect the risk of TKA infection. METHODS: The Humana data set was reviewed from 2007 to 2014 for all patients who received a knee injection before TKA. Current Procedural Terminology (CPT) codes and laterality modifiers were used to identify patients who underwent knee injection followed by ipsilateral TKA. Postoperative infection within 6 months of TKA was identified using International Classification of Diseases, 9(th) Revision/CPT codes that represent two infectious endpoints: any postoperative surgical site infection (encompasses all severities of infection) and operative intervention for TKA infection (surrogate for deep TKA infection). The injection cohort was stratified into 12 subgroups by monthly intervals out to 12 months corresponding to the number of months that had elapsed between injection and TKA. Risk of postoperative infection was compared between the injection and no injection cohorts. In total, 29,603 TKAs (35%) had an injection in the ipsilateral knee before the TKA procedure and 54,081 TKA cases (65%) did not. The PearlDiver database does not currently support line-by-line output of patient data, and so we were unable to perform a multivariate analysis to determine whether other important factors may have varied between the study groups that might have had a differential influence on the risk of infection between those groups. However, the Charlson Comorbidity index was no different between the injection and no injection cohorts (2.9 for both) suggesting similar comorbidity profiles between the groups. RESULTS: The proportion of TKAs developing any postoperative infection was higher among TKAs that received an injection before TKA than in those that did not (4.4% versus 3.6%; odds ratio [OR], 1.23; 95% confidence interval [CI], 1.15-1.33; p < 0.001). Likewise, the proportion of TKAs developing infection resulting in return to the operating room after TKA was also higher among TKAs that received an injection before TKA than those that did not (1.49% versus 1.04%; OR, 1.4; 95% CI, 1.3-1.63; p < 0.001). Month-by-month analysis of time between injection and TKA revealed the odds of any postoperative infection remained higher for the injection cohort out to a duration of 6 months between injection and TKA (ORs ranged 1.23 to 1.46 when 1-6 months between injection and TKA; p < 0.05 for all) as did the odds of operative intervention for TKA infection when injection occurred within 7 months of TKA (OR ranged from 1.38 to 1.88 when 1-7 months between injection and TKA; p < 0.05 for all). When the duration between injection and TKA was longer than 6 or 7 months, the ORs were no longer elevated at these endpoints, respectively. CONCLUSIONS: Injection before TKA was associated with a higher risk of postoperative infection and appears to be time-dependent with closer proximity between injection and TKA having increased odds of	Unadjusted retrospective cohort study of patients with unilateral total knee replacement for osteoarthritis or rheumatoid arthritis who did or did not receive intraarticular corticosteroid injections prior to surgery. Cortiosteroid injections within 7 months of surgery were associated with an increased risk of postoperative infection. --> Suggest that corticosteroid injections prior to TKA are associated with an increased risk of infection after TKA in patients with advanced osteoarthritis.
36	I / D /3	Conservative Therapy; Medications; Intra-articular corticosteroids	Ravi B, Escott BG, Wasserstein D, Croxford R, Hollands S, Paterson JM, Kreder HJ, Hawker GA. Intraarticular hip injection and early revision surgery following total hip arthroplasty: a retrospective cohort study. Arthritis Rheumatol. 2015 Jan;67(1):162-8. PMID: 25250699	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	OBJECTIVE: Therapeutic intraarticular injections are used in the management of hip osteoarthritis (OA). Some studies suggest that their use increases the risk of infection and subsequent revision surgery after primary total hip arthroplasty (THA), while others do not. We undertook this study to clarify the relationship between prior intraarticular injection and the risk of complication in a subsequent primary THA. METHODS: In a cohort of patients with hip OA who underwent a primary elective THA between 2002 and 2009, we identified those who received ≥1 intraarticular injection performed by a radiologist in the 5 years preceding their THA. Multivariable Cox proportional hazards models were used to determine the relationship between receipt of a presurgical injection (no injection, 1-5 years prior to THA, or <1 year prior to THA) and the occurrence of postsurgical joint infection and revision THA in the following 2 years, while controlling for confounders. RESULTS: Of 37,881 eligible THA recipients, 2,468 (6.5%) received an intraarticular injection performed by a radiologist within 5 years of their THA (1,691 at <1 year, 777 at 1-5 years). Controlling for age, sex, comorbidity, frailty, income, and provider volume, those who had an injection in the year preceding surgery were at increased risk of infection (adjusted hazard ratio [HR] 1.37, P = 0.03) and revision THA (adjusted HR 1.53, P = 0.03) within 2 years of the primary THA, relative to patients who did not. The association between prior injection and revision arthroplasty was attenuated and became nonsignificant (adjusted HR 1.41, P = 0.13) after occurrence of postoperative infection was controlled for in the regression model. No effect was found for injection 1-5 years prior to surgery. CONCLUSION: Intraarticular injection in the year preceding THA independently predicted increased risk of infection leading to early revision surgery. Further	This is a retrospective cohort study of patients with primary elective total hip replacement who either did or did not receive an intraarticular injection of unspecified medication within 5 years preceeding total hip replacement. Patients receiving an intraarticular injection within one year preceeding surgery had a higher rate of infection. --> This study supports avoiding an intraarticular hip injection if surgery is likely within one year.

37	I / D /3	Conservative Therapy; Medications; Intra-articular corticosteroids	Jüni P, Hari R, Rutjes AW, Fischer R, Silletta MG, Reichenbach S, da Costa BR. Intra-articular corticosteroid for knee osteoarthritis. Cochrane Database Syst Rev. 2015 Oct 22;(10):CD005328. PMID: 26490760	2/B	http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD005328.pub3/full	BACKGROUND: Knee osteoarthritis is a leading cause of chronic pain, disability, and decreased quality of life. Despite the long-standing use of intra-articular corticosteroids, there is an ongoing debate about their benefits and safety. This is an update of a Cochrane review first published in 2005. OBJECTIVES: To determine the benefits and harms of intra-articular corticosteroids compared with sham or no intervention in people with knee osteoarthritis in terms of pain, physical function, quality of life, and safety. SEARCH METHODS: We searched the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, and EMBASE (from inception to 3 February 2015), checked trial registers, conference proceedings, reference lists, and contacted authors. SELECTION CRITERIA: We included randomised or quasi-randomised controlled trials that compared intra-articular corticosteroids with sham injection or no treatment in people with knee osteoarthritis. We applied no language restrictions. DATA COLLECTION AND ANALYSIS: We calculated standardised mean differences (SMDs) and 95% confidence intervals (CI) for pain, function, quality of life, joint space narrowing, and risk ratios (RRs) for safety outcomes. We combined trials using an inverse-variance random-effects meta-analysis. MAIN RESULTS: We identified 27 trials (13 new studies) with 1767 participants in this update. We graded the quality of the evidence as 'low' for all outcomes because treatment effect estimates were inconsistent with great variation across trials, pooled estimates were imprecise and did not rule out relevant or irrelevant clinical effects, and because most trials had a high or unclear risk of bias. Intra-articular corticosteroids appeared to be more beneficial in pain reduction than control interventions (SMD -0.40, 95% CI -0.58 to -0.22), which corresponds to a difference in pain scores of 1.0 cm on a 10-cm visual analogue scale between corticosteroids and sham injection and translates into a number needed to treat for an additional beneficial outcome (NNTB) of 8 (95% CI 6 to	High quality systematic review with overall low quality evidence, heterogeneity between trials and "evidence of small study effects." -->"Whether there are clinically important benefits of intra-articular corticosteroids after one to six weeks remains unclear."
38	I / D /3	Conservative Therapy; Medications; Intra-articular corticosteroids	McAlindon TE, LaValley MP, Harvey WF, Price LL, Driban JB, Zhang M, Ward RJ. Effect of Intra-articular Triamcinolone vs Saline on Knee Cartilage Volume and Pain in Patients With Knee Osteoarthritis: A Randomized Clinical Trial. JAMA. 2017 May 16;317(19):1967-1975. PMID: 28510679	1/A	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	Importance: Synovitis is common and is associated with progression of structural characteristics of knee osteoarthritis. Intra-articular corticosteroids could reduce cartilage damage associated with synovitis but might have adverse effects on cartilage and periarticular bone. Objective: To determine the effects of intra-articular injection of 40 mg of triamcinolone acetonide every 3 months on progression of cartilage loss and knee pain. Design, Setting, and Participants: Two-year, randomized, placebo-controlled, double-blind trial of intra-articular triamcinolone vs saline for symptomatic knee osteoarthritis with ultrasonic features of synovitis in 140 patients. Mixed-effects regression models with a random intercept were used to analyze the longitudinal repeated outcome measures. Patients fulfilling the American College of Rheumatology criteria for symptomatic knee osteoarthritis, Kellgren-Lawrence grades 2 or 3, were enrolled at Tufts Medical Center beginning February 11, 2013; all patients completed the study by January 1, 2015. Interventions: Intra-articular triamcinolone (n = 70) or saline (n = 70) every 12 weeks for 2 years. Main Outcomes and Measures: Annual knee magnetic resonance imaging for quantitative evaluation of cartilage volume (minimal clinically important difference not yet defined), and Western Ontario and McMaster Universities Osteoarthritis index collected every 3 months (Likert pain subscale range, 0 [no pain] to 20 [extreme pain]; minimal clinically important improvement, 3.94). Results: Among 140 randomized patients (mean age, 58 [SD, 8] years, 75 women [54%]), 119 (85%) completed the study. Intra-articular triamcinolone resulted in significantly greater cartilage volume loss than did saline for a mean change in index compartment cartilage thickness of -0.21 mm vs -0.10 mm (between-group difference, -0.11 mm; 95% CI, -0.20 to -0.03 mm); and no significant difference in pain (-1.2 vs -1.9; between-group difference, -0.6; 95% CI, -1.6 to 0.3). The saline group had 3 treatment-related adverse events compared with 5 in the triamcinolone group and had a small increase in hemoglobin A1c levels (between-group difference, -0.2%; 95% CI, -0.5% to -0.007%). Conclusions and Relevance: Among patients with symptomatic knee osteoarthritis, 2 years of intra-articular triamcinolone, compared with intra-articular saline, resulted in significantly greater cartilage volume loss and no significant difference in knee pain. These findings do not support this treatment for patients with symptomatic knee osteoarthritis. Trial Registration: ClinicalTrials.gov Identifier: NCT01230424.	A randomized, blinded trial of patients with moderate osteoarthritis and chronic pain who received either intra-articular saline or triamcinolone every 3 months for 2 years with good follow-up. Patients receiving triancinolone had no clear improvement in symptoms versus those treated with saline but did have greater loss of cartilage. --> Study did not appear to deal with patients with an acute increase in joint inflammation nor did it assess short-term effects on pain following steroid injection (pain assessments were performed every 3 months, just prior to the next injection). Supports the conclusion that long term, chronic use of corticosteroid injections are ineffective for long-term pain relief in osteoarthritis of the knee.
Cycle 2: Fitness for Surgery							

39	II / A / 1 / a	Obesity & Surgical Complications	Kerkhoffs GM, Servien E, Dunn W, Dahm D, Bramer JA, Haverkamp D. The influence of obesity on the complication rate and outcome of total knee arthroplasty: a meta-analysis and systematic literature review. J Bone Joint Surg Am. 2012 Oct 17;94(20):1839-44. PMID: 23079875	2/B	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3489068/	BACKGROUND: The increase in the number of individuals with an unhealthy high body weight is particularly relevant in the United States. Obesity (body mass index ≥ 30 kg/m2) is a well-documented risk factor for the development of osteoarthritis. Furthermore, an increased prevalence of total knee arthroplasty in obese individuals has been observed in the last decades. The primary aim of this systematic literature review was to determine whether obesity has a negative influence on outcome after primary total knee arthroplasty. METHODS: A search of the literature was performed, and studies comparing the outcome of total knee arthroplasty in different weight groups were included. The methodology of the included studies was scored according to the Cochrane guidelines. Data extraction and pooling were performed. The weighted mean difference for continuous data and the weighted odds ratio for dichotomous variables were calculated. Heterogeneity was calculated with use of the I2 statistic. RESULTS: After consensus was reached, twenty studies were included in the data analysis. The presence of any infection was reported in fourteen studies including 15,276 patients (I2, 26%). Overall, infection occurred more often in obese patients, with an odds ratio of 1.90 (95% confidence interval [CI], 1.46 to 2.47). Deep infection requiring surgical debridement was reported in nine studies including 5061 patients (I2, 0%). Deep infection occurred more often in obese patients, with an odds ratio of 2.38 (95% CI, 1.28 to 4.55). Revision of the total knee arthroplasty, defined as exchange or removal of the components for any reason, was documented in eleven studies including 12,101 patients (I2, 25%). Revision for any reason occurred more often in obese patients, with an odds ratio of 1.30 (95% CI, 1.02 to 1.67). CONCLUSIONS: Obesity had a negative influence on outcome after total knee arthroplasty.	Well-done systematic review of mixed quality prognosis studies. "Our results showed that patients with a BMI of ≥30 kg/m2 had more infections and a higher revision rate compared with patients with a BMI of <30 kg/m2." --> Supports the conclusion that obesity has a negative influence on outcomes following total knee replacement.
40	II / A / 1 / a	Obesity & Surgical Complications	Haverkamp D, Klinkenbijl MN, Somford MP, Albers GH, van der Vis HM. Obesity in total hip arthroplasty--does it really matter? A meta-analysis. Acta Orthop. 2011 Aug;82(4):417-22. PMID: 21657972	2/B	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3237030/pdf/ORT-1745-3674-82-417.pdf	BACKGROUND AND PURPOSE: Discussion persists as to whether obesity negatively influences the outcome of hip arthroplasty. We performed a meta-analysis with the primary research question of whether obesity has a negative effect on short- and long-term outcome of total hip arthroplasty. METHODS: We searched the literature and included studies comparing the outcome of hip arthroplasty in different weight groups. The methodology of the studies included was scored according to the Cochrane guidelines. We extracted and pooled the data. For continuous data, we calculated a weighted mean difference and for dichotomous variables we calculated a weighted odds ratio (OR). Heterogeneity was calculated using I(2) statistics. RESULTS: 15 studies were eligible for data extraction. In obese patients, dislocation of the hip (OR = 0.54, 95% CI: 0.38-0.75) (10 studies, n = 8,634), aseptic loosening (OR = 0.64, CI: 0.43-0.96) (6 studies, n = 5,137), infection (OR = 0.3, CI: 0.19-0.49) (10 studies, n = 7,500), and venous thromboembolism (OR = 0.56, CI: 0.32-0.98) (7 studies, n = 3,716) occurred more often. Concerning septic loosening and intraoperative fractures, no statistically significant differences were found, possibly due to low power. Subjective outcome measurements did not allow pooling because of high heterogeneity (I(2) = 68%). INTERPRETATION: Obesity appears to have a negative influence on the outcome of total hip replacement.	Lower quality than Kirkoffs citation, but still fits criteria for Tier-2 study. --> Supports conclusion that obesity has a negative influence on outcome of total hip replacement.
41	II / A / 1 / a	Obesity & Surgical Complications	Liu W, Wahafu T, Cheng M, Cheng T, Zhang Y, Zhang X. The influence of obesity on primary total hip arthroplasty outcomes: A meta-analysis of prospective cohort studies. Orthop Traumatol Surg Res. 2015 May;101(3):289-96. PMID: 25817907	1/A	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Whether or not, obesity negatively influencing the outcomes of primary total hip arthroplasty (THA) remains a controversial issue. Though observational studies focused on this topic, the reported conclusions remain inconsistent. Therefore, we performed a meta-analysis of prospective cohort studies to evaluate if obesity negatively affects: (1) the overall complication rate (incidence of dislocation, deep infection and osteolysis); (2) functional outcome; (3) operative time and stay duration in hospital for the primary THA. METHODS: We searched the PubMed, Embase, Web of Science, and the Cochrane Library until July 2014 to identify the eligible prospective studies. The Newcastle Ottawa Scale (NOS) was used for quality assessment of the included studies. We extracted and pooled the data. As for continuous data, mean difference (MD) was calculated; for dichotomous variables, we calculated a weighted relative risk (RR) with its 95% confidence interval. Heterogeneity was evaluated using I(2) statistics. P ≤ 0.05 was thought to be significant. RESULTS: Fifteen studies were eligible for data extraction, which involved 11,271 total hip arthroplasties. The pooled data of complication rate demonstrated that obese patients suffered higher rates of complication (RR: 1.68, 95% CI 1.23 to 2.30, P = 0.0004), dislocation (RR: 2.08, 95% CI 1.54 to 2.81, P < 0.0001) and deep infection (RR: 2.92, 95% CI 0.74 to 11.49, P = 0.13). For the functional result, obese patients acquired relatively lower Harris Hip Score than non-obese patients (MD: -2.75, 95% CI -4.77 to -0.6), no difference was found regarding Oxford Hip Score (MD: -0.46, 95% CI -2.18 to 1.26, P = 0.60). Obese patients compared to non-obese patients showed an increase duration of operation (MD: 10.67, 95% CI 3.00 to 18.35, P = 0.006). However, no significant difference was found in the length of stay in hospital between obese and non-obese patients (MD: -0.16, 95% CI -0.34 to 0.02, P = 0.08). CONCLUSIONS: This meta-analysis of prospective cohort studies demonstrates that obesity negatively influences the overall complication rate, dislocation rate, functional outcome and operative time of primary total hip arthroplasty.	High-quality, meta analysis of prospective cohort studies showing consistent findings related to association of obesity with complications of total hip replacement. --> Supports the association of obesity and complications following hip surgery.
42	II / A / 1 / a	Obesity & Surgical Complications	Si HB, Zeng Y, Shen B, Yang J, Zhou ZK, Kang PD, Pei FX. The influence of body mass index on the outcomes of primary total knee arthroplasty. Knee Surg Sports Traumatol Arthrosc. 2015 Jun;23(6):1824-32. PMID: 25217315	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	PURPOSE: The body mass index (BMI) is widely recognized as a prognostic factor in multiple operations; however, the relationship between the BMI and outcomes following total knee arthroplasty (TKA) is extensively debated. We aimed to evaluate the effect of the BMI at different cutoff values on the outcomes following primary TKA. METHODS: Electronic databases (PubMed/Medline, CENTRAL, Embase and Web of Science) were systematically searched for studies investigating the association between the BMI and outcomes following primary TKA. Two investigators independently reviewed studies for eligibility, assessed the study quality using the Newcastle-Ottawa Scale and extracted the data. A meta-analysis was performed using Review Manager software. RESULTS: Twenty-eight articles including a total of 20,988 TKAs were identified. The postoperative Knee Society Score appeared to trend lower in obese (BMI ≥ 30 kg/m(2)) patients than in non-obese (BMI < 30 kg/m(2)) patients. The meta-analysis showed that revision with follow-up ≥5 years, any infection, superficial infection and deep vein thrombosis occurred statistically more frequently in obese patients, whereas a deep infection occurred statistically more frequently in morbidly obese (BMI ≥ 40 kg/m(2)) patients than in non-obese patients. No differences in aseptic loosening with follow-up ≥5 years, pulmonary embolism and perioperative mortality rates were found between obese and non-obese patients. CONCLUSIONS: Patients with a BMI ≥ 30 kg/m(2) are at a higher risk of lower functional scores and developing complications following primary TKA. It appears reasonable to encourage obese patients to lose weight before selective TKA. LEVEL OF EVIDENCE: Prognostic study, Level III.	Good quality meta analysis of high quality cohort studies with some inconsistency in predicting complications based on BMI --> Supports the conclusion that obesity is positively correlated with post operative complications following knee surgery.

43	II / A / 1 / a	Obesity & Surgical Complications	Electricwala AJ, Narkbunnam R, Huddleston JI 3rd, Maloney WJ, Goodman SB, Amanatullah DF. Obesity is Associated With Early Total Hip Revision for Aseptic Loosening. J Arthroplasty. 2016 Sep;31(9 Suppl):217-20. PMID: 27108056	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Obesity affects more than half a billion people worldwide, including one-third of men and women in the United States. Obesity is associated with higher postoperative complication rates after total hip arthroplasty (THA). It remains unknown whether obese patients progress to revision THA faster than nonobese patients. METHODS: A total of 257 consecutive primary THAs referred to an academic tertiary care center for revision THA were retrospectively stratified according to preoperative body mass index (BMI), reason for revision THA, and time from primary to revision THA. RESULTS: When examining primary THAs referred for revision THA, increasing BMI adversely affected the mean time to revision THA. The percentage of primary THAs revised at 5 years was 25% for a BMI of 18-25, 38% for a BMI of 25-30, 56% for a BMI of 30-35, 73% for a BMI of 35-40, and 75% for a BMI of greater than 40 (P < .001). The percentage of primary THAs revised at 15 years was 70%, 82%, 87%, 94%, and 100%, respectively (P < .001). A significant increase in early revision THA for aseptic loosening/osteolysis in obese patients (56%, 23/41) when compared with the nonobese patients (12%, 10/83, P < .001, relative risk ratio = 4.7). CONCLUSION: Preoperative BMI influences the time of failure of primary THAs referred to an academic tertiary care for revision THA as well as the mechanism of failure. Specifically, obesity increased in the relative ri	A retrospective cohort study of 257 patients that relates to interval between total hip replacement and need for revision. Proportion of patients requiring revision in 5 years increased with BMI and was 75% for BMI greater than 40. "a significant increase in early revision THA for aseptic loosening/osteolysis in obese patients when compared with the nonobese patients." --> Obesity shortens the interval between first total hip replacement and need for revision.
44	II / A / 1 / b	Nicotine Cessation	Møller AM, Villebro N, Pedersen T, Tønnesen H. Effect of preoperative smoking intervention on postoperative complications: a randomised clinical trial. Lancet. 2002 Jan 12;359(9301):114-7. PMID: 11809253	1/A	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Smokers are at higher risk of cardiopulmonary and wound-related postoperative complications than non-smokers. Our aim was to investigate the effect of preoperative smoking intervention on the frequency of postoperative complications in patients undergoing hip and knee replacement. METHODS: We did a randomised trial in three hospitals in Denmark. 120 patients were randomly assigned 6-8 weeks before scheduled surgery to either the control (n=60) or smoking intervention (60) group. Smoking intervention was counselling and nicotine replacement therapy, and either smoking cessation or at least 50% smoking reduction. An assessor, who was masked to the intervention, registered the occurrence of cardiopulmonary, renal, neurological, or surgical complications and duration of hospital admittance. The main analysis was by intention to treat. FINDINGS: Eight controls and four patients from the intervention group were excluded from the final analysis because their operations were either postponed or cancelled. Thus, 52 and 56 patients, respectively, were analysed for outcome. The overall complication rate was 18% in the smoking intervention group and 52% in controls (p=0.0003). The most significant effects of intervention were seen for wound-related complications (5% vs 31%, p=0.001), cardiovascular complications (0% vs 10%, p=0.08), and secondary surgery (4% vs 15%, p=0.07). The median length of stay was 11 days (range 7-55) in the intervention group and 13 days (8-65) in the control group. INTERPRETATION: An effective smoking intervention programme 6-8 weeks before surgery reduces postoperative morbidity, and we recommend, on the basis of our results, this programme be adopted	Randomised multicenter trial comparing complications following hip and knee replacement in a control group of smokers versus patients treated with smoking interventions that resulted in either smoking cessation or at least 50% reduction in smoking. The smoking intervention group had fewer complications when intervention was initiatied 6-8 weeks prior to surgery. --> Supports the conclusion that smoking intervention prior to surgery reduces postoperative morbidity.
45	II / A / 1 / b	Nicotine Cessation	Lindström D, Sadr Azodi O, Wladis A, Tønnesen H, Linder S, Nåsell H, Ponzer S, Adami J. Effects of a perioperative smoking cessation intervention on postoperative complications: a randomized trial. Ann Surg. 2008 Nov;248(5):739-45. PMID: 18948800	1/A	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	OBJECTIVE: To determine whether an intervention with smoking cessation starting 4 weeks before general and orthopedic surgery would reduce the frequency of postoperative complications. SUMMARY BACKGROUND DATA: Complications are a major concern after elective surgery and smokers have an increased risk. There is insufficient evidence concerning how the duration of preoperative smoking intervention affects postoperative complications. METHODS: A randomized controlled trial, conducted between February 2004 and December 2006 at 4 university-affiliated hospitals in the Stockholm region, Sweden. The outcome assessment was blinded. The follow-up period for the primary outcome was 30 days. Eligibility criteria were active daily smokers, aged 18 to 79 years. Of the 238 patients assessed, 76 refused participating, and 117 men and women undergoing surgery for primary hernia repair, laparoscopic cholecystectomy, or a hip or knee prosthesis were enrolled. INTERVENTION: Smoking cessation therapy with individual counseling and nicotine substitution started 4 weeks before surgery and continued 4 weeks postoperatively. The control group received standard care. The main outcome measure was frequency of any postoperative complication. RESULTS: An intention-to-treat analysis showed that the overall complication rate in the control group was 41%, and in the intervention group, it was 21% (P = 0.03). Relative risk reduction for the primary outcome of any postoperative complication was 49% and number needed to treat was 5 (95% CI, 3-40). An analysis per protocol showed that abstainers had fewer complications (15%) than those who continued to smoke or only reduced smoking (35%), although this difference was not statistically significant. CONCLUSION: Perioperative smoking cessation seems to be an effective tool to reduce postoperative complications even if it is introduced as late as 4 weeks before surgery.	Randomized controlled trial of smokers who continue to smoke versus smokers treated with conseling and nicotine substitution beginning 4 weeks prior to surgery and continuing 4 week postoperatively. Abstainers had fewer postoperative complications. --> Supports the conclusion that smoking cessation prior to surgery reduces postoperative complications if smoking discontinued as late as four weeks prior to surgery. Note: study relates to discontinuation of smoking rather than discontinuation of nicotine.

46	II / A / 1 / b	Nicotine Cessation	Thomsen T(1), Villebro N, Møller AM. Interventions for preoperative smoking cessation. Cochrane Database Syst Rev. 2014 Mar 27;(3):CD002294. PMID: 24671929	2/B	http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD002294.pub4/abstract	BACKGROUND: Smokers have a substantially increased risk of postoperative complications. Preoperative smoking intervention may be effective in decreasing this incidence, and surgery may constitute a unique opportunity for smoking cessation interventions. OBJECTIVES: The objectives of this review are to assess the effect of preoperative smoking intervention on smoking cessation at the time of surgery and 12 months postoperatively, and on the incidence of postoperative complications. SEARCH METHODS: We searched the Cochrane Tobacco Addiction Group Specialized Register in January 2014. SELECTION CRITERIA: Randomized controlled trials that recruited people who smoked prior to surgery, offered a smoking cessation intervention, and measured preoperative and long-term abstinence from smoking or the incidence of postoperative complications or both outcomes. DATA COLLECTION AND ANALYSIS: The review authors independently assessed studies to determine eligibility, and discussed the results between them. MAIN RESULTS: Thirteen trials enrolling 2010 participants met the inclusion criteria. One trial did not report cessation as an outcome. Seven reported some measure of postoperative morbidity. Most studies were judged to be at low risk of bias but the overall quality of evidence was moderate due to the small number of studies contributing to each comparison.Ten trials evaluated the effect of behavioural support on cessation at the time of surgery; nicotine replacement therapy (NRT) was offered or recommended to some or all participants in eight of these. Two trials initiated multisession face-to-face counselling at least four weeks before surgery and were classified as intensive interventions, whilst seven used a brief intervention. One further study provided an intensive intervention to both groups, with the intervention group additionally receiving a computer-based scheduled reduced smoking intervention. One placebo-controlled trial examined the effect of varenicline administered one week preoperatively followed by 11 weeks postoperative treatment, and one placebo-controlled trial examined the effect of nicotine lozenges from the night before surgery as an adjunct to brief counselling at the preoperative evaluation. There was evidence of heterogeneity between the effects of trials using intensive and brief interventions, so we pooled these separately. An effect on cessation at the time of surgery was apparent in both subgroups, but the effect was larger for intensive intervention (pooled risk ratio (RR) 10.76; 95% confidence interval (CI) 4.55 to 25.46, two trials, 210 participants) than for brief interventions (RR 1.30; 95% CI 1.16 to 1.46, 7 trials, 1141 participants). A single trial did not show evidence of benefit of a scheduled reduced smoking intervention. Neither nicotine lozenges nor varenicline were shown to increase cessation at the time of surgery but both had wide confidence intervals (RR 1.34; 95% CI 0.86 to 2.10 (1 trial, 46 participants) and RR 1.49; 95% CI 0.98 to 2.26 (1 trial, 286 participants) respectively). Four of these trials evaluated long-term smoking cessation and only the intensive intervention retained a significant effect (RR 2.96; 95% CI 1.57 to 5.55, 2 trials, 209 participants), whilst there was no evidence of a long-term effect following a brief intervention (RR 1.09; 95% CI 0.68 to 1.75, 2 trials, 341	High quality systematic review rating overall quality of evidence as moderate. --> Supports the value of smoking interventions to reduce post-operative morbidity.
47	II / A / 1 / b	Secondhand smoke exposure	Department of Community Health and Prevention, Beijing Anzhen Hospital, Capital Medical University, Beijing Institute of Heart Lung and Blood Vessel Disease, Beijing. Association of serum cotinine levels and the parameters of vascular structure and function in never-smoking adults. J Am Soc Hypertens. 2015 Dec;9(12):918-24. PMID: 26481411	3/C	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	Passive smoking is now recognized to be associated with early arterial damage. The aim of this study was to assess the relationship between secondhand smoke (SHS) exposure, measured objectively by serum cotinine level, and the parameters used to assess vascular structure and function among never smokers in North China. From January 2008 to August 2008, 652 adults aged 20-70 years were enrolled. Brachial-ankle pulse wave velocity (baPWV), ankle-brachial index, and carotid intima-media thickness measurements were performed in all patients. All participants were required to respond to an interviewer-led questionnaire including medical histories and demographic data and to receive blood tests on biochemical indicators. We found that in nonsmokers, higher levels of serum cotinine were positively associated with higher baPWV and brachial pulse pressure after adjusting for heart rate, body mass index, and other confounders. Tests for linear trends for this association were statistically significant. In contrast, no association was present with ankle-brachial index and carotid intima-media thickness. In never smokers, higher SHS exposure measured objectively by serum cotinine levels was found to be associated with brachial pulse pressure and baPWV after adjusting for confounders.	Study performed in an environment with a hight rate of exposure to tobacco smoke. Cohort was self selected participants who declared they were nonsmokers. Serum contine levels were correlated with artierial stiffness as judged by brachial-ankle pressure wave velocity. --> Supports the conclusion that serum contine levels are positively associated with arterial stiffness but did not study clinical outcomes.
48	II / A / 1 / b	Secondhand smoke exposure	Baltar VT, Xun WW, Chuang SC, Relton C, et al. Smoking, secondhand smoke, and cotinine levels in a subset of EPIC cohort. Cancer Epidemiol Biomarkers Prev. 2011 May;20(5):869-75. PMID: 21357382	3/C	http://cebp.aacrjournals.org/content/20/5/869.long	BACKGROUND: Several countries are discussing new legislation regarding the ban on smoking in public places, based on the growing evidence of the hazards of secondhand smoke (SHS) exposure. The objective of the present study is to quantitatively assess the relationship between smoking, SHS, and serum cotinine levels in the European Prospective Investigation into Cancer and Nutrition (EPIC) cohort. METHODS: From a study on lung cancer in the EPIC cohort, questionnaire information on smoking was collected at enrolment, and cotinine was measured in serum. Three statistical models were applied by using samples available in a cross-section design: (i) cotinine levels by categories combining smoking and SHS (n = 859); (ii) the effect of hours of passive smoking exposure in nonsmokers only (n = 107); (iii) the effect of the number of cigarettes consumed per day in current smokers only (n = 832). All models were adjusted for country, sex, age, and body mass index. RESULTS: Among nonsmokers, passive smokers presented significant differences in cotinine compared with nonexposed, with a marked (but not significant) difference among former-smokers. A one hour per day increment of SHS gave rise to a significant 2.58 nmol/L (0.45 ng/mL) increase in mean serum cotinine (P < 0.001). In current smokers, a one cigarette per day increment gave rise to a significant 22.44 nmol/L (3.95 ng/mL) increase in cotinine mean (P < 0.001). CONCLUSIONS: There is clear evidence that not only tobacco smoking but also involuntary exposure increases cotinine levels. IMPACT: This study strengthens the evidence for the benefits of a smoking ban in public places.	A nested cohort study of patients with and without lung cancer correlating second hand smoking among nonsmokers to serum contine levels. Nonsmoking cohort apparently includes some patients with lung cancer. --> Supports the conclusion that second hand smoking increases serum contine levels in nonsmokers.

49	II / A / 1 / c	Unhealthy alcohol use	Smith PC, Schmidt SM, Allensworth-Davies D, Saitz R. Primary care validation of a single-question alcohol screening test. J Gen Intern Med. 2009 Jul; 24(7): 783-8. PMID: 19247718	2/B	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2695521/	BACKGROUND: Unhealthy alcohol use is prevalent but under-diagnosed in primary care settings. OBJECTIVE: To validate, in primary care, a single-item screening test for unhealthy alcohol use recommended by the National Institute on Alcohol Abuse and Alcoholism (NIAAA). DESIGN: Cross-sectional study. PARTICIPANTS: Adult English-speaking patients recruited from primary care waiting rooms. MEASUREMENTS: Participants were asked the single screening question, "How many times in the past year have you had X or more drinks in a day?", where X is 5 for men and 4 for women, and a response of 1 or greater [corrected] is considered positive. Unhealthy alcohol use was defined as the presence of an alcohol use disorder, as determined by a standardized diagnostic interview, or risky consumption, as determined using a validated 30-day calendar method. MAIN RESULTS: Of 394 eligible primary care patients, 286 (73%) completed the interview. The single-question screen was 81.8% sensitive (95% confidence interval (CI) 72.5% to 88.5%) and 79.3% specific (95% CI 73.1% to 84.4%) for the detection of unhealthy alcohol use. It was slightly more sensitive (87.9%, 95% CI 72.7% to 95.2%) but was less specific (66.8%, 95% CI 60.8% to 72.3%) for the detection of a current alcohol use disorder. Test characteristics were similar to that of a commonly used three-item screen, and were affected very little by subject demographic characteristics. CONCLUSIONS: The single screening question recommended by the NIAAA accurately identified unhealthy alcohol use in this sample of primary care patients. These findings support the use of this brief screen in primary care.	Validation study of patients in a primary care setting comparing a single question regarding alcohol consumption with a validated 30 day "calendar method." --> Supports use of a single question screen to identify unhealthy alcohol use.
50	II / A / 1 / d	Glycemic Control	Dronge AS, Perkal MF, Kancir S, Concato J, Aslan M, Rosenthal RA. Long-term glycemic control and postoperative infectious complications. Arch Surg. 2006 Apr; 141(4): 375-80; discussion 380. PMID: 16618895	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	Abstract: HYPOTHESIS: Good preoperative glycemic control (hemoglobin A(1c) [HbA(1c)] levels <7%) is associated with decreased postoperative infections. DESIGN: Retrospective observational study using Veterans Affairs National Surgical Quality Improvement Program data from the Veterans Affairs Connecticut Healthcare System from January 1, 2000, through September 30, 2003. SETTING: Veterans Affairs Connecticut Healthcare System, a tertiary referral center and major university teaching site. PATIENTS: Six hundred forty-seven diabetic patients underwent major noncardiac surgery during the study period; 139 were excluded because the HbA(1c) levels were more than 180 days prior to surgery; 19 were excluded for other reasons; 490 diabetic patients were analyzed. The study patients were predominantly nonblack men with a median age of 71 years. MAIN OUTCOME MEASURES: Primary outcomes were infectious complications, including pneumonia, wound infection, urinary tract infection, or sepsis. Bivariate analysis was used first to determine the association of each independent variable (age, race, diabetic treatment, American Society of Anesthesiologists classification, Activities of Daily Living assessment, elective vs emergent procedure, wound classification, operation length, and HbA(1c) levels) with outcome. Factors significant at P<.05 were used in a multivariable logistic regression model. RESULTS: In the multivariable model, age, American Society of Anesthesiologists class, operation length, wound class, and HbA(1c) levels were significantly associated with postoperative infections. Emergency/urgent cases and dependence in Activities of Daily Living were significant in bivariate analysis but failed to reach statistical significance in the multivariable model. An HbA(1c) level of less than 7% was significantly associated with decreased infectious complications with an adjusted odds ratio of 2.13 (95% confidence interval, 1.23-3.70) and a P value of .007. CONCLUSION: Good preoperative glycemic control (HbA(1c) levels <7%) is associated with a decrease in infectious complications across a variety of surgical procedures.	Retrospective observational study of the Veterans Affairs Connecticut Healthcare System of diabetic patients comparing complication rates of patients with hemoglobin A(1c) levels <7% to those with higher values. --> Supports value of preoperative glycemic control in surgical patients. Patients with elevated A(1c) had more infectious complications. Note: 13% of patients were orthopaedic and cohort includes only male patients.
51	II / A / 1 / d	Glycemic Control	Marchant MH Jr, Viens NA, Cook C, Vail TP, Bolognesi MP. The impact of glycemic control and diabetes mellitus on perioperative outcomes after total joint arthroplasty. J Bone Joint Surg Am. 2009 Jul; 91(7): 1621-9. PMID: 19571084	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: As the prevalence of diabetes mellitus in people over the age of sixty years is expected to increase, the number of diabetic patients who undergo total hip and knee arthroplasty should be expected to increase accordingly. In general, patients with diabetes are at increased risk for adverse events following arthroplasty. The goal of the present study was to determine whether the quality of preoperative glycemic control affected the prevalence of in-hospital peri-operative complications following lower extremity total joint arthroplasty. METHODS: From 1988 to 2005, the Nationwide Inpatient Sample recorded over 1 million patients who underwent joint replacement surgery. The present retrospective study compared patients with uncontrolled diabetes mellitus (n = 3973), those with controlled diabetes mellitus (n = 105,485), and those without diabetes mellitus (n = 920,555) with regard to common surgical and systemic complications, mortality, and hospital course alterations. Additional stratification compared the effects of glucose control among patients with Type-I and Type-II diabetes. Glycemic control was determined by physician assessments on the basis of the American Diabetes Association guidelines with use of a combination of patient self-monitoring of blood-glucose levels, the hemoglobin A1c level, and related comorbidities. RESULTS: Compared with patients with controlled diabetes mellitus, patients with uncontrolled diabetes mellitus had a significantly increased odds of stroke (adjusted odds ratio = 3.42; 95% confidence interval = 1.87 to 6.25; p < 0.001), urinary tract infection (adjusted odds ratio = 1.97; 95% confidence interval = 1.61 to 2.42; p < 0.001), ileus (adjusted odds ratio = 2.47; 95% confidence interval = 1.67 to 3.64; p < 0.001), postoperative hemorrhage (adjusted odds ratio = 1.99; 95% confidence interval = 1.38 to 2.87; p < 0.001), transfusion (adjusted odds ratio = 1.19; 95% confidence interval = 1.04 to 1.36; p = 0.011), wound infection (adjusted odds ratio = 2.28; 95% confidence interval = 1.36 to 3.81; p = 0.002), and death (adjusted odds ratio = 3.23; 95% confidence interval = 1.87 to 5.57; p < 0.001). Patients with uncontrolled diabetes mellitus had a significantly increased length of stay (almost a full day) as compared with patients with controlled diabetes (p < 0.0001). All patients with diabetes had significantly increased inflation-adjusted postoperative charges when compared with nondiabetic patients (p < 0.0001). CONCLUSIONS: Regardless of diabetes type, patients with uncontrolled diabetes mellitus exhibited significantly increased odds of surgical and systemic complications, higher mortality, and increased length of stay during the index hospitalization following lower extremity total joint arthroplasty.	Retrospective study using the Nationwide Inpatient Sample comparing patients with uncontrolled diabetes, controlled diabetes, and no diabetes with regard to complications following total hip or knee arthroplasty. Patients with uncontrolled diabetes had a higher rate of postoperative complications, length of stay, and costs. Level of diabetes control judged on basis of provider coding without correlation with blood sugar or A1C levels. --> Supports the conclusion that uncontrolled diabetes is associated with an increased risk of complications compared to patients with controlled diabetes.

52	II / A / 1 / d	Glycemic Control	Buchleitner AM(1), Martínez-Alonso M, Hernández M, Solà I, Mauricio D. Perioperative glycaemic control for diabetic patients undergoing surgery. Cochrane Database Syst Rev. 2012 Sep 12;(9):CD007315. PMID: 22972106	2/B	http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007315.pub2/full	BACKGROUND: Patients with diabetes mellitus are at increased risk of postoperative complications. Data from randomised clinical trials and meta-analyses point to a potential benefit of intensive glycaemic control, targeting near-normal blood glucose, in patients with hyperglycaemia (with and without diabetes mellitus) being submitted to surgical procedures. However, there is limited evidence concerning this question in patients with diabetes mellitus undergoing surgery. OBJECTIVES: To assess the effects of perioperative glycaemic control for diabetic patients undergoing surgery. SEARCH METHODS: Trials were obtained from searches of The Cochrane Library, MEDLINE, EMBASE, LILACS, CINAHL and ISIS (all up to February 2012). SELECTION CRITERIA: We included randomised controlled clinical trials that prespecified different targets of perioperative glycaemic control (intensive versus conventional or standard care) DATA COLLECTION AND ANALYSIS: Two authors independently extracted data and assessed risk of bias. We summarised studies using meta-analysis or descriptive methods. MAIN RESULTS: Twelve trials randomised 694 diabetic participants to intensive control and 709 diabetic participants to conventional glycaemic control. The duration of the intervention ranged from just the duration of the surgical procedure up to 90 days. The number of participants ranged from 13 to 421, and the mean age was 64 years. Comparison of intensive with conventional glycaemic control demonstrated the following results for our predefined primary outcomes: analysis restricted to studies with low or unclear detection or attrition bias for infectious complications showed a risk ratio (RR) of 0.46 (95% confidence interval (CI) 0.18 to 1.18), P = 0.11, 627 participants, eight trials, moderate quality of the evidence (grading of recommendations assessment, development and evaluation - (GRADE)). Evaluation of death from any cause revealed a RR of 1.19 (95% CI 0.89 to 1.59), P = 0.24, 1365 participants, 11 trials, high quality of the evidence (GRADE).On the basis of a posthoc analysis, there is the hypothesis that intensive glycaemic control may increase the risk of hypoglycaemic episodes if longer-term outcome measures are analysed (RR 6.92, 95% CI 2.04 to 23.41), P = 0.002, 724 patients, three trials, low quality of the evidence (GRADE). Analysis of our predefined secondary outcomes revealed the following findings: cardiovascular events had a RR of 1.03 (95% CI 0.21 to 5.13), P = 0.97, 682 participants, six trials, moderate quality of the evidence (GRADE) when comparing the two treatment modalities; and renal failure also did not show significant differences between intensive and regular glucose control (RR 0.61, 95% CI 0.34 to 1.08), P = 0.09, 434 participants, two trials, moderate quality of the evidence (GRADE). We did not meta-analyse length of hospital stay and intensive care unit (ICU) stay due to substantial unexplained heterogeneity. Mean differences between intensive and regular glucose control groups ranged from -1.7 days to 2.1 days for ICU stay and between -8 days to 3.7 days for hospital stay (moderate quality of the evidence (GRADE)). One trial assessed health-related quality of life in 12/37 (32.4%) of participants in the intervention group and 13/44 (29.5%) of participants in the control group, and did not show an important difference (low quality of the evidence (GRADE)) in the measured physical health composite score of the short-form 12-	Meta analysis of 12 randomized trials. "11 trials included patients requiring admission to the ICU and eight included patients undergoing cardiovascular surgical interventions." --> Does not support a clear benefit related to intensive diabetes control in the perioperative period in terms of avoiding surgical complications. In "posthoc evaluation, the implementation of intensive glycaemic control was associated with a higher number of patients experiencing hypoglycaemic episodes." Applicability to uncomplicated orthopedic patients is unclear.
53	II / A / 1 / e	Opioids	Rozell JC, Courtney PM(, Dattilo JR(, Wu CH(1), Lee GC. Preoperative Opiate Use Independently Predicts Narcotic Consumption and Complications After Total Joint Arthroplasty. J Arthroplasty. 2017 Sep;32(9):2658-2662.PMID: 28478186	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Multimodal pain protocols have reduced opioid requirements and decreased complications after elective total hip arthroplasty (THA) and total knee arthroplasty (TKA). However, these protocols are not universally effective. The purposes of this study are to determine the risk factors associated with increased opioid requirements and the impact of preoperative narcotic use on the length of stay and inhospital complications after THA or TKA. METHODS: We prospectively evaluated a consecutive series of 802 patients undergoing elective primary THA and TKA over a 9-month period. All patients were managed using a multimodal pain protocol. Data on medical comorbidities and history of preoperative narcotic use were collected and correlated with deviations from the protocol. RESULTS: Of the 802 patients, 266 (33%) required intravenous narcotic rescue. Patients aged <75 years (odds ratio [OR], 1.85; 95% confidence interval [CI], 1.10-3.12; P = .019) and with preoperative narcotic use (OR, 2.74; 95% CI, 2.01-3.75; P < .001) were more likely to require rescue. Multivariate logistic regression analysis demonstrated that preoperative narcotic use (OR, 2.74; 95% CI, 2.01-3.75; P < .001) was the largest independent predictor of increased postoperative opioid requirements. These patients developed more inhospital complications (OR, 1.92; 95% CI, 1.34-2.76; P < .001). This was associated with an increased length of stay (OR, 1.59; 95% CI, 1.06-2.37; P = .025) and a 2.5-times risk of requiring oral narcotics at 3 months postoperatively (OR, 2.48; 95% CI, 1.61-3.82; P < .001). CONCLUSION: Despite the effectiveness of multimodal postoperative pain protocols, younger patients with preoperative history of narcotic use require additional opioids and are at a higher risk for complications and a greater length of stay.	A prospective cohort study that relates preoperative opioid use to increase opioid need, complications, length of stay, and long term need for postoperative opioids. --> Describes the adverse consequences of preoperative opioid use.
54	II / A / 1 / e	Opioids	Washington State Department of Labor and Industries. Guideline for prescribing opioids to treat pain in injured workers. Effective July 1, 2013.	Tier-2 Source	http://www.lni.wa.gov/ClaimsIns/Files/OMD/MedTreat/FINALOpioidGuideline010713.pdf	The Washington State Department of Labor & Industries (L&I, or the department) is officially adopting the Interagency Guideline on Opioid Dosing for Chronic Non-Cancer Pain as developed by the Agency Medical Directors' Group (AMDG Guideline) and revised in June 2010 [1]. The AMDG Guideline represents the best practices and universal precautions necessary to safely and effectively prescribe opioids to treat patients with chronic non-cancer pain. This guideline is a supplement to both the AMDG Guideline and the Department of Health's (DOH) pain management rules, and provides information specific to treating injured workers covered by Washington State workers' compensation [3]. Both the AMDG Guideline and this guideline are intended for use by health care providers, the department, insurers, and utilization review staff. This guideline was developed in 2011-2012 by the Industrial Insurance Medical Advisory Committee (IIMAC) and its subcommittee on chronic non-cancer pain. It is based on the best available clinical and scientific evidence from a systematic review of the literature and a consensus of expert opinion. The IIMAC's primary goal is to provide standards that ensure the highest quality of care for injured workers in Washington State.	Washington State standard from Labor & Industries --> Recommends postoperative use of opioids should be limited to no longer than six weeks. Also provides recommendations for perioperative management of patients on chronic opioid therapy.

55	II / A / 1 / e	Opioids	Kim SC, Choudhry N, Franklin JM, Bykov K, Eikermann M, Lii J, Fischer MA, Bateman BT. Patterns and predictors of persistent opioid use following hip or knee arthroplasty. Osteoarthritis Cartilage. 2017 Apr 19. PMID: 28433815	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	OBJECTIVE: The relationship between arthroplasty and long-term opioid use in patients with knee or hip osteoarthritis is not well studied. We examined the prevalence, patterns and predictors of persistent opioid use after hip or knee arthroplasty. METHOD: Using claims data (2004-2013) from a US commercial health plan, we identified adults who underwent hip or knee arthroplasty and filled ≥1 opioid prescription within 30 days after the surgery. We defined persistent opioid users as patients who filled ≥1 opioid prescription every month during the 1-year postoperative period based on group-based trajectory models. Multivariable logistic regression was used to determine preoperative predictors of persistent opioid use after surgery. RESULTS: We identified 57,545 patients who underwent hip or knee arthroplasty. The mean ± SD age was 61.5 ± 7.8 years and 87.1% had any opioid use preoperatively. Overall, 7.6% persistently used opioids after the surgery. Among patients who used opioids in 80% of the time for ≥4 months preoperatively (n = 3023), 72.1% became persistent users. In multivariable analysis, knee arthroplasty vs hip, a longer hospitalization stay, discharge to a rehabilitation facility, preoperative opioid use (e.g., a longer duration and greater dosage and frequency), a higher comorbidity score, back pain, rheumatoid arthritis, fibromyalgia, migraine and smoking, and benzodiazepine use at baseline were strong predictors for persistent opioid use (C-statistic = 0.917). CONCLUSION: Over 7% of patients persistently used opioids in the year after hip or knee arthroplasty. Given the adverse health effects of persistent opioid use, strategies need to be developed to prevent persistent opioid use after this common surgery.	Retrospective cohort study related to predictive factors and likelihood persistent use of opioids continuing for one year following hip or knee arthroplasty. Chronic preoperative use of opioids and painful comorbidities were associated with persistent long term use of opioids following surgery. --> Supports the conclusion that long term use of opioids following surgery is prevalent and suggests that such chronic use might be predicted based on patient characteristics.
56	II / A / 1 / e	Opioids	Smith SR, Bido J, Collins JE, Yang H, Katz JN, Losina E. Impact of Preoperative Opioid Use on Total Knee Arthroplasty Outcomes. J Bone Joint Surg Am. 2017 May 17;99(10):803-808. PMID: 28509820	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: There is growing concern about the use of opioids prior to total knee arthroplasty (TKA), and research has suggested that preoperative opioid use may lead to worse pain outcomes following surgery. We evaluated the pain relief achieved by TKA in patients who had and those who had not used opioids use before the procedure. METHODS: We augmented data from a prospective cohort study of TKA outcomes with opioid-use data abstracted from medical records. We collected patient-reported outcomes and demographic data before and 6 months after TKA. We used the Pain Catastrophizing Scale and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) to quantify the pain experiences of patients treated with TKA who had had a baseline score of ≥20 on the WOMAC pain scale (a 0 to 100-point scale, with 100 being the worst score), who provided follow-up data, and who had not had another surgical procedure within the 2 years prior to TKA. We built a propensity score for preoperative opioid use based on the Pain Catastrophizing Scale score, comorbidities, and baseline pain. We used a general linear model, adjusting for the propensity score and baseline pain, to compare the change in the WOMAC pain score 6 months after TKA between persons who had and those who had not used opioids before TKA. RESULTS: The cohort included 156 patients with a mean age of 65.7 years (standard deviation [SD] = 8.2 years) and a mean body mass index (BMI) of 31.1 kg/m (SD = 6.1 kg/m); 62.2% were female. Preoperatively, 36 patients (23%) had had at least 1 opioid prescription. The mean baseline WOMAC pain score was 43.0 points (SD = 12.8) for the group that had not used opioids before TKA and 46.9 points (SD = 15.7) for those who had used opioids (p = 0.12). The mean preoperative Pain Catastrophizing Scale score was greater among opioid users (15.5 compared with 10.7 points among non-users, p = 0.006). Adjusted analyses showed that the opioid group had a mean 6-month reduction in the WOMAC pain score of 27.0 points (95% confidence interval [CI] = 22.7 to 31.3) compared with 33.6 points (95% CI = 31.4 to 35.9) in the non-opioid group (p = 0.008). CONCLUSIONS: Patients who used opioids prior to TKA obtained less pain relief from the operation. Clinicians should consider limiting pre-TKA opioid prescriptions to optimize the benefits of TKA. LEVEL OF EVIDENCE: Therapeutic Level III. See Instructions for Authors for a complete description of levels of evidence.	Prospective cohort study of outcomes of 156 TKA patients with opioid-use data abstracted from medical records with patient reported outcomes measured before and 6 months after TKA. "The mean preoperative Pain Catastrophizing Scale score was greater among opioid users." Authors used statistical methods to control for catastrophizing comorbidities and baseline pain. "Patients who used opioids prior to TKA obtained less pain relief from the operation." --> Supports the conclusion that patients receiving preoperative opioids compared to those who do not may experience more pain 6 months following surgery. Study also indicates that a high Pain Catastrophizing Scale is associated with use of opioids.

57	II / A / 1 / e	Documentation of Disability; Opioids	da Costa BR, Nüesch E, Kasteler R, Husni E, Welch V, Rutjes AW, Jüni P. Oral or transdermal opioids for osteoarthritis of the knee or hip. Cochrane Database Syst Rev. 2014 Sep 17;(9):CD003115. PMID: 25229835	2/B	http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD003115.pub4/abstract;jsessionid=29FBEF859AC4E96EAB02F780D097AE31.f04t03	BACKGROUND: Osteoarthritis is the most common form of joint disease and the leading cause of pain and physical disability in older people. Opioids may be a viable treatment option if people have severe pain or if other analgesics are contraindicated. However, the evidence about their effectiveness and safety is contradictory. This is an update of a Cochrane review first published in 2009. OBJECTIVES: To determine the effects on pain, function, safety, and addiction of oral or transdermal opioids compared with placebo or no intervention in people with knee or hip osteoarthritis. SEARCH METHODS: We searched the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE and CINAHL (up to 28 July 2008, with an update performed on 15 August 2012), checked conference proceedings, reference lists, and contacted authors. SELECTION CRITERIA: We included randomised or quasi-randomised controlled trials that compared oral or transdermal opioids with placebo or no treatment in people with knee or hip osteoarthritis. We excluded studies of tramadol. We applied no language restrictions. DATA COLLECTION AND ANALYSIS: We extracted data in duplicate. We calculated standardised mean differences (SMDs) and 95% confidence intervals (CI) for pain and function, and risk ratios for safety outcomes. We combined trials using an inverse-variance random-effects meta-analysis. MAIN RESULTS: We identified 12 additional trials and included 22 trials with 8275 participants in this update. Oral oxycodone was studied in 10 trials, transdermal buprenorphine and oral tapentadol in four, oral codeine in three, oral morphine and oral oxymorphone in two, and transdermal fentanyl and oral hydromorphone in one trial each. All trials were described as double-blind, but the risk of bias for other domains was unclear in several trials due to incomplete reporting. Opioids were more beneficial in pain reduction than control interventions (SMD -0.28, 95% CI -0.35 to -0.20), which corresponds to a difference in pain scores of 0.7 cm on a 10-cm visual analogue scale (VAS) between opioids and placebo. This corresponds to a difference in improvement of 12% (95% CI 9% to 15%) between opioids (41% mean improvement from baseline) and placebo (29% mean improvement from baseline), which translates into a number needed to treat (NNTB) to cause one additional treatment response on pain of 10 (95% CI 8 to 14). Improvement of function was larger in opioid-treated participants compared with control groups (SMD -0.26, 95% CI -0.35 to -0.17), which corresponds to a difference in function scores of 0.6 units between opioids and placebo on a standardised Western Ontario and McMaster Universities Arthritis Index (WOMAC) disability scale ranging from 0 to 10. This corresponds to a difference in improvement of 11% (95% CI 7% to 14%) between opioids (32% mean improvement from baseline) and placebo (21% mean improvement from baseline), which translates into an NNTB to cause one additional treatment response on function of 11 (95% CI 7 to 14). We did not find substantial differences in effects according to type of opioid, analgesic potency, route of administration, daily dose, methodological quality of trials,	Updated Cochrane meta analysis of 22 trials with over 8000 participants concluding that of patients with osteoarthritis of the knee or hip treated with oral or transdermal opioids versus placebo or no treatment. Pooled risk ratio ws 3.35 for serious adverse events compared to patients not receiving opioids. --> Supports avoiding the use of opioids in patients with osteoarthritis of the knee or hip.
58	II / A / 1 / f	Nutritional status	van Stijn MF, Korkic-Halilovic I, Bakker MS, van der Ploeg T, van Leeuwen PA, Houjijk AP. Preoperative nutrition status and postoperative outcome in elderly general surgery patients: a systematic review. JPEN: Journal of Parenteral & Enteral Nutrition, 2013 Jan; 37(1): 37-43. PMID: 22549764	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Poor nutrition status is considered a risk factor for postoperative complications in the adult population. In elderly patients, who often have a poor nutrition status, this relationship has not been substantiated. Thus, the aim of this systematic review was to assess the merit of preoperative nutrition parameters used to predict postoperative outcome in elderly patients undergoing general surgery. METHODS: A systematic literature search of 10 consecutive years, 1998-2008, in PubMed, EMBASE, and Cochrane databases was performed. Search terms used were nutrition status, preoperative assessment, postoperative outcome, and surgery (hip or general), including their synonyms and MeSH terms. Limits used in the search were human studies, published in English, and age (65 years or older). Articles were screened using inclusion and exclusion criteria. All selected articles were checked on methodology and graded. RESULTS: Of 463 articles found, 15 were included. They showed profound heterogeneity in the parameters used for preoperative nutrition status and postoperative outcome. The only significant preoperative predictors of postoperative outcome in elderly general surgery patients were serum albumin and >= 10% weight loss in the previous 6 months. CONCLUSIONS: This systematic review revealed only 2 preoperative parameters to predict postoperative outcome in elderly general surgery patients: weight loss and serum albumin. Both are open to discussion in their use as a preoperative nutrition parameter. Nonetheless, serum albumin seems a reliable preoperative parameter to identify a patient at risk for nutrition deterioration and related complicated postoperative course.	Systematic review of 15 citations assessing pre-operative nutritional state as a risk factor for complications for patients 65 years of age or older. Definitions of low serum albumin in this paper included the following citations "Koval et al defined low serum albumin as serum albumin <35 g/L, Formiga et al and Ganai et al as serum albumin <30 g/L, and Bozzetti et al as serum albumin ≤30 g/L." --> Supports conclusion that reduced serum albumin and >= 10% weight loss in the previous 6 months predicts postoperative complications for elderly general surgery patients.
59	II / A / 1 / f	Reduced serum albumin	Pimlott BJ, Jones CA, Beaupre LA, Johnston DW, Majumdar SR. Prognostic impact of pre-operative albumin on short-term complications in patients with hip fracture. Archives of Gerontology & Geriatrics, 2011 Jul-Aug; 53(1): 90-4. PMID: 20684997	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	Low serum albumin may have prognostic value for morbidity and mortality in patients with hip fracture. The primary aim of the study was to evaluate the independent association between low serum albumin (<35 g/l) at hospital admission and short-term (in-hospital) mortality and post-operative complications of patients with hip fracture. We reviewed a prospective population-based cohort of 583 hip fracture patients who had pre-operative albumin values measured at hospital admission in one of the 3 tertiary hospitals in Northern Alberta, Canada. Patients with a primary diagnosis of hip fracture and 65 years or older were included. The primary outcomes were in-hospital mortality and any pre-specified post-operative complication. Mean serum albumin level was 33.8+/-4.5 g/l (+/-S.D.), and overall 55% (n=318) of patients had a low albumin. The in-hospital mortality was 8% (n=46) and rate of any non-fatal post-operative complication rate was 31/100. Mortality was 11% (n=35) among those with low albumin levels and 4% (n=11) for those with normal values (unadjusted odds ratio (OR) 2.86, 95% CI=1.42-5.74). After multivariate adjustment, the association between low serum albumin and mortality remained large and statistically significant (adjusted OR=2.44, 95% confidence interval (CI)=1.17-5.12). Low albumin levels were also significantly associated with post-operative medical complications (adjusted OR=1.96, 95% CI=1.36-2.83). We conclude that routine measurement of serum albumin provides valuable prognostic information for treating this frail population	A retrospective multivariant analysis correlating 16 postoperative complications with low serum albumin in a cohort of elderly patients undergoing surgery for hip fracture. Low serum albumin was associated with postoperative complications. --> Supports the conclusion that patients with low serum albumin and hip fracture are at increased risk for postoperative complications.

60	II / A / 1 / g	Dementia	Hu CJ, Liao CC, Chang CC, Wu CH, Chen TI. Postoperative adverse outcomes in surgical patients with dementia: a retrospective cohort study. World Journal of Surgery, 2012 Sep; 36(9): 2051-8. PMID: 22535212	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Dementia patients often present with coexisting medical conditions and potentially face higher risk of complications during hospitalization. Because the general features of postoperative adverse outcomes among surgical patients with dementia are unknown, we conducted a nationwide, retrospective cohort study to characterize surgical complications among dementia patients compared with sex- and age-matched nondementia controls. METHODS: Reimbursement claims from the Taiwan National Health Insurance Research Database were studied. A total of 18,923 surgical patients were enrolled with preoperative diagnosis of dementia for 207,693 persons aged 60 years or older who received inpatient major surgeries between 2004 and 2007. Their preoperative comorbidities were adjusted and risks for major surgical complications were analyzed. RESULTS: Dementia patients who underwent surgery had a significantly higher overall postoperative complication rate, adjusted odds ratio (OR) 1.79 (95 % confidence interval [CI] 1.72-1.86), with higher medical resources use, and in-hospital expenditures. Compared with controls, dementia patients had a higher incidence of certain postoperative complications that are less likely to be identified in their initial stage, such as: acute renal failure, OR = 1.32 (1.19-1.47); pneumonia, OR = 2.18 (2.06-2.31); septicemia, OR = 1.8 (1.69-1.92); stroke, OR = 1.51 (1.43-1.6); and urinary tract infection, OR = 1.62 (1.5-1.74). CONCLUSIONS: These findings have specific implications for postoperative care of dementia patients regarding complications that are difficult to diagnose in their initial stages. Acute renal failure, pneumonia, septicemia, stroke, and urinary tract infection are the top priorities for prevention, early recognition, and intervention of postoperative complications among surgical patients with dementia. Further efforts are needed to determine specific protocols for health care teams serving this population.	Retrospective cohort study measuring complications following major inpatient surgeries in Taiwanese patients with claim-based diagnosis of dementia compared to age and sex matched non-demented controls. --> Supports the conclusion that patients with dementia undergoing surgical procedures have a higher rate of postoperative complications.
61	II / A / 1 / g	Dementia	van Dortmont LM, Douw CM, van Breukelen AM, Laurens DR, Mulder PG, Wereldsma JC, van Vugt AB. Outcome after hemi-arthroplasty for displaced intracapsular femoral neck fracture related to mental state. Injury. 2000 Jun;31(5):327-31. PMID: 10775686	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	This study was performed to assess mortality and functional outcome after hemi-arthroplasty for displaced intracapsular femoral neck fractures in relation to mental state. Between 1991 and 1995, 202 consecutive patients over 70 years of age were followed for at least two years or until death. Thirty-nine patients were known with senile dementia at the time of admission. The four-month mortality rate was 11.7% for the mentally normal patients and 33.3% for the mentally impaired patients. After one year the mortality rate was 19. 6% for the mentally normal patients and 43.6% for the mentally impaired patients. This difference is statistically significant (p<0. 001). Of the 141 surviving mentally normal patients, who had been mobile before operation, 16 (11.3%) were not mobile four months after operation. Of the 24 surviving mentally impaired patients, who had been mobile before operation, 18 (75.0%) were not mobile four months after operation. This difference is statistically significant (p<0.001). The conclusion of our study is that mental state has a statistically significant effect on mortality and functional outcome after hemi-arthroplasty for displaced intracapsular femoral neck fractures. For demented patients, hemi-arthrplasty is a too major operation and less invasive methods of internal fixation should be considered.	Prospective cohort study of 202 patients over the age of 70 following surgery for hip fracture. Patients with dementia were compared with non-demented controls. Demented patients had higher mortality and lower mobility following surgery. --> Supports the conclusion that patients with dementia have worse outcomes following surgery for hip fracture. Appraisal reflects that cohort was not elective surgery.
62	II / A / 1 / g	Screening for dementia; Mini-Cog	Borson S, Scanlan JM, Chen P, Ganguli M. The Mini-Cog as a screen for dementia: validation in a population-based sample. J Am Geriatr Soc. 2003 Oct;51(10):1451-4. PMID: 14511167	2/B	https://deepblue.lib.umich.edu/handle/2027.42/65703	OBJECTIVES: To test the Mini-Cog, a brief cognitive screening test, in an epidemiological study of dementia in older Americans. DESIGN: A population-based post hoc examination of the sensitivity and specificity of the Mini-Cog for detecting dementia in an existing data set. SETTING: The Monongahela Valley in Western Pennsylvania. PARTICIPANTS: A random sample of 1,119 older adults enrolled in the Monongahela Valley Independent Elders Survey (MoVIES). MEASUREMENTS: The effectiveness of the Mini-Cog in detecting independently diagnosed dementia was compared with that of the Mini-Mental State Examination (MMSE) and a standardized neuropsychological battery. RESULTS: The Mini-Cog, scored by an algorithm as "possibly impaired" or "probably normal," and the MMSE, at a cutpoint of 25, had similar sensitivity (76% vs 79%) and specificity (89% vs 88%) for dementia, comparable with that achieved using a conventional neuropsychological battery (75% sensitivity, 90% specificity). CONCLUSION: When applied post hoc to an existing population, the Mini-Cog was as effective in detecting dementia as longer screening and assessment instruments. Its brevity is a distinct advantage when the goal is to improve identification of older adults in a population who may be cognitively impaired. Prior evidence of good performance in a multiethnic community-based sample further supports its validity in the ethnolinguistically diverse populations of the United States in which widely used cognitive screens often fail.	The Mini-Mental State Examination (MMSE) is compared to the Mini-Cog in detecting dementia in a community-based population sample of 1,700 subjects aged 65 or older. The Mini-Cog, scored as "possibly impaired" or "probably normal" had similar specificity and sensitivity in detecting dementia to MMSE at a cutpoint of 25. --> Mini-Cog has similar utility to MMSE in screening for dementia.
63	II / A / 1 / g	Screening for dementia; Mini-Cog	Brodaty H(1), Low LF, Gibson L, Burns K. What is the best dementia screening instrument for general practitioners to use? Am J Geriatr Psychiatry. 2006 May;14(5):391-400. PMID: 16670243	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	OBJECTIVE: The objective of this study was to review existing dementia screening tools with a view to informing and recommending suitable instruments to general practitioners (GPs) based on their performance and practicability for general practice. METHOD: A systematic search of pre-MEDLINE, MEDLINE, PsycINFO, and the Cochrane Library Database was undertaken. Only available full-text articles about dementia screening instruments written in English or with an English version were included. Articles using a translation of an English language instrument were excluded unless validated in a general practice, community, or population sample. RESULTS: The General Practitioner Assessment of Cognition (GPCOG), Mini-Cog, and Memory Impairment Screen (MIS) were chosen as most suitable for routine dementia screening in general practice. The GPCOG, Mini-Cog, and MIS were all validated in community, population, or general practice samples, are easy to administer, and have administration times of 5 minutes or less. They also have negative predictive validity and misclassification rates, which do not differ significantly from those of the Mini-Mental Status Examination. CONCLUSIONS: It is recommended that GPs consider using the GPCOG, Mini-Cog, or MIS when screening for cognitive impairment or for case detection.	Systematic review comparing sixteen tests used to screen for dementia. General Practitioner Assessment of Cognition (GPCOG), Mini-Cog, and Memory Impairment Screen (MIS) are recommended by the authors for use in general practice. --> Mini-Cog compares favorably with other tests for use in screening for dementia.
64	II / A / 1 / g	Pre-operative exam; screen for dementia; screening tool; MoCA	Freitas S, Simões MR, Alves L, Duro D, Santana I. Montreal Cognitive Assessment (MoCA): validation study for frontotemporal dementia. J Geriatr Psychiatry Neurol. 2012 Sep;25(3):146-54. PMID: 22859702	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	The Montreal Cognitive Assessment (MoCA) is a brief instrument developed for the screening of milder forms of cognitive impairment, having surpassed the well-known limitations of the Mini-Mental State Examination (MMSE). The aim of the present study was to validate the MoCA as a cognitive screening test for behavioral-variant frontotemporal dementia (bv-FTD) by examining its psychometric properties and diagnostic accuracy. Three matched subgroups of participants were considered: bv-FTD (n = 50), Alzheimer disease (n = 50), and a control group of healthy adults (n = 50). Compared with the MMSE, the MoCA demonstrated consistently superior psychometric properties and discriminant capacity, providing comprehensive information about the patients' cognitive profiles. The diagnostic accuracy of MoCA for bv-FTD was extremely high (area under the curve AUC [MoCA] = 0.934, 95% confidence interval [CI] = 0.866-.974; AUC [MMSE] = 0.772, 95% CI = 0.677-0.850). With a cutoff below 17 points, the MoCA results for sensitivity, specificity, positive predictive value, negative predictive value, and classification accuracy were significantly superior to those of the MMSE. The MoCA is a sensitive and accurate instrument for screening the patients with bv-FTD and represents a better option than the MMSE.	Validation study comparing MoCA with MMSE. --> Validates use of MoCA as an instrument for screening for cognitive impairment. Limitation: study cohort is patients undergoing hip surgery for displaced femoral neck fracture, not uncomplicated joint replacement.

65	II / A / 1 / g	Delirium & adverse outcomes	Witlox J, Eurelings LS, de Jonghe JF, Kalisvaart KJ, Eikelenboom P, van Gool WA. Delirium in elderly patients and the risk of postdischarge mortality, institutionalization, and dementia: a meta-analysis. JAMA. 2010 Jul 28;304(4):443-51. PMID: 20664045	1/A	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	CONTEXT: Delirium is a common and serious complication in elderly patients. Evidence suggests that delirium is associated with long-term poor outcome but delirium often occurs in individuals with more severe underlying disease. OBJECTIVE: To assess the association between delirium in elderly patients and long-term poor outcome, defined as mortality, institutionalization, or dementia, while controlling for important confounders. DATA SOURCES: A systematic search of studies published between January 1981 and April 2010 was conducted using the databases of MEDLINE, EMBASE, PsycINFO, and CINAHL. STUDY SELECTION: Observational studies of elderly patients with delirium as a study variable and data on mortality, institutionalization, or dementia after a minimum follow-up of 3 months, and published in the English or Dutch language. Titles, abstracts, and articles were reviewed independently by 2 of the authors. Of 2939 references in the original search, 51 relevant articles were identified. DATA EXTRACTION: Information on study design, characteristics of the study population, and outcome were extracted. Quality of studies was assessed based on elements of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist for cohort studies. DATA SYNTHESIS: The primary analyses included only high-quality studies with statistical control for age, sex, comorbid illness or illness severity, and baseline dementia. Pooled-effect estimates were calculated with random-effects models. The primary analysis with adjusted hazard ratios (HRs) showed that delirium is associated with an increased risk of death compared with controls after an average follow-up of 22.7 months (7 studies; 271/714 patients [38.0%] with delirium, 616/2243 controls [27.5%]; HR, 1.95 [95% confidence interval {CI}, 1.51-2.52]; I(2), 44.0%). Moreover, patients who had experienced delirium were also at increased risk of institutionalization (7 studies; average follow-up, 14.6 months; 176/527 patients [33.4%] with delirium and 219/2052 controls [10.7%]; odds ratio [OR], 2.41 [95% CI, 1.77-3.29]; I(2), 0%) and dementia (2 studies; average follow-up, 4.1 years; 35/56 patients [62.5%] with delirium and 15/185 controls [8.1%]; OR, 12.52 [95% CI, 1.86-84.21]; I(2), 52.4%). The sensitivity, trim-and-fill, and secondary analyses with unadjusted high-quality risk estimates stratified according to the study characteristics confirmed the robustness of these results. CONCLUSION: This meta-analysis provides evidence that delirium in elderly patients is associated with poor outcome independent of important confounders, such as age, sex, comorbid illness or illness severity, and baseline dementia.+I37:I44	A meta-analysis "assessing the association between delirium in elderly patients and long-term poor outcome, defined as mortality, institutionalization, or dementia, while controlling for important confounders." --> Supports the conclusion that delerium is associated with poor outcomes.
66	II / A / 1 / j	Peripheral vascular disease	Bozic KJ, Lau E, Kurtz S, Ong K, Berry DJ. Patient-related risk factors for postoperative mortality and periprosthetic joint infection in medicare patients undergoing TKA. Clinical Orthopaedics & Related Resarch, 2012 Jan; 470(1): 130-7. PMID: 21874391	2/B	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3237966/pdf/11999_2011_Article_2043.pdf	BACKGROUND: The impact of specific baseline comorbid conditions on the relative risk of postoperative mortality and periprosthetic joint infection (PJI) in elderly patients undergoing TKA has not been well defined. QUESTIONS/PURPOSES: We calculated the relative risk of postoperative mortality and PJI associated with 29 comorbid conditions in Medicare patients undergoing TKA. PATIENTS AND METHODS: The Medicare 5% sample was used to calculate the relative risk of 90-day postoperative mortality and PJI as a function of 29 preexisting comorbid conditions in 83,011 patients who underwent primary TKA between 1998 and 2007. RESULTS: The independent risk factors for 90-day postoperative mortality (in decreasing order of significance) were congestive heart failure, metastatic cancer, renal disease, peripheral vascular disease, cerebrovascular disease, lymphoma, cardiac arrhythmia, dementia, pulmonary circulation disorders, and chronic liver disease. The independent risk factors for PJI (in decreasing order of significance) were congestive heart failure, chronic pulmonary disease, preoperative anemia, diabetes, depression, renal disease, pulmonary circulation disorders, obesity, rheumatologic disease, psychoses, metastatic tumor, peripheral vascular disease, and valvular disease. CONCLUSIONS: We believe this information important when counseling elderly patients regarding the risks of mortality and PJI after TKA and risk-adjusting publicly reported TKA patient outcomes.	A retrospective multivariant regression analysis of Medicare patients undergoing total knee arthroplasty that relates comorbidities to postoperative mortality and periprosthetic joint infection. --> Supports the conclusion that patients with peripheral vascular disease undergoing total joint replacement have an increased risk of infection and mortality.
67	II / A / 1 / k	Liver function	Is there a benefit to a routine preoperative screening of infectivity for HIV, hepatitis B and C virus before elective orthopaedic operations? Weber P., Eberle J., Bogner J.R., Schrimpf F., Jansson V., Huber-Wagner S. Infection 2013 41:2 (479-483). PMID:23225209[	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	Purpose: Before elective operations, particularly orthopaedic surgery, national guidelines in Germany recommend testing for human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) to reduce the risk of transmission of the virus through a needlestick or cutting injury. Such testing is expensive. The number of new and unknown diagnoses of viral infections that can be detected by routine screening has not yet been evaluated. Methods: The aim of our department of orthopaedic surgery is to screen every adult patient listed for an operation for HBV, HCV and HIV. We retrospectively analysed the number of operations in this single centre from 2001 to 2010, correlated this number with the total number of screens and calculated the number of newly diagnosed infections. An additional cost:benefit ratio was calculated. Results: A total of 20,869 operations were performed by the department between 2001 and 2010. After exclusion of all interventions in children and all patients who had multiple operations, 15,482 patients remained. Test results were found for 10,011 of these patients during this period (screening rate 65 %). Of those screened, in only four cases (0.4 (per mille)) was a previously unknown infection detected. Conclusions: Two-thirds of the patients included in our study actually underwent screening; this rate was lower than expected. The incidence of newly detected infections was low, putting the benefit of a routine preoperative screening for HBV, HCV and HIV into question. From an economic point of view the low detection rate is a strong argument in favour of omitting routine preoperative screening. Screening only those patients with risk factors may be as safe as screening every patient and would help reduce costs. (copyright) 2012 Springer-Verlag Berlin Heidelberg.	Retrospective cohort study of 15,000 patients patients undergoing orthopaedic surgery in a German university hospital. 10,000 (65%) of these patients were screened for HIV, HBV, and HCV. One patient was newly diagnosed positive for HVB and three patients were diagnosed positive for HCV, for a combined prevalence in this population of 0.04%. Two of the newly diagnosed patients had a history of transfusions and one a history of intravenous drug abuse. The authors conclude that routine screening for HIV, HBV, and HCV in patients without other risk factors undergoing orthopaedic surgery is not warranted or cost effective. --> Does not support routine screening for HIV, HBV, or HCV in patients without risk factors undergoing orthopaedic surgery.
68	II / A / 1 / k	Liver function (prothrombin, proteins, etc.)	Lin T.-Y., Liao J.-C., Chen W.-J., Chen L.-H., Niu C.-C., Fu T.-S., Lai P.-L., Tsai T.-T. Surgical risks and perioperative complications of instrumented lumbar surgery in patients with liver cirrhosis. Biomedical Journal, 2014 Jan-Feb; 37(1): 18-23. PMID: 24667674	2/B	http://biomedj.cgu.edu.tw/pdfs/2014/37/1/images/BiomedJ_2014_37_1_18_113376.pdf	Background: Patients with liver cirrhosis have high surgical risks due to malnutrition, impaired immunity, coagulopathy, and encephalopathy. However, there is no information in English literature about the results of liver cirrhotic patients who underwent instrumented lumbar surgery. The purpose of this study is to report the perioperative complications, clinical outcomes and determine the surgical risk factors in cirrhotic patients. Methods: We retrospectively reviewed 29 patients with liver cirrhosis who underwent instrumented lumbar surgery between 1997 and 2009. The hepatic functional reserves of the patients were recorded according to the Child-Turcotte-Pugh scoring system. Besides, fourteen other variables and perioperative complications were also collected. To determine the risks, we divided the patients into two groups according to whether or not perioperative complications developed. Results: Of the 29 patients, 22 (76%) belonged to Child class A and 7 (24%) belonged to Child class B. Twelve patients developed one or more complications. Patients with Child class B carried a significantly higher incidence of complications than those with Child class A (p = 0.011). In the Child class A group, patients with 6 points had a significantly higher incidence of complications than those with 5 points (p = 0.025). A low level of albumin was significantly associated with higher risk, and a similar trend was also noted for the presence of ascites although statistical difference was not reached. Conclusion: The study concludes that patients with liver cirrhosis who have undergone instrumented lumbar surgery carry a high risk of developing perioperative complications, especially in those with a Child-Turcotte-Pugh score of 6 or more.	Retrospective cohort study with few patients, including those treated as early as 1997. Uncontrolled for confounding factors other than liver function. Study showed higher risk of complications in patients with cirrhosis (Child-Turcotte-Pugh* score of 6 or more). --> Supports use of Child-Turcotte-Pugh score for assessing risk for perioperative complications and recommending caution in patients with cirrhosis, particularly w/ score of 6 or more. * C-T-P score is composite of five clinical indicators of liver disease: total bilirubin, serum albumin, PT INR, ascites, and hepatic encephalopathy.

69	II / B / 1	Care partner	64th Legislature 2016 Regular Session (Washington State) Certification of Enrollment Substitute Senate Bill 6327.	2016 WA State statute	http://lawfilesext.leg.wa.gov/biennium/2015-16/Pdf/Bills/Senate%20Passed%20Legislature/6327-S.PL.pdf	An Act relating to hospital discharge planning with lay caregivers.	An act relating to hospital discharge planning with lay caregivers. Statute specifies offering "an opportunity for the patient to designate a lay caregiver." --> This Washington state statute specifies offering the opportunity to the patient to designate a lay caregiver. Tasks include contact information, necessary aftercare tasks, participation in discharge planning, instruction or training provided to the patient including medication management. Designated lay caregiver should be notified of patient's discharge or transfer.
70	II / B / 1	Care partner	Rodakowski J, Rocco PB, Ortiz M, Folb B, Schulz R, Morton SC, Leathers SC, Hu L, James AE 3rd. Caregiver Integration During Discharge Planning for Older Adults to Reduce Resource Use: A Metaanalysis. J Am Geriatr Soc. 2017 Apr 3. doi: 10.1111/jgs.14873. PMID: 28369687	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	OBJECTIVES: To determine the effect of integrating informal caregivers into discharge planning on postdischarge cost and resource use in older adults. DESIGN: A systematic review and metaanalysis of randomized controlled trials that examine the effect of discharge planning with caregiver integration begun before discharge on healthcare cost and resource use outcomes. MEDLINE, EMBASE, and the Cochrane Library databases were searched for all English-language articles published between 1990 and April 2016. SETTING: Hospital or skilled nursing facility. PARTICIPANTS: Older adults with informal caregivers discharged to a community setting. MEASUREMENTS: Readmission rates, length of and time to post-discharge rehospitalizations, costs of postdischarge care. RESULTS: Of 10,715 abstracts identified, 15 studies met the inclusion criteria. Eleven studies provided sufficient detail to calculate readmission rates for treatment and control participants. Discharge planning interventions with caregiver integration were associated with a 25% fewer readmissions at 90 days (relative risk (RR) = 0.75, 95% confidence interval (CI) = 0.62-0.91) and 24% fewer readmissions at 180 days (RR = 0.76, 95% CI = 0.64-0.90). The majority of studies reported statistically significant shorter time to readmission, shorter rehospitalization, and lower costs of postdischarge care among discharge planning interventions with caregiver integration. CONCLUSION: For older adults discharged to a community setting, the integration of caregivers into the discharge planning process reduces the risk of hospital readmission.	Systematic review and meta analysis of RCTs of variable quality examining effect of involving lay caregivers in discharge planning and post discharge care in patients 65 and older. Degree of involvement of caregiver in post discharge care was uncertain as was reason for hospitalization. Patients receiving support from caregivers following discharge had lower 90 and 180 day readmission rates. --> Supports the conclusion that involving caregivers in discharge planning reduce the likelihood of readmission
71	II / B / 3	Advance Directives	Nicholas LH. Langa KM. Iwashyna TJ. Regional variation in the association between advance directives and end-of-life Medicare expenditures. JAMA, 2011 Oct 5; 306(13): 1447-53. PMID: 21972306	2/B	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3332047/	CONTEXT: It is unclear if advance directives (living wills) are associated with end-of-life expenditures and treatments. OBJECTIVE: To examine regional variation in the associations between treatment-limiting advance directive use, end-of-life Medicare expenditures, and use of palliative and intensive treatments. DESIGN, SETTING, AND PATIENTS: Prospectively collected survey data from the Health and Retirement Study for 3302 Medicare beneficiaries who died between 1998 and 2007 linked to Medicare claims and the National Death Index. Multivariable regression models examined associations between advance directives, end-of-life Medicare expenditures, and treatments by level of Medicare spending in the decedent's hospital referral region. MAIN OUTCOME MEASURES: Medicare expenditures, life-sustaining treatments, hospice care, and in-hospital death over the last 6 months of life. RESULTS: Advance directives specifying limits in care were associated with lower spending in hospital referral regions with high average levels of end-of-life expenditures (-$5585 per decedent; 95% CI, -$10,903 to -$267), but there was no difference in spending in hospital referral regions with low or medium levels of end-of-life expenditures. Directives were associated with lower adjusted probabilities of in-hospital death in high- and medium-spending regions (-9.8%; 95% CI, -16% to -3% in high-spending regions; -5.3%; 95% CI, -10% to -0.4% in medium-spending regions). Advance directives were associated with higher adjusted probabilities of hospice use in high- and medium-spending regions (17%; 95% CI, 11% to 23% in high-spending regions, 11%; 95% CI, 6% to 16% in medium-spending regions), but not in low-spending regions. CONCLUSION: Advance directives specifying limitations in end-of-life care were associated with significantly lower levels of Medicare spending, lower likelihood of in-hospital death, and higher use of hospice care in regions characterized by higher levels of end-of-life spending.	Prospectively collected survey of Medicare patients associating advance directives with lower end of life Medicare expenditures. --> Supports the use of advance directives to reduce the use of inappropriate and costly end-of-life care.
72	II / C	Geriatric pre-operative evaluation	Chow WB, Rosenthal RA, Merkow RP, Ko CY, Esnaola NF; American College of Surgeons National Surgical Quality Improvement Program; American Geriatrics Society. Optimal preoperative assessment of the geriatric surgical patient: a best practices guideline from the American College of Surgeons National Surgical Quality Improvement Program and the American Geriatrics Society. J Am Coll Surg. 2012 Oct;215(4):453-66. PMID: 22917646	Tier-2 Source	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	Abstract not available	Society guideline --> Recommends elements of preoperative evaluation of geriatric patients prior to surgery
73	II / C	Risk reduction initiatives	Keeney JA, Nam D, Johnson SR, Nunley RM, Clohisy JC, Barrack RL. The Impact of Risk Reduction Initiatives on Readmission: THA and TKA Readmission Rates. J Arthroplasty. 2015 Dec;30(12):2057-60. PMID: 26111791	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	We assessed whether sequential incorporation of initiatives to decrease postoperative surgical complications were similarly effective in reducing 30-day readmission rates following total knee arthroplasty (TKA) and total hip arthroplasty (THA). Readmission rates following TKA decreased substantially (5.6% vs. 3.0%, P<0.001), but readmissions following THA (4.0% vs. 3.4%, P=0.41) were not significantly reduced. The greatest impact of the multimodal treatment approach was a reduction of surgically related TKA complications. Advanced medical disease, facility discharge status, and Medicare or Medicaid coverage contributed to the highest risk for 30-day readmission after THA. Risk models defining expected readmission rates should account for these factors to avoid penalizing hospitals that provide higher proportional care to Centers for Medicaid and Medicare Services (CMS) beneficiaries.	Retrospective, before-and-after quality improvement cohort study from a single institution compared 30 day hospital readmission following multiple interventions including measures to reduce infection, bleeding, VTE, and hyperglycemia. Readmissions for TKA decreased but those following THA did not. Strongest association of readmission risk was related to liver failure, peptic ulcer disease, diabetes with end organ disease, kidney disease, and heart failure. --> Historical controls could not account for general improvements in medical care unrelated to interventions studied but study suggests a variety of advances in care reduce readmission rate.
74	II / C / 1	Pre-operative evaluation	Committee on Standards and Practice Parameters. Apfelbaum JL, et.al. Practice advisory for preanesthesia evaluation: an updated report by the American Society of Anesthesiologists Task Force on Preanesthesia Evaluation. Anesthesiology, 2012 Mar; 116(3): 522-38. PMID: 22273990	Tier-2 Source	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	Abstract not available	Society guideline: opinion based recommendations informed by evidence appraisal. --> Recommendations for preanesthesia evaluation.

75	II / C / 1 / a	Fitness for surgery; cardiopulmonary fitness	Fleisher LA, Fleischmann KE, Auerbach AD, Barnason SA, Beckman JA, Bozkurt B, Davila-Roman VG, Gerhard-Herman MD, Holly TA, Kane GC, Marine JE, Nelson MT, Spencer CC, Thompson A, Ting HH, Uretsky BF, Wijeysundera DN; American College of Cardiology; American Heart Association. Circulation. 2014 Dec 9;130(24):2215-45. PMID: 25085962	Tier-2 Source	http://circ.ahajournals.org/content/early/2014/07/31/CIR.0000000000000106	Abstract not available	High quality society guideline with evidence appraisals --> "The focus of this clinical practice guideline is the perioperative cardiovascular evaluation and management of the adult patient undergoing moncardiac surgery."
76	II / C / 1 / c	Nasal culture	Kim DH. Et.al. Institutional prescreening for detection and eradication of Methicillin-Resistant Staphylococcus aureus in patients undergoing elective orthopaedic surgery. J Bone Joint Surg Am 2010 Aug 4; 92(9): 1820-6. PMID: 20610773	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Surgical site infection has been identified as one of the most important preventable sources of morbidity and mortality associated with medical treatment. The purpose of the present study was to evaluate the feasibility and efficacy of an institutional prescreening program for the preoperative detection and eradication of both methicillin-resistant and methicillin-sensitive Staphylococcus aureus in patients undergoing elective orthopaedic surgery. METHODS: Data were collected prospectively during a single-center study. A universal prescreening program, employing rapid polymerase chain reaction analysis of nasal swabs followed by an eradication protocol of intranasal mupirocin and chlorhexidine showers for identified carriers, was implemented. Surgical site infection rates were calculated and compared with a historical control period immediately preceding the start of the screening program. RESULTS: During the study period, 7019 of 7338 patients underwent preoperative screening before elective surgery, for a successful screening rate of 95.7%. One thousand five hundred and eighty-eight (22.6%) of the patients were identified as Staphylococcus aureus carriers, and 309 (4.4%) were identified as methicillin-resistant Staphylococcus aureus carriers. A significantly higher rate of surgical site infection was observed among methicillin-resistant Staphylococcus aureus carriers (0.97%; three of 309) compared with noncarriers (0.14%; seven of 5122) (p = 0.0162). Although a higher rate of surgical site infection was also observed among methicillin-sensitive Staphylococcus aureus carriers (0.19%; three of 1588) compared with noncarriers, this difference did not achieve significance (p = 0.709). Overall, thirteen cases of surgical site infection were identified during the study period, for an institutional infection rate of 0.19%. This rate was significantly lower than that observed during the control period (0.45%; twenty-four cases of surgical site infection among 5293 patients) (p = 0.0093). CONCLUSIONS: Implementation of an institution-wide prescreening program for the identification and eradication of methicillin-resistant and methicillin-sensitive Staphylococcus aureus carrier status among patients undergoing elective orthopaedic surgery is feasible and can lead to significant reductions in postoperative rates of surgical site infection. LEVEL OF EVIDENCE: Therapeutic Level III. See Instructions to Authors for a complete description of levels of evidence.	Prospective single center study using historical controls comparing surgical site infections before and after universal prescreening and treatment of nasal staphylococcus found to reduce surgical site infection. Note: cannot determine drop-out rate in control or experimental group. --> Supports the use of pre-operative screening and eradication of carrier state for Staphylococcal aureus prior to elective orthopedic surgery.
77	II / C / 1 / c	Nasal culture	Bode LGM. Et.al. Preventing surgical-site infections in nasal carriers of Staphylococuccus aureus. New England Journal of Medicine, 2010 Jan 7; 362(1): 9-17. PMID: 20054045	1/B	http://www.nejm.org/doi/pdf/10.1056/NEJMoa0808939	BACKGROUND: Nasal carriers of Staphylococcus aureus are at increased risk for health care-associated infections with this organism. Decolonization of nasal and extranasal sites on hospital admission may reduce this risk. METHODS: In a randomized, double-blind, placebo-controlled, multicenter trial, we assessed whether rapid identification of S. aureus nasal carriers by means of a real-time polymerase-chain-reaction (PCR) assay, followed by treatment with mupirocin nasal ointment and chlorhexidine soap, reduces the risk of hospital-associated S. aureus infection. RESULTS: From October 2005 through June 2007, a total of 6771 patients were screened on admission. A total of 1270 nasal swabs from 1251 patients were positive for S. aureus. We enrolled 917 of these patients in the intention-to-treat analysis, of whom 808 (88.1%) underwent a surgical procedure. All the S. aureus strains identified on PCR assay were susceptible to methicillin and mupirocin. The rate of S. aureus infection was 3.4% (17 of 504 patients) in the mupirocin-chlorhexidine group, as compared with 7.7% (32 of 413 patients) in the placebo group (relative risk of infection, 0.42; 95% confidence interval [CI], 0.23 to 0.75). The effect of mupirocin-chlorhexidine treatment was most pronounced for deep surgical-site infections (relative risk, 0.21; 95% CI, 0.07 to 0.62). There was no significant difference in all-cause in-hospital mortality between the two groups. The time to the onset of nosocomial infection was shorter in the placebo group than in the mupirocin-chlorhexidine group (P=0.005). CONCLUSIONS: The number of surgical-site S. aureus infections acquired in the hospital can be reduced by rapid screening and decolonizing of nasal carriers of S. aureus on admission. (Current Controlled Trials number, ISRCTN56186788.	A randomized, double-blind, placebo-controlled, multicenter trial comparing postoperative infection rates with or without treatment for positive nasal cultures for S. aureaus with mupirocin nasal ointment and chlorhexidine soap. --> Supports treatment of patients with Staphylococcus aureus diagnosed by nasal swab PCR assay to reduce incidence of surgical site infections.
78	II / C / 1 / c	Reducing nasal colonization; reducing skin colonization	Torres EG, Lindmair-Snell JM, Langan JW, Burnikel BG. Is Preoperative Nasal Povidone-Iodine as Efficient and Cost-Effective as Standard Methicillin-Resistant Staphylococcus aureus Screening Protocol in Total Joint Arthroplasty? J Arthroplasty. 2016 Jan;31(1):215-8. PMID: 26521129	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	The purpose of this study was to compare nasal povidone-iodine swab for total joint arthroplasty patients to methicillin-resistant Staphylococcus aureus (MRSA) screening on the incidence of 90-day postoperative surgical site infections in total knee and hip arthroplasties as well as the cost-effectiveness. This is a single-center retrospective review of primary or revision total knee or hip arthroplasty patients. There were 849 patients screened for MRSA and 1004 patients in the nasal swab groups, both with an infection rate of 0.8%. The mean cost for the nasal swab was $27.21 (SD, 0), significantly different (P ≤ .01) than the mean cost for MRSA screens, $121.16 (SD, 26.18). There were significant cost savings with no difference in infection rates; therefore, nasal povidone-iodine swab antiseptic is financially and clinically successful.	Single center, retrospective study with an unspecified number of patients excluded because of lack of 90 day follow-up. Study compared screening for MRSA and subsequent treatment with nasal mupirocin versus no screening and preoperative treatment of nares with povidone iodine solution. 90 day postoperative surgical site infection was 0.8% in both control and experimental groups. Cost of screening and treatment was $121.16. Cost of treatment without screening was $27.21. --> Preoperative treatment of nares with providone iodine appears to be of equal efficacy with substantial reduction in cost.
79	II / C / 2 / a	Dental screening	AAOS. Prevention of orthopaedic implant infection in patients undergoing dental procedures. Evidence-based guideline and evidence report. 2012	Tier-2 Source	http://www.aaos.org/research/guidelines/PUDP/PUDP_guideline.pdf	Recommendation #3: In the absence of reliable evidence linking poor oral health to prosthetic joint infection, it is the opinion of the work group that patients with prosthetic joint implants or other orthopaedic implants maintain appropriate oral hygiene. Grade of Recommendation: Consensus.	Professional society guideline. --> Does not address issue of pre-operative dental screening, but recommends good dental hygiene in patients with joint implants.

80	II / C / 2 / c	Preoperative physical therapy	Wang L, Lee M, Zhang Z, Moodie J, Cheng D, Martin J. Does preoperative rehabilitation for patients planning to undergo joint replacement surgery improve outcomes? A systematic review and meta-analysis of randomised controlled trials. BMJ Open. 2016 Feb 2;6(2):e009857. PMID: 26839013	2 / B	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4746481/	OBJECTIVES: The clinical impact of preoperative physiotherapy on recovery after joint replacement remains controversial. This systematic review aimed to assess the clinical impact of prehabilitation before joint replacement. DESIGN: We searched PubMed, Embase and Cochrane CENTRAL up to November 2015 for randomised controlled trials comparing prehabilitation versus no prehabilitation before joint replacement surgery. Postoperative pain and function scores were converted to Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain and function subscales (0-100, high scores indicate worse outcome). Random effects meta-analysis was performed to calculate weighted mean differences (WMD, 95% CI), subgrouped by hip and knee surgery. PRIMARY AND SECONDARY OUTCOMES: Postoperative pain and function scores, time to resume activities of daily living, quality of life, length of hospital stay, total cost, patient satisfaction, postoperative complications, any adverse events and discontinuations. RESULTS: Of 22 studies (1492 patients), 18 had high risk of bias. Prehabilitation slightly reduced pain scores within 4 weeks postoperatively (WMD -6.1 points, 95% CI -10.6 to -1.6 points, on a scale of 0-100), but differences did not remain beyond 4 weeks. Prehabilitation slightly improved WOMAC function score at 6-8 and 12 weeks (WMD -4.0, 95% CI -7.5 to -0.5), and time to climbing stairs (WMD -1.4 days, 95% CI -1.9 to -0.8 days), toilet use (-0.9 days, 95% CI -1.3 to -0.5 days) and chair use (WMD -1.2 days, 95% CI -1.7 to -0.8 days). Effects were similar for knee and hip surgery. Differences were not found for SF-36 scores, length of stay and total cost. Other outcomes of interest were inadequately reported. CONCLUSIONS: Existing evidence suggests that prehabilitation may slightly improve early postoperative pain and function among patients undergoing joint replacement; however, effects remain too small and short-term to be considered clinically-important, and did not affect key outcomes of interest (ie, length of stay, quality of life, costs).	A meta-analysis of 22 studies (1492 patients) of which 18 were judged to have a high risk of bias. Preoperative physical therapy prior to knee or hip surgery was variable and translation of outcome measures to WOMAC scores was also variable. Authors concluded that preoperative physical therapy showed small effect on improving short term pain and function. --> Study with limitations in methodology showed modest short term improvement with physical therapy prior to joint replacement.
81	II / C / 2 / c	Preoperative physical therapy	Calatayud J, Casaña J, Ezzatvar Y, Jakobsen MD, Sundstrup E, Andersen LL. High-intensity preoperative training improves physical and functional recovery in the early post-operative periods after total knee arthroplasty: a randomized controlled trial. Knee Surg Sports Traumatol Arthrosc. 2016 Jan 14. [Epub ahead of print] PMID: 26768606	2 / B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	PURPOSE: The benefits of preoperative training programmes compared with alternative treatment are unclear. The purpose of this study was to evaluate the effectiveness of a high-intensity preoperative resistance training programme in patients waiting for total knee arthroplasty (TKA). METHODS: Forty-four subjects (7 men, 37 women) scheduled for unilateral TKA for osteoarthritis (OA) during 2014 participated in this randomized controlled trial. Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), the Physical Functioning Scale of the Short Form-36 questionnaire (SF-36), a 10-cm visual analogue scale (VAS), isometric knee flexion, isometric knee extension, isometric hip abduction, active knee range of motion and functional tasks (Timed Up and Go test and Stair ascent-descent test) were assessed at 8 weeks before surgery (T1), after 8 weeks of training (T2), 1 month after TKA (T3) and finally 3 months after TKA (T4). The intervention group completed an 8-week training programme 3 days per week prior to surgery. RESULTS: Isometric knee flexion, isometric hip abduction, VAS, WOMAC, ROM extension and flexion and all the functional assessments were greater for the intervention group at T2, T3 and T4, whereas isometric knee extension was greater for this group at T2 and T4 compared with control. CONCLUSION: The present study supports the use of preoperative training in end-stage OA patients to improve early postoperative outcomes. High-intensity strength training during the preoperative period reduces pain and improves lower limb muscle strength, ROM and functional task performance before surgery, resulting in a reduced length of stay at the hospital and a faster physical and functional recovery after TKA. The present training programme can be used by specialists to speed up recovery after TKA.	RCT with a small cohort randomized to control versus 8 weeks of training prior to total knee replacement. Experimental group had improved WOMAC scores following surgery. --> Small study supports preoperative training prior to total knee replacement.
82	II / C / 3	Patient education pre-surgery	Yoon RS, Nellans KW, Geller JA, Kim AD, Jacobs MR, Macaulay W. Patient education before hip or knee arthroplasty lowers length of stay. J Arthroplasty. 2010 Jun;25(4):547-51. PMID: 19427164	2 / B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	From April 2006 to May 2007, 261 patients undergoing primary unilateral total hip arthroplasty or total knee arthroplasty were offered voluntary participation in a one-on-one preoperative educational program. Length of stay (LOS) and inpatient data were monitored and recorded, prospectively. Education participants enjoyed a significantly shorter LOS than nonparticipants for both total hip arthroplasty (3.1 +/- 0.8 days vs 3.9 +/- 1.4 days; P = .0001) and total knee arthroplasty (3.1 +/- 0.9 days vs 4.1 +/- 1.9 days; P = .001).	Unblinded, uncontrolled study. --> Suggests pre-operative education for patients undergoing total knee or total hip replacement surgery.
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83	III / A / 1	Surgeon/hospital volume	Wilson S, Marx RG, Pan TJ, Lyman S. Meaningful Thresholds for the Volume-Outcome Relationship in Total Knee Arthroplasty. J Bone Joint Surg Am. 2016 Oct 19;98(20):1683-1690. PMID: 27869618	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Increasing evidence supports the finding that patients undergoing a total knee arthroplasty with high-volume physicians and hospitals achieve better outcomes. Unfortunately, the existing definitions for high-volume surgeons and hospitals are highly variable and entirely arbitrary. The aim of this study was to identify a set of meaningful hospital and surgeon total knee arthroplasty volume thresholds. METHODS: Using 289,976 patients undergoing primary total knee arthroplasty from an administrative database, we applied stratum-specific likelihood ratio (SSLR) analysis of a receiver operating characteristic (ROC) curve to generate sets of volume thresholds most predictive of adverse outcomes. The outcomes considered for surgeon volume included 90-day complication and 2-year revision. For hospital volume, we considered 90-day complications and 90-day mortality. RESULTS: SSLR analysis of the ROC curves for 90-day complication and 2-year revision rates by surgeon volume identified four volume categories: 0 to 12, 13 to 59, 60 to 145, and ≥146 total knee arthroplasties per year. Complication rates decreased significantly ($p < 0.05$) in progressively higher-volume categories. Revision rates followed a similar pattern, but did not decrease between surgeons performing 60 to 145 arthroplasties per year and those performing ≥146 arthroplasties per year. SSLR analysis of 90-day complication and 90-day mortality rates by hospital volume also identified four volume categories: 0 to 89, 90 to 235, 236 to 644, and ≥645 total knee arthroplasties per year. Complication rates decreased significantly ($p < 0.05$) in progressively higher-volume categories, but the rates did not decrease between hospitals performing 236 to 644 arthroplasties per year and those performing ≥645 arthroplasties per year. Mortality rates for hospitals with ≥645 total knee arthroplasties per year were significantly lower ($p < 0.05$) than those below the threshold. CONCLUSIONS: Our study supports the use of SSLR analysis of ROC curves for risk-based volume stratification in total knee arthroplasty volume-outcomes research. SSLR analysis established meaningful volume definitions for low, medium, high, and very high-volume total knee arthroplasty surgeons and hospitals. This should help patients, surgeons, hospitals, and policymakers to make decisions with regard to the optimal delivery of total knee arthroplasty.	Retrospective study of almost 300, 000 New York state residents receiving primary total knee arthroplasty. Authors applied a "stratum-specific likelihood ratio" to determine correlation between surgeon volume versus complication and revision rates and hospital volume versus complications and mortality. "Surgeon volume identified four volume categories: 0 to 12, 13 to 59, 60 to 145, and ≥146 total knee arthroplasties per year. Complication rates decreased significantly ($p < 0.05$) in progressively higher-volume categories. Revision rates did not decrease between surgeons performing at least 60 arthroplasties per year. SSLR analysis of 90-day complication and 90-day mortality rates by hospital volume also identified four volume categories: 0 to 89, 90 to 235, 236 to 644, and ≥645 total knee arthroplasties per year. Complication rates decreased significantly ($p < 0.05$) in progressively higher-volume categories, but the rates did not decrease between hospitals with increments greater than 236 per year. Mortality rates for hospitals with ≥645 total knee arthroplasties per year were significantly lower ($p < 0.05$) than those below the threshold." --> Supports the conclusion that surgeon and hospital volume are associated with lower rates of complications.
84	III / A / 1	Surgeon volume	Lau RL, Perruccio AV, Gandhi R, Mahomed NN. The role of surgon volume on patient outcome in total knee arthroplasty: a systematic review of the literature. BMC Musculoskeletal Dis, 2012 Dec 14; 13(): 250. PMID: 23241362	2/B	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3534547/pdf/1471-2474-13-250.pdf	BACKGROUND: A number of factors have been identified as influencing total knee arthroplasty outcomes, including patient factors such as gender and medical comorbidity, technical factors such as alignment of the prosthesis, and provider factors such as hospital and surgeon procedure volumes. Recently, strategies aimed at optimizing provider factors have been proposed, including regionalization of total joint arthroplasty to higher volume centers, and adoption of volume standards. To contribute to the discussions concerning the optimization of provider factors and proposals to regionalize total knee arthroplasty practices, we undertook a systematic review to investigate the association between surgeon volume and primary total knee arthroplasty outcomes. METHODS: We performed a systematic review examining the association between surgeon volume and primary knee arthroplasty outcomes. To be included in the review, the study population had to include patients undergoing primary total knee arthroplasty. Studies had to report on the association between surgeon volume and primary total knee arthroplasty outcomes, including perioperative mortality and morbidity, patient-reported outcomes, or total knee arthroplasty implant survivorship. There were no restrictions placed on study design or language. RESULTS: Studies were variable in defining surgeon volume ('low': <3 to <52 total knee arthroplasty per year; 'high': >5 to >70 total knee arthroplasty per year). Mortality rate, survivorship and thromboembolic events were not found to be associated with surgeon volume. We found a significant association between low surgeon volume and higher rate of infection (0.26% - 2.8% higher), procedure time (165 min versus 135 min), longer length of stay (0.4 - 2.13 days longer), transfusion rate (13% versus 4%), and worse patient reported outcomes. CONCLUSIONS: Findings suggest a trend towards better outcomes for higher volume surgeons, but results must be interpreted with caution.	Systematic review, lower quality but with patient-oriented outcomes. --> Suggests better outcomes for higher volume surgeons, but results must be interpreted with caution.
85	III / A / 1	Surgeon volume	Baker P, Jameson S, Critchley R, Reed M, Gregg P, Deehan D. Center and surgeon volume influence the revision rate following unicondylar knee replacement: an analysis of 23,400 medial cemented unicondylar knee replacements. J Bone Joint Surg Am. 2013 Apr 17;95(8):702-9. PMID: 23595068	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Revision rates following unicondylar knee replacement vary among reporting institutions. Revision rates from institutions involved in the design of these implants and independent single-center series are comparable with those following total knee replacement, suggesting that higher operative volumes and surgical enthusiasm improve revision outcomes. METHODS: This registry-based cohort study involved the analysis of 23,400 medial cemented Oxford unicondylar knee replacements for the treatment of osteoarthritis. Total center and surgeon operative volumes were calculated over an eight-year time span since the inception of the registry (April 2003 to December 2010). The revision rate was calculated according to center volume and surgeon volume, each of which was grouped into five categories. The groups were compared with use of life tables, Kaplan-Meier plots, and Cox regression models that adjusted for variations in age, sex, and American Society of Anesthesiologists (ASA) grade among the groups. RESULTS: A total of 919 surgeons and a total of 366 centers performed at least one replacement, with the majority performing a small number of procedures. The revision rate for the centers with the lowest volume (fifty or fewer procedures over the eight-year study period) was 1.62 (95% confidence interval [CI], 1.42 to 1.82) revisions per 100 component years; this was significantly higher than the rate for the centers with the highest volume (more than 400 procedures), which was 1.16 (95% CI, 0.97 to 1.36) revisions per 100 component years. The five-year implant survival rate of 92.3% (95% CI, 91.2% to 93.3%) for the lowest-volume centers was significantly lower than the rate of 94.1% (95% CI, 93.0% to 95.2%) for the highest-volume centers. Similarly, the revision rate for the surgeons with the lowest volume (twenty-five or fewer procedures), 2.16 (95% CI, 1.91 to 2.41) revisions per 100 component years, was significantly higher than that for the surgeons with the highest volume (more than 200 procedures), 0.80 (95% CI, 0.62 to 0.98) revisions per 100 component years. The five-year survival rate of 90.1% (95% CI, 88.8% to 91.3%) for the lowest-volume surgeons was also significantly lower than the rate of 96.0% (95% CI, 95.0% to 97.0%) for the highest-volume surgeons. When center and surgeon volume were considered simultaneously, the hazard of revision was greater for lower-volume surgeons at lower-volume centers compared with higher-volume surgeons at higher-volume centers (hazard ratio = 1.87 [95% CI, 1.58 to 2.22], $p < 0.001$). CONCLUSIONS: High-volume centers and surgeons specializing in such procedures had superior results following unicondylar knee replacement compared with their low-volume counterparts. These results suggest that centers and surgeons should undertake a minimum of thirteen such procedures per year to achieve results comparable with the high-volume operators.	A retrospective, registry based cohort study with a large n adjusted for age, sex, and ASA grade. Cohort is unicondylar knee surgery patients using medial cemented Oxford unicondylar replacements. Study compared revision rates and survival rates among high and low volume surgeons and high and low volume centers and noted better outcomes for higher volume surgeons and centers. Does not deal statistically with standard of fifty cases per year compared with less than fifty cases per year. --> Supports association between higher volumes by surgeon and lower revision rates.

86	III / A / 1	Surgeon volume	Paterson JM, Williams JI, Kreder HJ, Mahomed NN, Gunraj N, Wang X, Laupacis A. Provider volumes and early outcomes of primary total joint replacement in Ontario. Can J Surg. 2010 Jun;53(3):175-83. PMID: 20507790	2/B	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2878994/	BACKGROUND: A relation between provider volume and outcome of total joint replacement (TJR) has not been demonstrated in Canada. Given the recent increase in TJR, changing patient characteristics and small sizes of previous Ontario studies, we reassessed whether adverse outcomes of TJR are related to hospital and surgeon procedure volumes. METHODS: We included all Ontarians aged 20 years and older who underwent a unilateral elective primary total hip replacement (THR) or total knee replacement (TKR) between April 2000 and March 2004. The main data sources were hospital discharge abstracts and physician billings. We defined provider volume as the average annual number of primary and revision procedures performed by hospitals and surgeons during the study period. We assessed the association between procedure volumes and acute length of hospital stay (ALOS) and between volume and rate of surgical complications during the index admission; death within 90 days of operation; readmission for amputation, fusion or excision within 1 year; and revision arthroplasty within 1 year. We adjusted for age, sex, comorbidity, arthritis type, teaching hospital status and discharge disposition. The analyses of hospital volume were adjusted for surgeon volume and vice versa. RESULTS: We included 20,290 patients who received THR and 27,217 who received TKR. Patient age, sex and comorbidity were significant predictors of complications and mortality. There were no associations between provider volume and mortality. Findings for other outcomes were mixed. Surgeon procedure volume was related to rates of revision THR but not to rates of revision TKR. Shorter ALOS was associated with male sex, younger age, fewer comorbidities, discharge to a rehabilitation unit or facility and greater surgeon volume. CONCLUSION: Patient characteristics were significant predictors of complications, ALOS and mortality after primary TJR. Evidence for a relation between provider volume and outcome was limited and inconsistent.	Retrospective study of residents of Ontario age 20 years and older who had unilateral, elective primary total hip or knee replacement relating adverse outcomes to hospital and surgeon procedure volumes adjusting for risk factors. Authors divided surgeons performing THR into 4 volume categories based on the quartile per annum distribution of patients: 2–25, 26–40, 41–60 and 61 or more procedures. The authors found "little consistent evidence for an important relation between provider volumes and early outcomes of elective primary TJR in Ontario." The corresponding cut-points for TKR were: 2–35, 36–40, 51–70 and 71 or more procedures per annum. Authors calculated hospital volume categories in a similar way: 10-110, 111-150, 151-225, >225 and excluded hospitals that performed fewer than 10 procedures per annum. "Patient age, sex and comorbidity were significant predictors of complications and mortality. There were no associations between provider volume and mortality. Findings for other outcomes were mixed. Surgeon procedure volume was related to rates of revision THR but not to rates of revision TKR." --> The volume categories in this study are much narrower than in the Wilson study (see above citation) and may have obscured differences in rate of prevelence of adverse outcomes related to volume. This study does not
87	III / A / 1	Surgeon specialization	Sahni NR, Dalton M, Cutler DM, Birkmeyer JD, Chandra A. Surgeon specialization and operative mortality in United States: retrospective analysis. BMJ. 2016 Jul 21;354:i3571. doi: 10.1136/bmj.i3571. PMID: 27444190	2/B	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4957587/	OBJECTIVE: To measure the association between a surgeon's degree of specialization in a specific procedure and patient mortality. DESIGN: Retrospective analysis of Medicare data. SETTING: US patients aged 66 or older enrolled in traditional fee for service Medicare. PARTICIPANTS: 25 152 US surgeons who performed one of eight procedures (carotid endarterectomy, coronary artery bypass grafting, valve replacement, abdominal aortic aneurysm repair, lung resection, cystectomy, pancreatic resection, or esophagectomy) on 695 987 patients in 2008-13. MAIN OUTCOME MEASURE: Relative risk reduction in risk adjusted and volume adjusted 30 day operative mortality between surgeons in the bottom quarter and top quarter of surgeon specialization (defined as the number of times the surgeon performed the specific procedure divided by his/her total operative volume across all procedures). RESULTS: For all four cardiovascular procedures and two out of four cancer resections, a surgeon's degree of specialization was a significant predictor of operative mortality independent of the number of times he or she performed that procedure: carotid endarterectomy (relative risk reduction between bottom and top quarter of surgeons 28%, 95% confidence interval 0% to 48%); coronary artery bypass grafting (15%, 4% to 25%); valve replacement (46%, 37% to 53%); abdominal aortic aneurysm repair (42%, 29% to 53%); lung resection (28%, 5% to 46%); and cystectomy (41%, 8% to 63%). In five procedures (carotid endarterectomy, valve replacement, lung resection, cystectomy, and esophagectomy), the relative risk reduction from surgeon specialization was greater than that from surgeon volume for that specific procedure. Furthermore, surgeon specialization accounted for 9% (coronary artery bypass grafting) to 100% (cystectomy) of the relative risk reduction otherwise attributable to volume in that specific procedure. CONCLUSION: For several common procedures, surgeon specialization was an important predictor of operative mortality independent of volume in that specific procedure. When selecting a surgeon, patients, referring physicians, and administrators assigning operative workload may want to consider a surgeon's procedure specific volume as well as the degree to which a surgeon specializes in that procedure.	High quality retrospective cohort study addressing the issue of surgeon volume and degree of specialization controlling for comobrbiities and using 30 day operative mortality as an outcome. Does not include patients undergoing orthopedic procedures. --> Supports the conclusion that surgical specialization reduces operative mortality and may be more important than surgical volume for some procedures.

88	III / A / 1	Hospital volume	Sibley RA, Charubhumi V, Hutzler LH, Paoli AR, Bosco JA. Joint Replacement Volume Positively Correlates With Improved Hospital Performance on Centers for Medicare and Medicaid Services Quality Metrics. J Arthroplasty. 2017 May;32(5):1409-1413. doi: 10.1016/j.arth.2016.12.010. Epub 2016 Dec 21. PMID: 28089185	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: The Center for Medicare and Medicaid Services (CMS) is transitioning Medicare from a fee-for-service program into a value-based pay-for-performance program. In order to accomplish this goal, CMS initiated 3 programs that attempt to define quality and seek to reward high-performing hospitals and penalize poor-performing hospitals. These programs include (1) penalties for hospital-acquired conditions (HACs), (2) penalties for excess readmissions for certain conditions, and (3) performance on value-based purchasing (VBP). The objective of this study was to determine whether high-volume total joint hospitals perform better in these programs than their lower-volume counterparts. METHODS: We analyzed data from the New York Statewide Planning and Research Cooperative System database on total New York State hospital discharges from 2013 to 2015 for total knee and total hip arthroplasty. This was compared to data from Hospital Compare on HAC's, excess readmissions, and VBP. From these databases, we identified 123 hospitals in New York, which participated in all 3 Medicare pay-for-performance programs and performed total joint replacements. RESULTS: Over the 3-year period spanning 2013-2015, hospitals in New York State performed an average of 1136.59 total joint replacement surgeries and achieved a mean readmission penalty of 0.005909. The correlation coefficient between surgery volume and combined performance score was 0.277. Of these correlations, surgery volume and VBP performance, and surgery volume and combined performance showed statistical significance (P < .01). CONCLUSION: Our study demonstrates that there is a positive association between joint replacement volumes and overall hospital quality, as well as joint replacement volumes and VBP performance, specifically. These findings are consistent with previously reported associations between patient outcomes and procedure volumes. However, a relationship between joint replacement volume and HAC scores or readmission penalties could not be demonstrated.	A retrospective analysis regarding hospital volumes for total knee and hip replacements and parameters of CMS value based purchasing models. Authors found a positive correlation between hospital volume and CMS performance measures. Measurment standard varied during the period of study and a simple association between hospital volumes and clinically relevant outcomes was not apparent. --> Complex study of three value based purchasing programs implemented by CMS in New York state suggests an association between hospital volume and a composite of value indicators.
89	III / A / 4	Time of surgery start	Kelz RR, Freeman KM, Hosokawa PW, Asch DA, Spitz FR, Moskowitz M, Henderson WG, Mitchell ME, Itani KM. Time of day is associated with postoperative morbidity: an analysis of the national surgical quality improvement program data. Ann Surg. 2008 Mar;247(3):544-52. PMID: 18376202	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	OBJECTIVE: To examine the association between surgical start time and morbidity and mortality for nonemergent procedures. SUMMARY BACKGROUND DATA: Patients require medical services 24 hours a day. Several studies have demonstrated a difference in outcomes over the course of the day for anesthetic adverse events, death in the ICU, and dialysis care. The relationship between operation start time and patient outcomes is yet undefined. METHODS: We performed a retrospective cohort study of 144,740 nonemergent general and vascular surgical procedures performed within the VA Medical System 2000-2004 and entered into the National Surgical Quality Improvement Program Database. Operation start time was the independent variable of interest. Logistic regression was used to adjust for patient and procedural characteristics and to determine the association between start time and, in 2 independent models, mortality and morbidity. RESULTS: Unadjusted later start time was significantly associated with higher surgical morbidity and mortality. After adjustment for patient and procedure characteristics, mortality was not significantly associated with start time. However, after appropriate adjustment, operations starting between 4 pm and 6 pm were associated with an elevated risk of morbidity (OR = 1.25, P < or = 0.005) over those starting between 7 am and 4 pm as were operations starting between 6 pm and 11 pm (OR = 1.60, P < or = 0.005). CONCLUSIONS: When considering a nonemergent procedure, surgeons must bear in mind that cases that start after routine "business" hours within the VA System may face an elevated risk of complications that warrants further evaluation.	A retrospective cohort study studying association between surgical start time and subsequent morbidity or mortality. Note: does not deal with orthopedic surgery; cohort comprised of general and cardiovascular surgery in VA System. --> Supports starting surgeries during "business hours" rather than after-hours to reduce risk of complications.
90	III / A / 4	Time of surgery start	Kelz RR, Tran TT, Hosokawa P, Henderson W, Paulson EC, Spitz F, Hamilton BH, Hall BL. Time-of-day effects on surgical outcomes in the private sector: a retrospective cohort study. J Am Coll Surg. 2009 Oct;209(4):434-445.e2. PMID: 19801316	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Surgical care is delivered around the clock. Elective cases within the Veterans Affairs health system starting after 4 pm appear to have an elevated risk of morbidity, but not mortality, compared with earlier cases. The relationship between operation start time and patient outcomes is not described in private-sector patients or for emergency cases. STUDY DESIGN: We performed a retrospective cohort study of 56,920 general and vascular surgical procedures performed from October 2001 through September 2004, and entered into the National Surgical Quality Improvement Program database. Operation start time was the independent variable of interest. Random effects, hierarchical logistic regression models adjusted for patient, operative, and facility characteristics. Two independent models determined associations between start time and morbidity or mortality. Subset analysis was performed for emergency and nonemergency cases. RESULTS: After adjustment for patient and procedure characteristics, mortality had a moderately strong association with start time, but only for nonemergency cases starting 9:30 pm to 7:30 am (odds ratio = 1.752; p = 0.028; reference 7:30 am to 9:30 am). As for morbidity, after adjustment, operations starting 9:30 am to 1:30 pm and 5:30 pm to 9:30 pm were associated with a weakly elevated risk of morbidity, but those starting 9:30 pm to 7:30 am demonstrated a strong effect on morbidity (odds ratio = 1.32; p < 0.0001). Subgroup analysis showed this effect was largely a result of elevated risk of morbidity in emergency cases from this overnight time period (odds ratio = 1.48; p = 0.001). CONCLUSIONS: Surgical start times are associated with risk-adjusted patient outcomes. In terms of facility operations management and resource allocation, consideration should be given to the capacity to accommodate cases with differences in risk during different time periods.	A retrospective cohort study of 56,920 general and vascular procedures adjusted for confounding variables with unclear methodology indicated higher mortality and morbidity for non emergency cases starting between 9:30pm to 7:30am. --> Supports the conclusion that operative start times between 9:30pm to 7:30am carry increased risk of morbidity and mortality for general and vascular surgical procedures.

91	III / A / 4	Time of surgery start	Peskun C, Walmsley D, Waddell J, Schemitsch E. Effect of surgeon fatigue on hip and knee arthroplasty. Can J Surg, 2012 Apr; 55(2): 81-6. PMID: 22269219	2/B	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3310761/pdf/0550081.pdf	BACKGROUND: There is growing support in the literature that patient outcomes are adversely affected by physician fatigue in operator-dependent cognitive and technical tasks. Recent increases in total joint arthroplasty caseloads have resulted in longer operative days and increased surgeon fatigue. We sought to determine if time of day predicts perioperative complications and outcomes in total joint arthroplasty. METHODS: The records of all total hip and knee arthroplasties (THA; TKA) performed for primary osteoarthritis in one calendar year at one large university hospital were retrospectively reviewed. Demographic data, surgery start time and duration, intraoperative complications, radiographic component alignment and functional outcome scores (SF-12 and Western Ontario and McMaster Universities Osteoarthritis Index) were collected and analyzed using linear and nonparametric rank correlation statistics. Data were corrected for sex, body mass index, surgeon and postcall operating days. RESULTS: In the THA cohort (n=341), a later surgery start time was significantly related to duration of surgery (p= 0.004, mean difference -7.1 min). There was a trend toward significance between a later surgery start time and intraoperative femur fracture (p= 0.05). Postoperative complications, component alignment and functional outcome scores were not significantly affected by surgery start time. There were no significant findings for any of the intraoperative or postoperative outcomes in the TKA cohort (n=292). CONCLUSION: Duration of surgery and incidence of intraoperative complications for THA may increase with later surgery start time; however, the relatively small statistical differences observed imply that they likely are not clinically significant.	Retrospective cohort study of prognosis; duration of surgery as patient-oriented outcome. --> Supports avoiding late surgical start times, but small statistical differences imply results are lilkely not clinically significant.
92	III / A / 6	Concurrent/Overlapping Surgeries	American College of Surgeons Statements on Principles. Section D - The Operation - Interoperative Responsibility of the Primary Surgeon: Concurrent or Simultaneous Operations and Overlapping Operations	Tier 3 Source	https://www.facs.org/about-acs/statements/stonprin	Concurrent or Simultaneous Operations: Concurrent or simultaneous operations occur when the critical or key components of the procedures for which the primary attending surgeon is responsible are occurring all or in part at the same time. The critical or key components of an operation are determined by the primary attending surgeon. A primary attending surgeon's involvement in concurrent or simultaneous surgeries on two different patients in two different rooms is inappropriate.Overlapping Operations: Overlap of two distinct operations by the primary attending surgeon occurs in two general circumstances.The first and most common scenario is when the key or critical elements of the first operation have been completed, and there is no reasonable expectation that the primary attending surgeon will need to return to that operation. In this circumstance, a second operation is started in another operating room while a qualified practitioner performs noncritical components of the first operation—for example, wound closure—allowing the primary surgeon to initiate the second operation. In this situation, a qualified practitioner must be physically present in the operating room of the first operation. The second and less common scenario is when the key or critical elements of the first operation have been completed and the primary attending surgeon is performing key or critical portions of a second operation in another room. In this scenario, the primary attending surgeon must assign immediate availability in the first operating room to another attending surgeon. The patient needs to be informed in either of these circumstances. The performance of overlapping procedures should not negatively affect the seamless and timely flow of either procedure.	Professional society guideline on overlapping versus concurrent surgeries. --> Supports the policy that the primary attending surgeon should be present for critical componants of the operation.
93	III / A / 6	Concurrent/overlapping surgeries	Zygourakis CC, Sizdahkhani S, Keefe M, Lee J, Chou D, Mummaneni PV, Ames CP. Comparison of Patient Outcomes and Cost of Overlapping Versus Nonoverlapping Spine Surgery. World Neurosurg. 2017 Apr;100:658-664.e8. PMID: 28137549	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Overlapping surgery recently has gained significant media attention, but there are limited data on its safety and efficacy. To date, there has been no analysis of overlapping surgery in the field of spine. Our goal was to compare overlapping versus nonoverlapping spine surgery patient outcomes and cost. METHODS: A retrospective review was undertaken of 2319 spine surgeries (n = 848 overlapping; 1471 nonoverlapping) performed by 3 neurosurgery attendings from 2012 to 2015 at the University of California San Francisco. Collected variables included patient age, sex, insurance, American Society of Anesthesiology score, severity of illness, risk of mortality, procedure type, surgeon, day of surgery, source of transfer, admission type, overlapping versus nonoverlapping surgery (≥1 minute of overlapping procedure time), Medicare-Severity Diagnosis-Related Group, osteotomy, and presence of another attending/fellow/resident. Univariate, then multivariate mixed-effect models were used to evaluate the effect of the collected variables on the following outcomes: procedure time, estimated blood loss, length of stay, discharge status, 30-day mortality, 30-day unplanned readmission, unplanned return to OR, and total hospital cost. RESULTS: Urgent spine cases were more likely to be done in an overlapping fashion (all P < 0.01). After we adjusted for patient demographics, clinical indicators, and procedure characteristics, overlapping surgeries had longer procedure times (estimate = 26.17; P < 0.001) and lower rates of discharge to home (odds ratio 0.65; P < 0.001), but equivalent rates of 30-day mortality, readmission, return to the operating room, estimated blood loss, length of stay, and total hospital cost (all P = ns). CONCLUSIONS: Overlapping spine surgery may be performed safely at our institution, although continued monitoring of patient outcomes is necessary. Overlapping surgery does not lead to greater hospital costs.	Retrospective single institution cohort study of patients undergoing spine surgery with or without "overlapping" surgeries as defined by "≥1 minute of overlapping procedure time." Patients undergoing overlapping surgeries had no increase in mortality, readmissions, return to the OR, blood loss, length of stay or total hospital cost. --> This paper does not deal with concurrent surgeries. Limitation of study is definition of overlapping surgery as ≥1 minute would likely increase the denominator and possibly underrepresent adverse outcomes.
94	III / B	General surgical guidelines	McGrory BJ, Weber KL, Jevsevar DS, Sevarino K. Surgical Management of Osteoarthritis of the Knee: Evidence-based Guideline. J Am Acad Orthop Surg. 2016 Aug;24(8):e87-93. PMID: 27355286	Tier 2 source	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	Surgical Management of Osteoarthritis of the Knee: Evidence-based Guideline is based on a systematic review of the current scientific and clinical research. The guideline contains 38 recommendations pertaining to the preoperative, perioperative, and postoperative care of patients with osteoarthritis (OA) of the knee who are considering surgical treatment. The purpose of this clinical practice guideline is to help improve surgical management of patients with OA of the knee based on current best evidence. In addition to guideline recommendations, the work group highlighted the need for better research on the surgical management of OA of the knee.	Professional society guideline related to surgical management of osteoarthritis of the knee. --> Recommendations relate primarily to specifics of surgery.

95	III / B / 1	Nerve block	Jenstrup MT. Jaeger P. Lund J. Fomsgaard JS. Bache S. Mathiesen O. Larsen TK. Dahl JB. Effects of adductor-canal-blockade on pain and ambulation after total knee arthroplasty: a randomized study. Acta Anaesthesiologica Scandinavica. 56(3):357-64, 2012 Mar. PMID: 22221014	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	AB BACKGROUND: Total knee arthroplasty (TKA) is associated with intense post-operative pain. Besides providing optimal analgesia, reduction in side effects and enhanced mobilization are important in this elderly population. The adductor-canal-blockade is theoretically an almost pure sensory blockade. We hypothesized that the adductor-canal-blockade may reduce morphine consumption (primary endpoint), improve pain relief, enhance early ambulation ability, and reduce side effects (secondary endpoints) after TKA compared with placebo. METHODS: Patients aged 50-85 years scheduled for TKA were included in this parallel double-blind, placebo-controlled randomized trial. The patients were allocated to receive a continuous adductor-canal-blockade with intermittent boluses via a catheter with either ropivacaine 0.75% (n=34) or placebo (n=37) (http://www.clinicaltrials.gov Identifier: NCT01104883). RESULTS: Seventy-five patients were randomized in a 1:1 ratio and 71 patients were analyzed. Morphine consumption from 0 to 24h was significantly reduced in the ropivacaine group compared with the placebo group (40+/-21 vs. 56+/-26mg, P=0.006). Pain was significantly reduced in the ropivacaine group during 45 degrees flexion of the knee (P=0.01), but not at rest (P=0.06). Patients in the ropivacaine group performed the ambulation test, the Timed-Up-and-Go (TUG) test, at 24h significantly faster than patients in the placebo group (36+/-17 vs. 50+/-29s, P=0.03). CONCLUSION: The adductor-canal-blockade significantly reduced morphine consumption and pain during 45 degrees flexion of the knee compared with placebo. In addition, the adductor-canal-blockade significantly enhanced ambulation ability assessed by the TUG test	A double-blind, placebo-controlled randomized trial relating the use of adductor-canal-blockade with reduced morphine consumption, reduced pain and improved function postoperatively. --> Supports the use of adductor nerve block to improve post-operative mobilization.
96	III / B / 1	Nerve block	Andersen, Henning Lykke MD; Gyrn, Jens MD; Moller, Lars MD; Christensen, Bodil RN; Zaric, Dusanka MD, PhD. Continuous Saphenous Nerve Block as Supplement to Single-Dose Local Infiltration Analgesia for Postoperative Pain Management After Total Knee Arthroplasty. Regional Anesthesia & Pain Medicine, 2013 Mar/Apr; 38(2):106-111. PMID: 23222363	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	AB Background and Objectives: Local infiltration analgesia (LIA) reduces pain after total knee arthroplasty without the motor blockade associated with epidural analgesia or femoral nerve block. However, the duration and efficacy of LIA are not sufficient. A saphenous nerve block, in addition to single-dose LIA, may improve analgesia without interfering with early mobilization. Methods: Forty patients were included in this double-blind randomized controlled trial. All patients received spinal anesthesia for surgery and single-dose LIA during the operation. An ultrasound-guided saphenous nerve catheter was placed postoperatively in the adductor canal at midthigh level. Patients were randomized into 2 groups to receive 15-mL boluses of either ropivacaine 7.5 mg/mL or saline twice daily for 2 postoperative days. Results: Worst pain scores during movement on the day of surgery were significantly lower in the ropivacaine group (median [range] visual analog scale, 3 [0-7] vs 5.5 [0-10]; P < 0.050), as well as pain at rest (visual analog scale, 2 [0-8] vs 4 [0-8]; P = 0.032). Breakthrough pain occurred later in the ropivacaine group (10.5 [range, 0.5-48] hours vs 3.4 [range, 0.5-24] hours; P = 0.011). All patients in the ropivacaine group were able to ambulate on the day of surgery versus 13 patients in the control group (P = 0.004). Fewer patients had sleep disturbance on the first postoperative night in the ropivacaine group (P = 0.038). We found no differences in morphine consumption. Conclusions: The combination of a saphenous nerve block with single-dose LIA offered better pain relief on the day of surgery than LIA alone. (C)2013 American Society of Regional Anesthesia and Pain Medicine.	Single trial, reasonably well-done, but small sample size, same as for Jenstrup article. --> Supports use of saphenous nerve block to reduce pain without interfering with early mobilization.
97	III / B / 1	Nerve block	Hanson NA, Allen CJ, Hostetter LS, Nagy R, Derby RE, Slee AE, Arslan A, Auyong DB. Continuous ultrasound-guided adductor canal block for total knee arthroplasty: a randomized, double-blind trial. Anesth Analg. 2014 Jun;118(6):1370-7. PMID: 24842182	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Adductor canal blocks have shown promise in reducing postoperative pain in total knee arthroplasty patients. No randomized, controlled studies, however, evaluate the opioid-sparing benefits of a continuous 0.2% ropivacaine infusion at the adductor canal. We hypothesized that a continuous adductor canal block would decrease postoperative opioid consumption. METHODS: Eighty subjects presenting for primary unilateral total knee arthroplasty were randomized to receive either a continuous ultrasound-guided adductor canal block with 0.2% ropivacaine or a sham catheter. All subjects received a preoperative single-injection femoral nerve block with spinal anesthesia as is standard of care at our institution. Cumulative IV morphine consumption 48 hours after surgery was evaluated with analysis of covariance, adjusted for baseline characteristics. Secondary outcomes included resting pain scores (numeric rating scale), peak pain scores during physical therapy on postoperative days 1 and 2, quadriceps maximum voluntary isometric contraction, distance ambulated during physical therapy, postoperative nausea and vomiting, and satisfaction with analgesia. RESULTS: Eighty subjects were randomized, and 76 completed the study per-protocol. The least-square mean difference in cumulative morphine consumption over 48 hours (block - sham) was -16.68 mg (95% confidence interval, -29.78 to -3.59, P = 0.013). Total morphine use between 24 and 48 hours (after predicted femoral nerve block resolution) also differed by least-square mean -11.17 mg (95% confidence interval,: -19.93 to -2.42, P = 0.013). Intention-to-treat analysis was similar to the per-protocol results. Functional outcomes revealed subjects in the adductor canal catheter group had better quadriceps strength (P = 0.010) and further distance ambulated (P = 0.034) on postoperative day 2. CONCLUSIONS: A continuous adductor canal block for total knee arthroplasty reduces opioid consumption compared with that of placebo in the first 48 hours after surgery. Other outcomes including quadriceps strength, distance ambulated, and pain scores all show benefit from an adductor canal catheter after total knee arthroplasty but require further study before being interpreted as conclusive.	High-quality, single-center, randomized controled trial relating use of adductor blocks to reduce requirement for morphine. Cohort was small to moderate in size. Patient-oriented results included reduced pain and improved post-operative ambulation. --> Supports use of adductor blocks as a component of mulit-modal anesthesia for total knee arthroplasty.
98	III / B / 2	Reducing skin colonization; Chlorhexidine	Zywiel MG. Daley JA. Delanois RE. Naziri Q. Johnson AJ. Mont MA. Advance pre-operative chlorhexidine reduces the incidence of surgical site infections in knee arthroplasty. International Orthopaedics. 35(7):1001-6, 2011 Jul. PMID: 20563806	2/B	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3167398/pdf/264_2010_Article_1078.pdf	AB Surgical site infections following elective knee arthroplasties occur most commonly as a result of colonisation by the patient's native skin flora. The purpose of this study was to evaluate the incidence of deep surgical site infections in knee arthroplasty patients who used an advance cutaneous disinfection protocol and who were compared to patients who had peri-operative preparation only. All adult reconstruction surgeons at a single institution were approached to voluntarily provide patients with chlorhexidine gluconate-impregnated cloths and a printed sheet instructing their use the night before and morning of surgery. Records for all knee arthroplasties performed between January 2007 and December 2008 were reviewed to determine the incidence of deep incisional and periprosthetic surgical site infections. Overall, the advance pre-operative protocol was used in 136 of 912 total knee arthroplasties (15%). A lower incidence of surgical site infection was found in patients who used the advance cutaneous preparation protocol as compared to patients who used the in-hospital protocol alone. These findings were maintained when patients were stratified by surgical infection risk category. No surgical site infections occurred in the 136 patients who completed the protocol as compared to 21 infections in 711 procedures (3.0%) performed in patients who did not. Patient-directed skin disinfection using chlorhexidine gluconate-impregnated cloths the evening before, and the morning of, elective knee arthroplasty appeared to effectively reduce the incidence of surgical site infection when compared to patients who underwent in-hospital skin preparation only.	Uncontrolled study comparing surgical site infections in patients using chlorhexidine gluconate-impregnated cloths and instruction sheets prior to elective arthroplasty. --> Supports the conclusion that chlorhexidine night before and morning of surgery can lower infection risk.
99	III / B / 2	Avoiding infection	World Health Organization. Global Guidelines for the Prevention of Surgical Site Infection. 2016.	Tier-1 Source	http://apps.who.int/iris/bitstream/10665/250680/1/9789241549882-eng.pdf?ua=1	"The aim of these guidelines is to provide a comprehensive range of evidence-based recommendations for interventions to be applied during the pre-, intra- and postoperative periods for the prevention of SSI, while also considering aspects related to resource availability and values and preferences."	Comprehensive guideline related to surgical site infections with numerous citations and evidence tables. --> Provides specific recommendations related to surgical site infections.

100	III / B / 2	Perioperative antibiotics	Parvizi J, Gehrke T. Proceedings of the International Consensus Meeting on Perioprosthetic Joint Infection. International Consensus Group LLC, 2013. ISBN: 978-1-57400-147-1.	Tier-2 Source	http://datatrace.com/flipbooks/MPJI/#p=1	Executive Summary: Periprosthetic joint infection (PJI), with its disastrous implications, continues to challenge the orthopaedic community. Practicing orthopaedic surgeons continue to invest efforts to minimize surgical site infection (SSI). Although high-level evidence may support some of these practices, many are based on little to no scientific foundation. This results in wide variation across the globe for prevention and management of PJI. To address this, The International Consensus Meeting on Periprosthetic Joint Infection was organized. Delegates from disciplines including orthopaedic surgery, infectious disease, and many others participated.	Proceedings of The International Consensus Meeting on Periprosthetic Joint Infection. Numerous references of variable quality. --> International consensus document on prevention of prosthetic joint infection.
101	III / B / 2	Perioperative antibiotics; anticoagulation	Technical specifications for ACE Demonstration Quality Monitoring Program. Measures 1-4: Surgical Care Improvement Project measures. CMS, [revised] 2011.	Tier-1 Source	http://www.scip.mednet.ucla.edu/pages/scipmeasures	Introduction: The CMS Surgical Care Improvement Project (SCIP) measures are a subset of National Quality Hospital Measures created through the joint efforts of the Centers for Medicare & Medicaid and the Joint Commission (Specifications Manual for National Hospital Quality Measures Version 2.5 effective for discharges 10-01-2008 through 03-31-2009). The SCIP measures have been endorsed by the National Quality Forum, and are used by Hospital Compare, the Premier demonstration, and RHQDAPU. Corresponding measures are used by PQRI at the individual physician level. The NQF endorsed measures are calculated across a defined list of major surgical procedures and separately for the MS-DRG ACE demonstration surgical procedure groups of CABG, Cardiac Valves, and Hip and Knee Replacement.	Surgical Care Improvement Project recommendations --> CMS standard for measures to prevent infection and venous thromboembolism.
102	III / B / 2	Perioperative antibiotics	Hill C, Mazas F, Flamant R, Evrard J. Prophylactic cefazolin versus placebo in total hip replacement: report of a multicentre double-blind randomised trial. Lancet, 1981 Apr 11; 317(8224): 795-7. PMID: 6111670	1/A	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	The effect of five days of antibiotic prophylaxis with cefazolin injections (beginning just before surgery) on postoperative infections (beginning just before surgery) on postoperative infectious complications was evaluated in a double-blind, randomised, placebo-controlled trial in nine centres on 2137 patients undergoing hip replacement. Antibiotic prophylaxis reduced the number of hip infections significantly from 3.3% (placebo) to 0.9% (cefazolin). Positive peroperative blood samples and positive bacteriological examination of the drain were risk factors for hip infection but the prognostic value of obesity, diabetes, or previous hip surgery was not confirmed. Development of a urinary infection was not related to hip infection. Hip infections were less common in the four centres with hypersterile operating theatres, and the benefits of prophylactic antibiotics were restricted to patients having hip replacement operations in conventional theatres.	Multicenter, double blind, placebo controlled trial investigating the effect of antibiotic prophylaxis on infection following hip surgery. Note: hip infection was reduced with cefazolin administration to patients with surgery in standard operating rooms, but no difference seen with or without cefazolin when laminar flow used in operating rooms. --> Supports use of antibiotics to reduce post-operative infection.
103	III / B / 2	Perioperative antibiotics	Pavel A, Smith RL, Ballard A, Larsen AJ. Prophylactic antibiotics in clean orthopaedic surgery. J Bone Joint Surg Am, 1974 June; 56(4): 777-82. PMID: 4600111	1/A	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	A double-blind prospective study involving 1,591 clean orthopaedic surgical procedures was performed to test the effectiveness of preoperative and intraoperative antibiotics in reducing the postoperative infection rate. The antibiotic and placebo groups were analyzed for factors known to predispose to infection. A decrease in the over-all postoperative infection rate from 5 per cent in the placebo group to 2.8 per cent in the antibiotic group was found.	Double blind prospective study investigating the effect of perioperative antibiotics on postoperative infection in patients with knee or hip replacement sugery. Proportion of cohort with knee and hip replacement surgeries is not stated. Older study. --> Supports the use of pre-operative and intra-operative antibiotics in reducing the rate of post-opertive infection.
104	III / B / 3	Tranexamic acid	Ho KM, Ismail H. Use of intravenous tranexamic acid to reduce allogeneic blood transfusion in total hip and knee arthroplasty: a meta-analysis. Anaesth Intens Care, 2003; 31(5): 529-37. PMID: 14601276.	1/A	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	Total hip or knee arthroplasty is associated with significant blood loss. Techniques such as the use of antifibrinolytics or desmopressin, or normovolaemic haemodilution have been used to reduce the need for allogeneic blood transfusion. Tranexamic acid has been used to reduce blood loss and transfusion requirement for total hip and knee arthroplasty, with variable results. This meta-analysis aims to evaluate whether intravenous tranexamic acid, when compared with placebo, reduces blood loss and transfusion requirement in total hip and knee joint replacement surgery and whether it might increase the risk of thromboembolic complications. The literature search was based on MEDLINE, EMBASE, Cochrane Controlled Trials Register, and information from the pharmaceutical company that produces tranexamic acid (Pharmacia-Upjohn). We identified 15 clinical trials and 12 were considered suitable for detailed data extraction. Tranexamic acid reduces the proportion of patients requiring allogeneic blood transfusion (OR 0.16, 95% CI: 0.09-0.26), total amount of blood loss (WMD 460 ml, 95% CI: 274-626 ml), and the total number of units of allogeneic blood transfused (WMD 0.85 unit, 95% CI: 0.36-1.33). Tranexamic acid does not increase the risk of thromboembolic complications such as deep vein thrombosis, pulmonary embolism, thrombotic cerebral vascular accident, or myocardial infarction (OR 0.98, 95% CI: 0.45-2.12). Intravenous tranexamic acid appears effective and safe in reducing allogeneic blood transfusion and blood loss in total hip and knee arthroplasty.	A meta analysis of 12 clinical trials --> Supports use of tranexamic acid to decrease transfusions and blood loss without increasing thromboembolic complications.
105	III / B / 3	Tranexamic acid	Panchmatia JR, Chegini S, Lobban D, Shah G, Stapleton C, Smallman JM, Kucheria R. The routine use of tranexamic acid in hip and knee replacements. Bull NYU Hosp Joint Dis, 2012; 70(4): 246-9. PMID: 23267449	2/B	http://www.nyuhjdbulletin.org/Mod/Bulletin/V70N4/Docs/V70N4_6.pdf	PURPOSE: Our aim was to determine whether the administration of intravenous tranexamic acid is a safe and effective means of reducing blood loss associated with hip and knee replacement surgery. METHOD: Sequential cohort study analysing hemoglobin titers, transfusion rates, and the occurrence of venous thromboembolism in patients undergoing hip and knee replacements with and without the administration of tranexamic acid at the time of induction. Finally, a cost benefit analysis was performed. RESULTS: Two hundred and seventy-three patients were included in our study. We demonstrated that 1 gram of tranexamic acid administered intravenously at the time of induction significantly reduces operative blood loss and transfusion rates ($p < 0.05$). Moreover, the use of tranexamic acid reduces the costs associated with surgery. CONCLUSIONS: The administration of 1 gram of intravenous tranexamic acid is a safe and effective means of reducing operative blood loss and blood transfusion rates in patients undergoing hip and knee replacements.	Sequential cohort study with patient-oriented outcomes. --> Supports use of tranexamic acid to reduce surgical blood loss.

106	III / B / 3	Tranexamic acid	Hallstrom B, Singal B, Cowen ME, Roberts KC, Hughes RE. The Michigan Experience with Safety and Effectiveness of Tranexamic Acid Use in Hip and Knee Arthroplasty. J Bone Joint Surg Am. 2016 Oct 5;98(19):1646-1655. PMID: 27707851	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: The efficacy of tranexamic acid (TXA) in reducing blood loss and transfusion requirements in total hip and knee arthroplasty has been well established in small controlled clinical trials and meta-analyses. The purpose of the current study was to determine the risks and benefits of TXA use in routine orthopaedic surgical practice on the basis of data from a large, statewide arthroplasty registry. METHODS: From April 18, 2013, to September 30, 2014, there were 23,236 primary total knee arthroplasty cases and 11,489 primary total hip arthroplasty cases completed and registered in the Michigan Arthroplasty Registry Collaborative Quality Initiative (MARCQI). We evaluated the association between TXA use and hemoglobin drop, transfusion, length of stay (LOS), venous thromboembolism (VTE), readmission, and cardiovascular events by fitting mixed-effects generalized linear and mixed-effects Cox models. We used inverse probability of treatment weighting to enhance causal inference. RESULTS: For total hip arthroplasty, TXA use was associated with a smaller drop in hemoglobin (mean difference = -0.65 g/dL; 95% confidence interval [CI] = -0.60 to -0.71 g/dL), decreased odds of blood transfusion (odds ratio [OR] = 0.72; 95% CI = 0.60 to 0.86), and decreased readmissions (OR = 0.77; 95% CI = 0.64 to 0.93) compared with no TXA use. There was no effect on VTE (hazard ratio [HR] = 0.91; 95% CI = 0.62 to 1.33), LOS (incident rate ratio [IRR] = 1.00; 95% CI = 0.97 to 1.03), or cardiovascular events (OR = 0.85; 95% CI = 0.47 to 1.52). For total knee arthroplasty, TXA was associated with a smaller drop in hemoglobin (mean difference = -0.68 g/dL; 95% CI = -0.64 to -0.71 g/dL) and one-fourth the odds of blood transfusion (OR = 0.26; 95% CI = 0.21 to 0.31). There was an association with decreased risk of VTE within 90 days after surgery (HR = 0.56; 95% CI = 0.42 to 0.73), slightly decreased LOS (IRR = 0.93; 95% CI = 0.92 to 0.95), and no association with readmissions (OR = 0.90; 95% CI = 0.79 to 1.04) or cardiovascular events (OR = 1.12; 95% CI = 0.74 to 1.71). CONCLUSIONS: In routine orthopaedic surgery practice, TXA use was associated with decreased blood loss and transfusion risk for both total knee and total hip arthroplasty, without evidence of increased risk of complications. TXA use was also associated with reduced risk of readmission among total hip arthroplasty patients and reduced risk of VTE among total knee arthroplasty patients, and did not have an adverse effect on cardiovascular complications in either group. LEVEL OF EVIDENCE: Therapeutic Level III. See Instructions for Authors for a complete description of levels of evidence.	State of Michigan cohort study comparing blood loss transfusion risk and complication rate with or without TXA during total joint replacement. --> Study favors the use of TXA in total joint replacement.
107	III / B / 4	Anticoagulation	Falck-Ytter Y, Francis CW, Johanson NA, Curley C, Dahl OE, Schulman S, Ortel TL, Pauker SG, Colwell CW Jr; American College of Chest Physicians. Prevention of VTE in orthopedic surgery patients: antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest. 2012 Feb;141(2 Suppl):e278S-325S. PMID: 22315265	Tier-2 Source	http://journal.publications.chestnet.org/issue.aspx?issueid=23443	BACKGROUND: VTE is a serious, but decreasing complication following major orthopedic surgery. This guideline focuses on optimal prophylaxis to reduce postoperative pulmonary embolism and DVT. METHODS: The methods of this guideline follow those described in Methodology for the Development of Antithrombotic Therapy and Prevention of Thrombosis Guidelines: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines in this supplement. RESULTS: In patients undergoing major orthopedic surgery, we recommend the use of one of the following rather than no antithrombotic prophylaxis: low-molecular-weight heparin; fondaparinux; dabigatran, apixaban, rivaroxaban (total hip arthroplasty or total knee arthroplasty but not hip fracture surgery); low-dose unfractionated heparin; adjusted-dose vitamin K antagonist; aspirin (all Grade 1B); or an intermittent pneumatic compression device (IPCD) (Grade 1C) for a minimum of 10 to 14 days. We suggest the use of low-molecular-weight heparin in preference to the other agents we have recommended as alternatives (Grade 2C/2B), and in patients receiving pharmacologic prophylaxis, we suggest adding an IPCD during the hospital stay (Grade 2C). We suggest extending thromboprophylaxis for up to 35 days (Grade 2B). In patients at increased bleeding risk, we suggest an IPCD or no prophylaxis (Grade 2C). In patients who decline injections, we recommend using apixaban or dabigatran (all Grade 1B). We suggest against using inferior vena cava filter placement for primary prevention in patients with contraindications to both pharmacologic and mechanical thromboprophylaxis (Grade 2C). We recommend against Doppler (or duplex) ultrasonography screening before hospital discharge (Grade 1B). For patients with isolated lower-extremity injuries requiring leg immobilization, we suggest no thromboprophylaxis (Grade 2B). For patients undergoing knee arthroscopy without a history of VTE, we suggest no thromboprophylaxis (Grade 2B). CONCLUSIONS: Optimal strategies for thromboprophylaxis after major orthopedic surgery include pharmacologic and mechanical approaches.	Professional society guideline related to preventing pulmonary embolism and DVT following orthopedic surgery. --> Supports the use of anticoagulants post-operatively.
108	III / B / 4	Anticoagulation	Prandoni P. et al. Prolonged thromboprophylaxis with oral anticoagulants after total hip arthroplasty: a prospective controlled randomized study. Arch Intern Med, 2002 Sep 23; 162(17): 1966-71. PMID: 12230419	2/B	http://archinte.jamanetwork.com/article.aspx?articleid=213079	BACKGROUND: The optimal duration of thromboprophylaxis after major orthopedic surgery is controversial. Although oral anticoagulants are still widely used for the prevention of venous thromboembolism after hip replacement, to our knowledge no study has assessed the benefit of prolonging anticoagulation beyond the hospital stay. METHODS: Consecutive patients who had received warfarin sodium prophylaxis after total hip arthroplasty were randomized to stop taking the drug at the time of hospital discharge or to continue taking it for 4 more weeks. The rate of symptomatic and asymptomatic venous thromboembolic events (as shown by compression ultrasonography of the proximal-vein system) occurring during the study period was compared between the 2 groups. The study was prematurely terminated after the inclusion of the first 360 patients because a statistically significant and clinically relevant superiority of extended over short-term thromboprophylaxis was observed. RESULTS: Objectively confirmed venous thromboembolic complications were recorded in 10 patients: 9 (5.1%) in the group of 176 control patients, and 1 (0.5%) in the group of 184 patients who continued the warfarin treatment. The absolute difference in the incidence of events was 4.57% (95% confidence interval [CI], 1.15-7.99). The relative risk of venous thromboembolism developing in control patients compared with patients assigned to extended thromboprophylaxis was 9.4 (95% CI, 1.2-73.5). The number needed to treat was 22. Major bleeding developed in 1 patient who was randomized to the extended prophylaxis group (0.5%; 95% CI, 0.02-3.0) compared with none in the control group. CONCLUSION: Extending prophylaxis with warfarin for a few more weeks beyond the hospital stay has the potential to considerably improve the outcome of patients who undergo hip arthroplasty.	A randomized study of patients following hip replacement who either continued or discontinued warfarin at the time of hospital discharge versus continuing warfarin for four additional weeks. Authors concluded that patient discontinuing warfarin at hospital discharge had a greater risk of venous thromboembolism. Relatively small study, n=360; did not include analysis of antithrombotic agents other than warfarin. --> Supports the use of post-operative warfarin for one month following hip surgery versus discontinuation of warfarin at hospital discharge.

109	III / B / 4	Anticoagulation	Dorr LD, Gendelman V, Maheshwari AV, Boutary M, Wan Z, Long WT. Multimodal thromboprophylaxis for total hip and knee arthroplasty based on risk assessment. J Bone Joint Surg Am. 2007 Dec;89(12):2648-57. PMID: 18056497	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Orthopaedic surgeons are increasingly challenged to find a prophylaxis regimen that protects patients from thromboembolism while minimizing adverse clinical outcomes such as bleeding. We used a multimodal approach in which the treatment regimen is selected according to patient risk factors. METHODS: We retrospectively reviewed the records on 1179 consecutive total joint arthroplasties in 970 patients who had undergone primary and revision total hip and total knee replacement. Preoperatively, patients were assigned to one of two deep venous thrombosis prophylactic regimens on the basis of an assessment of their risk factors. Eight hundred and fifty-six patients (1046 operations) were considered to be low risk and were managed with aspirin, dipyridamole, or clopidogrel bisulfate as well as intermittent pneumatic calf compression devices. One hundred and fourteen patients (133 operations) were considered to be high risk and were managed with low-molecular-weight heparin or warfarin and intermittent calf compression. All patients were mobilized from bed within twenty-four hours after surgery, and all underwent Doppler ultrasonography within the twenty-four hours before hospital discharge. All of the patients were followed for six months postoperatively. The prevalence of asymptomatic and symptomatic distal and proximal deep venous thrombosis, symptomatic and fatal pulmonary emboli, overall mortality, and bleeding complications was determined. Thrombotic events were expressed as a percentage of 1179 operations because some patients had two or more operations. RESULTS: Overall, there were no fatal pulmonary emboli, three symptomatic pulmonary emboli (prevalence, 0.25%), and five clinically symptomatic deep venous thrombi (0.4%). Sixty-one asymptomatic deep venous thrombi (5.2%) were found with use of routine postoperative Doppler ultrasound scans. There were three deaths (prevalence, 0.25%) that were unrelated to thromboembolism, and there were two nonfatal gastrointestinal bleeding events (prevalence, 0.17%). Wound hematomas occurred in association with five (0.4%) of the 1179 operations. Three nonfatal pulmonary emboli (prevalence, 0.3%) were detected in association with the 1046 procedures in the low-risk group, and none were detected in association with the 133 operations in the high-risk group (p = 0.767). Clinically symptomatic deep venous thrombosis was detected in association with four (0.38%) of the 1046 operations in the low-risk group and one (0.75%) of the 133 operations in the high-risk group (p = 0.93). Asymptomatic distal deep venous thrombosis was detected in association with thirty-seven (3.5%) of the 1046 procedures in the low-risk group and four (3.0%) of the 133 operations in the high-risk group. Asymptomatic proximal thrombosis was detected in association with fourteen (1.3%) of the 1046 procedures in the low-risk group and six (4.5%) of the 133 procedures in the high-risk group (p = 0.03). Wound hematomas occurred only in patients being managed with warfarin or low-modular-weight heparin (p = 0.0001). CONCLUSIONS: A multimodal thromboembolic prophylactic regimen is consistent with protecting patients while limiting adverse clinical outcomes secondary to thromboembolic, vascular, and bleeding complications.	Non randomized, retrospective study comparing rate of VTE in patients undergoing arthroplasty. Patients with low risk of VTE were "managed with aspirin, dipyridamole, or clopidogrel bisulfate as well as intermittent pneumatic calf compression devices." High risk patients were "managed with lowmolecular-weight heparin or warfarin and intermittent calf compression." Authors noted no statistically significant difference in the development of VTE between the groups. 3% of patients in the low risk group required conversion to more aggressive anticoagulant therapy because of the appearance of DVT or non fatal pulmonary embolism. --> Supports selecting method of VTE prophylaxis based on risk stratification.
110	III / B / 4	Anticoagulation	Bohl DD, Maltenfort MG, Huang R, Parvizi J, Lieberman JR, Della Valle CJ. Development and Validation of a Risk Stratification System for Pulmonary Embolism After Elective Primary Total Joint Arthroplasty. J Arthroplasty. 2016 Sep;31(9 Suppl):187-91. PMID: 27067463	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	INTRODUCTION: Stratification of patients into different risk categories for pulmonary embolism (PE) after total joint arthroplasty (TJA) may allow clinicians to individualize venous thromboembolism prophylaxis based on an appropriate risk-benefit scale. METHODS: Patients undergoing primary total hip arthroplasty (THA) or total knee arthroplasty (TKA) as part of the American College of Surgeons National Surgical Quality Improvement Program were identified. Independent risk factors for PE within 30 days of surgery were identified and used to develop a point-scoring system to estimate the relative risk for PE. For validation, the system was tested on patients undergoing TJA at a single institution. RESULTS: A total of 118,473 patients were identified, including 72,673 (61.3%) undergoing TKA and 45,800 (38.7%) undergoing THA. The incidence of PE within 30 days of the index arthroplasty was 0.50%. The risk factors associated with PE were age ≥70, female gender, higher body mass index (25-30 kg/m(2) and ≥30 kg/m(2)), and TKA (vs THA); anemia was protective. The point scores derived for each of these factors were as follows: anemia: -2; female: +1; body mass index 25-30 kg/m(2): +2; body mass index ≥30 kg/m(2): +3; age ≥70 years: +3; TKA: +5. The point-scoring system was then applied to 17,384 patients from a single institution. Single-institution patients categorized as low risk using the point-scoring system had a 0.44% 90-day risk for PE (95% CI = 0.29%-0.58%); medium risk, 1.51% (95% CI = 1.18%-1.84%); and high risk, 2.60% (95% CI = 2.09%-3.10%). CONCLUSION: This point-scoring system predicts risk for PE after TJA and may help surgeons to optimize selection of chemical prophylaxis.	Authors applied a multivariate analysis to the NSQIP registry to estimate risk of pulmonary embolism in patients undergoing knee or hip arthroplasty. Some patients lost to follow up. When applied to patients in a single institution, the method differentiated high, medium, and low risk patients. --> Supports the conclusion that risk stratification can be used to predict PE in patients undergoing arthroplasty.
111	III / B / 4	Anticoagulation	Parvizi J, Huang R, Rezapoor M, Bagheri B, Maltenfort MG. Individualized Risk Model for Venous Thromboembolism After Total Joint Arthroplasty. J Arthroplasty. 2016 Sep;31(9 Suppl):180-6. PMID: 27094244	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: Venous thromboembolism (VTE) after total joint arthroplasty (TJA) is a potentially fatal complication. Currently, a standard protocol for postoperative VTE prophylaxis is used that makes little distinction between patients at varying risks of VTE. We sought to develop a simple scoring system identifying patients at higher risk for VTE in whom more potent anticoagulation may need to be administered. METHODS: Utilizing the National Inpatient Sample data, 1,721,806 patients undergoing TJA were identified, among whom 15,775 (0.9%) developed VTE after index arthroplasty. Among the cohort, all known potential risk factors for VTE were assessed. An initial logistic regression model using potential predictors for VTE was performed. Predictors with little contribution or poor predictive power were pruned from the data, and the model was refit. RESULTS: After pruning of variables that had little to no contribution to VTE risk, using the logistic regression, all independent predictors of VTE after TJA were identified in the data. Relative weights for each factor were determined. Hypercoagulability, metastatic cancer, stroke, sepsis, and chronic obstructive pulmonary disease had some of the highest points. Patients with any of these conditions had risk for postoperative VTE that exceeded the 3% rate. Based on the model, an iOS (iPhone operating system) application was developed (VTEstimator) that could be used to assign patients into low or high risk for VTE after TJA. CONCLUSION: We believe individualization of VTE prophylaxis after TJA can improve the efficacy of preventing VTE while minimizing untoward risks associated with the administration of anticoagulation.	Author used a logistic regression model applied to the National Inpatient Sample data registry to develop predictors of VTE in patients undergoing total joint arthroplasty. A cell phone application was developed to predict VTE. The article did not include data related to clinical testing of the model. --> Innovative approach to bringing VTE prediction to point of service. Evidence grade does not apply to clinical utility.
112	III / B / 4	Anticoagulation	Nam D, Nunley RM, Johnson SR, Keeney JA, Clohisy JC, Barrack RL. Thromboembolism Prophylaxis in Hip Arthroplasty: Routine and High Risk Patients. J Arthroplasty. 2015 Dec;30(12):2299-303. PMID: 26182980	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	This study's purpose was to present the use of a risk stratification protocol in which "routine" risk patients receive a mobile compression device with aspirin and "high" risk patients receive warfarin for thromboprophylaxis after hip arthroplasty. 1859 hip arthroplasty patients were prospectively enrolled (1402 routine risk--75.4%, 457 high risk--24.6%). The cumulative rate of venous thromboembolism events was 0.5% in the routine versus 0.5% in the high-risk cohort within 6weeks postoperatively (P=1.00). Patients in the routine risk cohort had a lower rate of major bleeding (0.5% versus 2.0%, P=0.006) and wound complications (0.2% versus 1.2%, P=0.01). Use of our risk stratification protocol allowed the avoidance of more aggressive anticoagulation in 75% of patients while achieving a low overall incidence of symptomatic VTE.	Prospective study of patients with hip arthroplasty treated with either routine or high risk VTE protocols based on a stratification method. Authors noted no difference in occurance of VTE but fewer episodes of major bleeding. "Major bleeding" included hematoma or seroma without further definition. Readmissions for complication for anticoagulation therapy were no different in the two groups. --> Study has some limitations but suggests that proportion of patients undergoing arthroplasty can be safely treated with less aggressive anticoagulation protocols.

113	III / B / 5	Glycemic control	Ramos M, Khalpey Z, Lipsitz S, Steinberg J, Panizales MT, Zinner M, Rogers SO. Relationship of perioperative hyperglycemia and postoperative infections in patients who undergo general and vascular surgery. Ann Surg. 2008 Oct;248(4):585-91. PMID: 18936571	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	OBJECTIVE: Evaluate the association of perioperative hyperglycemia and postoperative infections (POI) in patients who had undergone general surgery. BACKGROUND: Intensive glucose control leads to less postoperative infections (POI) in critically ill surgical patients, but the relationship of hyperglycemia and POI in a general surgical population remains unknown. METHODS: A retrospective study of 995 patients who had undergone general and vascular surgery investigated the association of perioperative acute hyperglycemia and risk of 30-day POI over an 18-month period. The primary predictor of interest was postoperative glucose (POG). Bivariate analyses determined the association of each independent variable with POI. Factors significant at P < 0.05 were used in multivariable logistic regression models. RESULTS: In bivariate analyses, preoperative blood glucose (P = 0.012), POG (P = 0.009), age (P = 0.002), diabetes (P = 0.04), American Society of Anesthesia Classification (ASAC) (P < 0.0001), operation length (P = 0.02), and blood transfusions (P = 0.02) were significant predictors of POI. In multivariate analyses, only POG (OR = 1.3, (1.03-1.64)), ASAC (OR = 1.9, (1.31-2.83)), and emergency status (OR = 2.2, (1.21-3.80)) remained significant predictors of POI. Postoperative hyperglycemia increased the risk of POI by 30% with every 40-point increase from normoglycemia (<110 mg/dL). Longer hospitalization was also observed for patients with POG from 110 to 200 mg/dL (OR = 1.4, (1.1-1.7)) and >200 mg/dL (OR = 1.8, (1.4-2.5). CONCLUSION: The increased risk of POI and length of hospitalization posed by postoperative hyperglycemia is independent of diabetic status and needs further evaluation to assess for possible benefits of postoperative glycemic control in patients who have undergone general surgery.	A retrospective cohort study of patients undergoing general and vascular surgery relating perioperative hyperglycemia with postoperative infection. A multivariate analysis indicated postoperative glucose, ASA classification and emergency status were predictors of postoperative infection. Study did not involve non-emergency, orthopedic surgeries. --> Identifies correlation between postoperative glucose and postoperative infections.
114	III / B / 5	Glycemic control	Cancienne JM, Werner BC, Chen DQ, Hassanzadeh H, Shimer AL. Perioperative hemoglobin A1c as a predictor of deep infection following single level lumbar decompression in patients with diabetes. Spine J. 2017 Mar 22. pii: S1529-9430(17)30112-2. doi: 10.1016/j.spine.2017.03.017. [Epub ahead of print]. PMID: 28343046	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND CONTEXT: Although multiple studies have cited diabetes mellitus as a risk factor decreased functional outcomes, increased infectious complications, and overall increased reoperation rate following degenerative lumbar spinal surgery, few have investigated how perioperative glycemic control influences such complications. PURPOSE: The primary goal of the present study was to use a national database to evaluate the association of perioperative glycemic control as demonstrated by Hemoglobin A1c levels in patients with diabetes undergoing primary, single level decompression without concomitant fusion with the incidence of deep postoperative infection following requiring operative irrigation and debridement. Our secondary objective was to calculate a threshold level of HbA1c above which the risk of postoperative infection after lumbar decompression increases significantly in patients with diabetes. STUDY DESIGN/SETTING: Retrospective case control database study, Level III Evidence PATIENT SAMPLE: This study comprised private-payer patients with diabetes mellitus undergoing single level lumbar decompression with a hemoglobin A1c lab value recorded in the database within 3 months of surgery. OUTCOME MEASURES: The outcome examined in this study was deep infection following primary single level lumbar decompression requiring surgical intervention. Postoperative infection within one year of the index primary single level lumbar decompression was assessed using Current Procedural Terminology procedure codes and International Classification of Diseases, 9th Revision diagnostic codes. METHODS: The Humana private-payer dataset from the PearlDiver database was used for this study. The database was queried for patients with diabetes mellitus undergoing primary, single-level lumbar decompression surgery using Current Procedural Terminology codes. Patients with a diagnosis of diabetes mellitus who had an HbA1c level drawn within 3 months before or after their surgical date were then selected to form the study group using International Classification of Diseases, 9th Revision diagnostic codes. Patients were then grouped into groups based on their HbA1c level by increments of 0.5 mg/dL. The incidence of deep infection requiring operative intervention within 1 year for each HbA1c group was then identified using CPT and ICD-9 codes. A receiver operating characteristic (ROC) and area under the curve analysis was performed to determine an optimal threshold value of the HbA1c above which the risk of postoperative infection was significantly increased. The threshold value was tested using a multivariable binomial logistic regression analysis. RESULTS: 5,194 patients who underwent primary single level lumbar decompression with diabetes and a perioperative HbA1c recorded within 3 months of surgery were included in the study. The rate of infection ranged from a low of 0.5% up to 3.5% for patients with an HbA1c level > 11.0 mg/dl (p = 0.012). The inflection point of the receiver operating characteristic curve corresponded to an HbA1c level above 7.5 mg/dL (p = 0.01, AUC = 0.71, spec. = 70%, sens. = 53%). After controlling for patient demographics and medical comorbidities, patients with an HbA1c level of 7.5 mg/dl or greater had a significantly higher risk for deep infection compared to patients below this threshold (O.R. 2.9, 95% C.I. 1.8-4.9, p < 0.0001). CONCLUSIONS: The risk of deep postoperative infection requiring surgical intervention following single-level lumbar decompression in patients with diabetes mellitus increases as the perioperative HbA1c increases. ROC and multivariable regression analyses determined that a perioperative HbA1c above 7.5	Retrospective, case controlled, database study of claims data of patients undergoing single level lumbar decompression surgery. Study relates elevation of A1c from 3 months before to 3 months after surgery to risk of deep infections controlling for medical comorbidities. --> Supports the relationship between elevated perioperative blood sugar control and wound infections.
115	III / C	Surgical implant registry	American Joint Replacement Registry. Third AJRR Annual Report on Hip and Knee Arthoplasty Data. 2016	Joint implant registry	http://www.ajrr.net/images/annual_reports/AJRR_2016_Annual_Report_final.pdf	"Included in the report are data on 427,181 procedures from 416 hospitals and 3,170 surgeons. This is a 102% increase in procedures, a 75% increase in reporting hospitals, and a 41% increase in surgeons compared to last year's report. Our goal is to capture over 90% of all joint replacements performed annually in the United States."	Registry sponsored by "American Academy of Orthopaedic Surgeons (AAOS), the American Association of Hip and Knee Surgeons (AAHKS), The Hip Society, The Knee Society, hospitals, ambulatory surgery centers (ASC), commercial health plans, medical device manufacturers, and contributions from individual orthopaedic surgeons." --> Reflects use and outcomes related to various implants.
116	III / C	Surgical implant registry	Australian Orthopaedic Association National Joint Replacement Registry. Annual Report. Adelaide:AOA; 2016	Joint implant registry	https://aoanjrr.sahmri.com/en/annual-reports-2016	"In 2011, the Registry reported for the first time on ten year outcomes for both hip and knee replacement. This year the Registry presents data on an increased number of prostheses combinations that have reached this milestone. At ten years, 44.0% of all primary total hip and 24.2% all primary total knee prostheses combinations have greater than 95% survivorship. An entirely new area of analysis for the Registry included in this Report examines the effect of the average number of procedures performed by a surgeon each year on the outcome of both primary total hip and primary total knee replacement. Four groups of surgeons were identified, surgeons averaging 10 or less procedures per year, more than ten but less than or equal to 25, more than 25 but less than or equal to 70 and more than 70. Comparing outcomes of the four groups demonstrated a relationship between the number of procedures a surgeon averages and the subsequent rate of revision. In general, the group of surgeons averaging more than 70 procedures per year have the best outcome. There is however, a complex interaction between the average number of procedures performed and the prostheses used."	Registry of the Australian Orthopaedic Association. --> Reflects use and outcomes related to various implants.
117	III / C	Surgical implant registry	National joint registry. 13th Annual Report. NJR Centre, Hertfordshire, UK; 2016.	Joint implant registry	http://www.njrcentre.org.uk/njrcentre/Portals/0/Documents/England/Reports/13th%20Annual%20Report/07950%20NJR%20Annual%20Report%202016%20ONLINE%20REPORT.pdf	"The core purpose of the NJR, to collect, manage and analyse data to provide early warning of issues related to patient safety and improve the quality of outcomes and cost effectiveness of joint replacement surgery, remains as important as ever. This is particularly true as our maturing dataset now reaches 2.1 million records - maintaining our position as the largest arthroplasty register in the world."	National joint registry reports outcomes and revision rates, specifying major brands. --> Reflects use and outcomes related to various implants.

Cycle 4: Post-operative Care and Return to Function							
118	IV	Discharge process	Hansen VJ, Gromov K, Lebrun LM, Rubash HE, Malchau H, Freiberg AA. Does the Risk Assessment and Prediction Tool predict discharge disposition after joint replacement? Clin Orthop Relat Res. 2015 Feb;473(2):597-601. PMID: 25106801	2/B	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4294888/	BACKGROUND: Payers of health services and policymakers place a major focus on cost containment in health care. Studies have shown that early planning of discharge is essential in reducing length of stay and achieving financial benefit; tools that can help predict discharge disposition would therefore be of use. The Risk Assessment and Prediction Tool (RAPT) is a preoperative survey constructed to predict discharge disposition after total joint arthroplasty (TJA). The RAPT was developed and tested on a population of Australian patients undergoing joint replacement, but its validity in other populations is unknown. A low RAPT score is reported to indicate a high risk of needing any form of inpatient rehabilitation after TJA, including short-term nursing facilities. QUESTIONS/PURPOSES: This study attempts (1) to assess predictive accuracy of the RAPT on US patients undergoing total hip and knee arthroplasty (THA/TKA); and (2) to determine predictive accuracy of each individual score (1-12). METHODS: Between June 2006 and December 2011, RAPT scores of 3213 patients (1449 THAs; 1764 TKAs) were prospectively captured during the preoperative clinical visit. Scores were stored along with other clinical data, including discharge disposition, in a dedicated database on a secure server. The database was queried by the nursing case manager to retrieve the RAPT scores of all patients captured during this time period. Binary logistic regression was used to analyze the scores and determine predictive accuracy. RESULTS: Overall predictive accuracy was 78%. RAPT scores<6 and >10 (of 12) predicted with >90% accuracy discharge to inpatient rehabilitation and home, respectively. Predictive accuracy was lowest for scores between 7 and 10 at 65.2% and almost 50% of patients received scores in this range. Based on our findings, the risk categories in our populations should be high risk<7, intermediate risk 7 to 10, and low risk>10. CONCLUSIONS: The RAPT accurately predicted discharge disposition for high- and low-risk patients in our cohort. Based on our data, intermediate-risk patients should be defined as those with scores of 7 to 10. Predictive accuracy for these patients could potentially be improved through the identification and addition of other factors correlated to discharge disposition. The RAPT allows for identification of patients who are likely to be discharged home or to rehabilitation, which may facilitate preoperative planning of postoperative care. Additionally, it identifies intermediate-risk patients and could be used to implement targeted interventions to facilitate discharge home in this group of patients.	A prospective study attempting to determine predictive accuracy of the Risk Assessment and Prediction Tool (RAPT) in determining likelyhood that patients will require intensive rehabilitation services. Scoring process was straight forward and the overall predictive accuracy was 78.3%. 46% of patients were in an "intermediate risk" zone. --> Simple tool for predicting greater utilization of rehabilitation services postoperatively but has limitation utility due to large "grey zone."
119	IV	Discharge process	Wagner C, Hosken R. Reducing readmissions: care transitions toolkit. Washington State Hospital Association, 2017	3/C	http://www.wsha.org/wp-content/uploads/WSHACareTransToolkit.pdf	"Research shows that 20 percent of patients in the U.S. are rehospitalized within 30 days of discharge. Although some patients are readmitted for medical reasons, many of the patients are readmitted for social or resource issues and not for medical issues. Effective strategies to reduce readmissions must incorporate both social and medical factors in order to be successful. Poorly executed transitions in care negatively affect the patient's health and well-being, family resources, and unnecessarily increase the costs incurred by the health care system. WSHA is working with all the health care agencies involved in the continuum of patient care from hospital to home to ensure that patients do not end up back in the hospital."	Includes recommended processes and tools to facilitate safe transistions in care. Includes 12 citations. --> Washington State standard with numerous stakeholders contributing to document.
120	IV	Discharge process	Jack BW, Chetty VK, Anthony D, Greenwald JL, Sanchez GM, Johnson AE, Forsythe SR, O'Donnell JK, Paasche-Orlow MK, Manasseh C, Martin S, Culpepper L. A reengineered hospital discharge program to decrease rehospitalization: a randomized trial. Ann Intern Med. 2009 Feb 3; 150(3): 178-87. PMID: 19189907	2/B	http://annals.org/article.aspx?articleid=744252	BACKGROUND: Emergency department visits and rehospitalization are common after hospital discharge. OBJECTIVE: To test the effects of an intervention designed to minimize hospital utilization after discharge. DESIGN: Randomized trial using block randomization of 6 and 8. Randomly arranged index cards were placed in opaque envelopes labeled consecutively with study numbers, and participants were assigned a study group by revealing the index card. SETTING: General medical service at an urban, academic, safety-net hospital. PATIENTS: 749 English-speaking hospitalized adults (mean age, 49.9 years). INTERVENTION: A nurse discharge advocate worked with patients during their hospital stay to arrange follow-up appointments, confirm medication reconciliation, and conduct patient education with an individualized instruction booklet that was sent to their primary care provider. A clinical pharmacist called patients 2 to 4 days after discharge to reinforce the discharge plan and review medications. Participants and providers were not blinded to treatment assignment. MEASUREMENTS: Primary outcomes were emergency department visits and hospitalizations within 30 days of discharge. Secondary outcomes were self-reported preparedness for discharge and frequency of primary care providers' follow-up within 30 days of discharge. Research staff doing follow-up were blinded to study group assignment. RESULTS: Participants in the intervention group (n = 370) had a lower rate of hospital utilization than those receiving usual care (n = 368) (0.314 vs. 0.451 visit per person per month; incidence rate ratio, 0.695 [95% CI, 0.515 to 0.937]; P = 0.009). The intervention was most effective among participants with hospital utilization in the 6 months before index admission (P = 0.014). Adverse events were not assessed; these data were collected but are still being analyzed. LIMITATION: This was a single-center study in which not all potentially eligible patients could be enrolled, and outcome assessment sometimes relied on participant report. CONCLUSION: A package of discharge services reduced hospital utilization within 30 days of discharge. FUNDING: Agency for Healthcare Research and Quality and National Heart, Lung, and Blood Institute, National Institutes of Health.	Study cohort is general medicine patients. --> Supports the value of a systematic approach to discharge process to reduce aggregate hospital readmissions.

121	IV	Discharge process	Gonçalves-Bradley DC, Lannin NA, Clemson LM, Cameron ID, Shepperd S. Discharge planning from hospital. Cochrane Database Syst Rev. 2016 Jan 27;(1):CD000313. PMID: 26816297	2/B	http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000313.pub5/abstract	BACKGROUND: Discharge planning is a routine feature of health systems in many countries. The aim of discharge planning is to reduce hospital length of stay and unplanned readmission to hospital, and to improve the co-ordination of services following discharge from hospital.This is the third update of the original review. OBJECTIVES: To assess the effectiveness of planning the discharge of individual patients moving from hospital. SEARCH METHODS: We updated the review using the Cochrane Central Register of Controlled Trials (CENTRAL) (2015, Issue 9), MEDLINE, EMBASE, CINAHL, the Social Science Citation Index (last searched in October 2015), and the US National Institutes of Health trial register (ClinicalTrials.gov). SELECTION CRITERIA: Randomised controlled trials (RCTs) that compared an individualised discharge plan with routine discharge care that was not tailored to individual participants. Participants were hospital inpatients. DATA COLLECTION AND ANALYSIS: Two authors independently undertook data analysis and quality assessment using a pre-designed data extraction sheet. We grouped studies according to patient groups (elderly medical patients, patients recovering from surgery, and those with a mix of conditions) and by outcome. We performed our statistical analysis according to the intention-to-treat principle, calculating risk ratios (RRs) for dichotomous outcomes and mean differences (MDs) for continuous data using fixed-effect meta-analysis. When combining outcome data was not possible because of differences in the reporting of outcomes, we summarised the reported data in the text. MAIN RESULTS: We included 30 trials (11,964 participants), including six identified in this update. Twenty-one trials recruited older participants with a medical condition, five recruited participants with a mix of medical and surgical conditions, one recruited participants from a psychiatric hospital, one from both a psychiatric hospital and from a general hospital, and two trials recruited participants admitted to hospital following a fall. Hospital length of stay and readmissions to hospital were reduced for participants admitted to hospital with a medical diagnosis and who were allocated to discharge planning (length of stay MD - 0.73, 95% CI - 1.33 to - 0.12, 12 trials, moderate certainty evidence; readmission rates RR 0.87, 95% CI 0.79 to 0.97, 15 trials, moderate certainty evidence). It is uncertain whether discharge planning reduces readmission rates for patients admitted to hospital following a fall (RR 1.36, 95% CI 0.46 to 4.01, 2 trials, very low certainty evidence). For elderly patients with a medical condition, there was little or no difference between groups for mortality (RR 0.99, 95% CI 0.79 to 1.24, moderate certainty). There was also little evidence regarding mortality for participants recovering from surgery or who had a mix of medical and surgical conditions. Discharge planning may lead to increased satisfaction for patients and healthcare professionals (low certainty evidence, six trials). It is uncertain whether there is any difference in the cost of care when discharge planning is implemented with patients who have a medical condition (very low certainty evidence, five trials). AUTHORS' CONCLUSIONS: A discharge plan tailored to the individual patient probably brings about a small reduction in hospital length of stay and reduces the risk of readmission to hospital at three months follow-up for older people with a medical condition. Discharge planning may lead to increased satisfaction with healthcare for patients and professionals. There is little evidence that discharge planning reduces costs to the health service.	A meta analysis of 30 RCTs focused on discharge planning as it relates to hospital length of stay and readmissions. Patients hospitalized with a medical condition whose care included discharge planning had lower readmission rates and hospital length of stay. --> Supports discharge planning to reduce readmission rates in patients who are hospitalized for medical conditions.
122	IV	Discharge process	Bini SA, Fithian DC, Paxton LW, Khatod MX, Inacio MC, Namba RS. Does discharge disposition after primary total joint arthroplasty affect readmission rates? J Arthroplasty. 2010 Jan;25(1):114-7. PMID: 19150214	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	We reviewed 90-day readmission rates for 9150 patients with a primary total hip or knee arthroplasty performed between April 2001 and December 2004. Patients with an American Society of Anesthesiologists score of 3 or greater or with perioperative complications were excluded. We correlated the readmission rate with discharge disposition to either skilled nursing facilities (SNFs) or Home. Of the 9150 patients identified, 1447 were discharged to an SNF. After statistically adjusting for sex, age and American Society of Anesthesiologists scores, total hip arthroplasty and total knee arthroplasty patients discharged to SNFs had higher odds of hospital readmission within 90 days of surgery than those discharged home (total hip arthroplasty: odds ratio = 1.9; 95% confidence interval, 1.2-3.2; P = .008; total knee arthroplasty: odds ratio = 1.6; 95% confidence interval, 1.1-2.4; P = .01). Healthy patients discharged to SNFs after primary total joint arthroplasty need to be followed closely for complications.	Retrospective cohort study in a single medical system of over 9000 patients with primary knee or hip arthroplasty comparing readmission rates in patients discharged either to skilled nursing facilities or home, controlling for sex, age, and ASA scores. Odds ratios of readmission were 1.9 for hip arthroplasty and 1.6 for knee arthroplasty, medical complications predominating. --> Supports discharge to home versus skilled nursing facility when possible.
123	IV / A / 1	Physical Therapy	Chandrasekaran S. Ariaretnam SK. Tsung J. Dickison D. Early mobilization after total knee replacement reduces the incidence of deep venous thrombosis. ANZ Journal of Surgery. 79(7-8):526-9, 2009 Jul. PMID: 19694660	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	Abstract: Both chemical and mechanical methods of prophylaxis have reduced the incidence of thromboembolic complications following total knee replacement (TKR). Only a few studies have shown that mobilization on the first post-operative day further reduces the incidence of thromboembolic phenomena. We conducted a prospective study to verify not only if early mobilization but also whether the distance mobilized on the first post-operative day after TKR reduced the incidence of thromboembolic complications. The incidence of deep venous thrombosis and pulmonary embolism were compared in 50 consecutive patients who underwent TKR from July 2006 following a change in the mobilization protocol with 50 consecutive patients who underwent TKR before the protocol was instigated. The mobilization protocol changed from strict bed rest the first post-operative day to mobilization on the first post-operative day. Mobilization was defined as sitting out of bed or walking for at least 15-30 min twice a day. The distance mobilized was accurately recorded by the physiotherapists. All patients underwent duplex scans of both lower limbs on the fourth post-operative day. There was a significant reduction in the incidence of thromboembolic complications in the mobilization group (seven in total) compared with the control group (16 in total) (P= 0.03). Furthermore, in the mobilization group the odds of developing a thromboembobloic complication was significantly reduced the greater the distance the patient mobilized (Chi-squared linear trend = 8.009, P= 0.0047). Early mobilization in the first 24 h after TKR is a cheap and effective way to reduce the incidence of post-operative deep venous thrombosis.	Small number of patients with a primary outcome of ultrasound findings of venous thrombosis. --> Supports the value of early mobilization following surgery to reduce post-operative deep venous thrombosis.
124	IV / A / 1	Physical Therapy	den Hertog A. Gliesche K. Timm J. Muhlbauer B. Zebrowski S. Pathway-controlled fast-track rehabilitation after total knee arthroplasty: a randomized prospective clinical study evaluating the recovery pattern, drug consumption, and length of stay. Archives of Orthopaedic & Trauma Surgery. 132(8):1153-63, 2012 Aug. PMID: 22643801	1/B	http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3400756/pdf/402_2012_Article_1528.pdf	PURPOSE: To investigate fast-track rehabilitation concept in terms of a measurable effect on the early recovery after total knee arthroplasty (TKA). METHODS: This was an open, randomized, prospective clinical study, comparing the fast-track rehabilitation--a pathway-controlled early recovery program (Joint Care())--with standard postoperative rehabilitation care, after TKA. Overall, 147 patients had TKA (N = 74 fast-track rehabilitation, N = 73 standard rehabilitation). The fast-track rehabilitation patients received a group therapy, early mobilization (same day as surgery) and 1:1 physiotherapy (2 h/day). Patient monitoring occurred over 3 months (1 pre- and 4 post-operative visits). The standard rehabilitation group received individual postoperative care according to the existing protocol, with 1:1 physiotherapy (1 h/day). The cumulative American Knee Society Score (AKSS) was the primary evaluation variable, used to detect changes in joint function and perception of pain. The secondary evaluation variables were WOMAC index score, analgesic drug consumption, length of stay (LOS), and safety. RESULTS: After TKA, patients in the fast-track rehabilitation group showed enhanced recovery compared with the standard rehabilitation group, as based on the differences between the groups for the cumulative AKSS (p = 0.0003), WOMAC index score (<0.0001), reduced intake of concomitant analgesic drugs, reduced LOS (6.75 vs. 13.20 days, p < 0001), and lower number of adverse events. CONCLUSION: For TKA, implementation of pathway-controlled fast-track rehabilitation is achievable and beneficial as based on the AKSS and WOMAC score, reduced intake of analgesic drugs, and reduced LOS.	Isolated study of a specific protocol; if study were repeated with similar results, evidence grade would be 1/A. --> Supports the value of early mobilization to reduce anagesic use, improve WOMAC score, and decrease length of stay.

125	IV / A / 1	Physical Therapy	Pearse EO. Caldwell BF. Lockwood RJ. Hollard J. Early mobilisation after conventional knee replacement may reduce the risk of postoperative venous thromboembolism. Journal of Bone & Joint Surgery - British Volume. 89(3): 316-22, 2007 Mar. PMID: 17356141	2/B	http://www.bjj.boneandjoint.org.uk/content/89-B/3/316.full.pdf+html	We carried out an audit on the result of achieving early walking in total knee replacement after instituting a new rehabilitation protocol, and assessed its influence on the development of deep-vein thrombosis as determined by Doppler ultrasound scanning on the fifth post-operative day. Early mobilisation was defined as beginning to walk less than 24 hours after knee replacement. Between April 1997 and July 2002, 98 patients underwent a total of 125 total knee replacements. They began walking on the second post-operative day unless there was a medical contraindication. They formed a retrospective control group. A protocol which allowed patients to start walking at less than 24 hours after surgery was instituted in August 2002. Between August 2002 and November 2004, 97 patients underwent a total of 122 total knee replacements. They formed the early mobilisation group, in which data were prospectively gathered. The two groups were of similar age, gender and had similar medical comorbidities. The surgical technique and tourniquet times were similar and the same instrumentation was used in nearly all cases. All the patients received low-molecular-weight heparin thromboprophylaxis and wore compression stockings post-operatively. In the early mobilisation group 90 patients (92.8%) began walking successfully within 24 hours of their operation. The incidence of deep-vein thrombosis fell from 27.6% in the control group to 1.0% in the early mobilisation group (chi-squared test, $p < 0.001$). There was a difference in the incidence of risk factors for deep-vein thrombosis between the two groups. However, multiple logistic regression analysis showed that the institution of an early mobilisation protocol resulted in a 30-fold reduction in the risk of post-operative deep-vein thrombosis when we adjusted for other risk factors.	Historical control. --> Supports early mobilization following total knee replacement to reduce post-operative deep vein thrombosis.
126	IV / A / 1	Physical Therapy	Robbins CE(1), Casey D, Bono JV, Murphy SB, Talmo CT, Ward DM. A multidisciplinary total hip arthroplasty protocol with accelerated postoperative rehabilitation: does the patient benefit? Am J Orthop (Belle Mead NJ). 2014 Apr;43(4):178-81. PMID: 24730003	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	Since its debut over 10 years ago, minimally invasive total hip arthroplasty (THA) has often been associated with accelerated postoperative rehabilitation when compared with THA performed with a traditional surgical approach. The objective of this study was to investigate the effect of accelerated postoperative rehabilitation and early mobilization on length of stay and hospital readmissions in patients undergoing THA at one institution. We retrospectively reviewed a consecutive series of 590 patients who underwent THA between January 31, 2011 and April 30, 2011. Six arthroplasty surgeons using varying surgical techniques participated. One hundred ninety patients received accelerated rehabilitation and were mobilized on the day of surgery. The remaining 400 patients were mobilized on postoperative day one (POD1). Length of stay for the accelerated rehabilitation group was 2.06 days and 3.38 days for the standard group. One patient was readmitted to the hospital within 30 days (.52%) in the accelerated group compared to 19 re-hospitalizations (4.72%) in the POD1 group. Ninety-six percent of the accelerated group were discharged home versus 62% in POD1 group. Our results support the use of an accelerated rehabilitation protocol at one institution following total hip replacement surgery.	Retrospective cohort study without randomization and uncontrolled for age and comorbidities. Cohort includes surgeries for conditions other than osteoarthritis. Variation in anesthesia and availability of physical therapy on day of surgery. --> Lower quality study does demonstrate that it is possible to reduce length of stay for hip arthroplasty with a care model that includes early mobilization.
127	IV / A / 1	Physical Therapy	One-to-One Therapy Is Not Superior to Group or Home-Based Therapy After Total Knee Arthroplasty: A Randomized, Superiority Trial. Ko, Victoria; Naylor, Justine; Harris, Ian; Crosbie, Jack; Yeo, Anthony; Mittal, Rajat. Journal of Bone & Joint Surgery, American Volume (J BONE JOINT SURG (AM)), 2013 Nov 6; 95 (21): 1942-9.	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	BACKGROUND: The aim of this study was to determine whether center-based, one-to-one physical therapy provides superior outcomes compared with group-based therapy or a simple monitored home-based program in terms of functional and physical recovery and health-related quality of life after total knee arthroplasty. METHODS: Patients awaiting primary total knee arthroplasty at two Sydney metropolitan hospitals were enrolled into this prospective, randomized, superiority trial preoperatively. At two weeks postoperatively, participants were randomly allocated to one of three six-week treatment programs (twelve one-to-one therapy sessions, twelve group-based therapy sessions, or a monitored home program) with use of a computer-generated sequence. Self-reported outcomes (Oxford Knee Score, Western Ontario and McMaster Universities Osteoarthritis Index pain and function subscales, and Medical Outcomes Study 12-Item Short-Form Survey) and performance-based functional outcomes were measured over twelve months postoperatively by a blinded assessor. The primary outcome was knee pain and function measured with use of the Oxford Knee Score at ten weeks postoperatively. Intention-to-treat analysis was conducted. RESULTS: Two hundred and forty-nine patients (eighty-five who had one-to-one therapy, eighty-four who had group-based therapy, and eighty who were in the monitored home program) were randomized and 233 were available for their one-year follow-up assessment. Participants who received one-to-one therapy did not have a superior Oxford Knee Score at week ten compared with those who received the alternative interventions; the median score was 32 points for the one-to-one therapy group, 36 points for the group-based therapy group, and 34 points for the monitored home program group ($p = 0.20$). Furthermore, one-to-one therapy was not superior compared with group-based therapy or monitored home program in improving any of the secondary outcomes across the first postoperative year. No adverse events were associated with any of the treatment arms. CONCLUSIONS: One-to-one therapy does not provide superior self-reported or performance-based outcomes compared with group-based therapy or a monitored home program, in the short term and the long term after total knee arthroplasty. LEVEL OF EVIDENCE: Therapeutic Level I. See Instructions for Authors for a complete description of levels of evidence.	Randomized controlled trial comparing individual, group and home-monitored self-administered physical therapy treatment programs. Beginnning two weeks post-surgery, individual and group treatment programs met twice weekly with a physical therapist. The home-monitored treatment program included two physical therapist sessions at two and four weeks after surgery. Good follow-up with intention to treat analysis. Outcomes were similar for all three treatment groups, although patients in the monitored group reported "the frequency of supervised sessions was insufficient." Only two patients in the home-monitored treatment group required a single addition physical therapist visit each. 8% of patients either didn't complete protocol or were lost to follow-up. Large %age of patients excluded, primarily due to inability to comprehend English. --> Supports the conclusion that patients following a home-monitored treatment program can have equivalent outcomes as patients receiving individualized or group physical therapy.
128	IV / A / 1	Physical Therapy	Physiotherapist-directed rehabilitation exercises in the outpatient or home setting improve strength, gait speed and cadence after elective total hip replacement: a systematic review. Coulter, Corinne L; Scarvell, Jennie M; Neeman, Teresa M; Smith, Paul N. Journal of Physiotherapy (J PHYSIOTHER), 2013 Dec; 59 (4): 219-26.	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	QUESTION: In people who have been discharged from hospital after a total hip replacement, do rehabilitation exercises directed by a physiotherapist improve strength, gait, function and quality of life? Are these exercises as effective in an unsupervised home-based setting as they are in a supervised outpatient setting? DESIGN: Systematic review with meta-analysis of randomised trials. PARTICIPANTS: Adult patients after elective total hip replacement. INTERVENTION: Physiotherapist-directed rehabilitation exercises after discharge from hospital following total hip replacement. OUTCOME MEASURES: Hip and knee strength, gait parameters, functional measures, and quality of life. RESULTS: Five studies comprising 234 participants were included in the review. Sufficient data for meta-analysis were only obtained for hip and knee strength, gait speed and cadence. Physiotherapy rehabilitation improved hip abductor strength by a mean of 16Nm (95% CI 10 to 22), gait speed by 6 m/min (95% CI 1 to 11) and cadence by 20 steps/min (95% CI 8 to 32). Favourable but non-significant improvements in strength were noted for other muscle groups at the hip and knee. Function and quality of life could not be meta-analysed due to insufficient data and heterogeneity of measures, but functional measures tended to favour the physiotherapy rehabilitation group. Most outcomes were similar between outpatient and home-based exercise programs. CONCLUSION: Physiotherapy rehabilitation improves hip abductor strength, gait speed and cadence in people who have been discharged from hospital after total hip replacement. Physiotherapist-directed rehabilitation exercises appear to be similarly effective whether they are performed unsupervised at home or supervised by a physiotherapist in an outpatient setting.	Meta-analysis of five moderate-quality trials including 234 participants, evaluating benefit of physiotherapy after total hip replacement, as well as supervised outpatient vs unsupervised home physiotherapy. --> Physiotherapy rehabilitation improves hip abductor strength, gait speed and cadence in people who have been discharged from hospital after total hip replacement. Physiotherapist-directed rehabilitation exercises appear to be similarly effective whether they are performed unsupervised at home or supervised by a physiotherapist in an outpatient setting.

129	IV / A / 1	Physical Therapy; Telemedicine	Internet-based outpatient telerehabilitation for patients following total knee arthroplasty: a randomized controlled trial. Russell TG; Buttrum P; Wootton R; Jull GA. Journal of Bone & Joint Surgery, American Volume (J BONE JOINT SURG (AM)), 2011 Jan; 93 (2): 113-20	2/B	http://jbjs.org/content/jbjsam/93/2/113.full.pdf?bypass_stamper=global	Total knee arthroplasty is an effective means for relieving the symptoms associated with degenerative arthritis of the knee. Rehabilitation is a necessary adjunct to surgery and is important in regaining optimum function. Access to high-quality rehabilitation services is not always possible, especially for those who live in rural or remote areas. The aim of this study was to evaluate the equivalence of an Internet-based telerehabilitation program compared with conventional outpatient physical therapy for patients who have had a total knee arthroplasty.	Randomized controlled trial assessing equivalency of "home" physical therapy with telemedicine technology versus face-to-face physical therapy. Results showed equivalency of these two formats. Each format included a weekly 45-minute visit with a physical therapist, either face-to-face or telerehabilitation. All patients were instructed to exercise twice daily. Therapy was initiated for all patients approximately one week after discharge. Patient satisfaction was greater in the telemedicine group. Telemedicine care occurred in a hospital-based simulated "home" environment for this study. --> Supports the conclusion that application of telemedicine technology produces equivalent results to face-to-face physical therapy following knee arthroplasty.
130	IV / A / 1	Physical Therapy; Telemedicine	Minns Lowe CJ, Barker KL, Dewey ME, Sackley CM. Effectiveness of physiotherapy exercise following hip arthroplasty for osteoarthritis: a systematic review of clinical trials. BMC Musculoskelet Disord. 2009 Aug 4;10:98. PMID: 19653883	2/B	http://www.biomedcentral.com/content/pdf/1471-2474-10-98.pdf	BACKGROUND: Physiotherapy has long been a routine component of patient rehabilitation following hip joint replacement. The purpose of this systematic review was to evaluate the effectiveness of physiotherapy exercise after discharge from hospital on function, walking, range of motion, quality of life and muscle strength, for osteoarthritic patients following elective primary total hip arthroplasty. METHODS: DESIGN: Systematic review, using the Cochrane Collaboration Handbook for Systematic Reviews of Interventions and the Quorom Statement. Database searches: AMED, CINAHL, EMBASE, KingsFund, MEDLINE, Cochrane library (Cochrane reviews, Cochrane Central Register of Controlled Trials, DARE), PEDro, The Department of Health National Research Register. Handsearches: Physiotherapy, Physical Therapy, Journal of Bone and Joint Surgery (Britain) Conference Proceedings. No language restrictions were applied. SELECTION: Trials comparing physiotherapy exercise versus usual/standard care, or comparing two types of relevant exercise physiotherapy, following discharge from hospital after elective primary total hip replacement for osteoarthritis were reviewed. OUTCOMES: Functional activities of daily living, walking, quality of life, muscle strength and range of hip joint motion. Trial quality was extensively evaluated. Narrative synthesis plus meta-analytic summaries were performed to summarise the data. RESULTS: 8 trials were identified. Trial quality was mixed. Generally poor trial quality, quantity and diversity prevented explanatory meta-analyses. The results were synthesised and meta-analytic summaries were used where possible to provide a formal summary of results. Results indicate that physiotherapy exercise after discharge following total hip replacement has the potential to benefit patients. CONCLUSION: Insufficient evidence exists to establish the effectiveness of physiotherapy exercise following primary hip replacement for osteoarthritis. Further well designed trials are required to determine the value of post discharge exercise following this increasingly common surgical procedure.	Systematic review of 8 trials testing the functional activity following hip replacement with or without postoperative physical therapy. Poor study quality prevented meta-analysis. Findings suggested potential benefit of post discharge PT but insuffficent data to reach a definative conclusion. --> There are insufficient data to assess the effects of post hospitalization physical therapy on patients following hip replacement surgery.
131	IV / A / 1	Post-operative care in hospital	Husted H, Jensen CM, Solgaard S, Kehlet H. Reduced length of stay following hip and knee arthroplasty in Denmark 2000-2009: from research to implementation. Arch Orthop Trauma Surg. 2012 Jan;132(1):101-4. PMID: 21947286	2/B	Not available without a subscription. Please contact your local Library to obtain a copy of this article.	INTRODUCTION: Fast-track surgery is the combination of optimized clinical and organizational factors aiming at reducing convalescence and perioperative morbidity including the functional recovery resulting in reduced hospitalization. As the previous nationwide studies have demonstrated substantial variations in length of stay (LOS) following standardized operations such as total hip and knee arthroplasty (THA and TKA), this nationwide study was undertaken to evaluate the implementation process of fast-track THA and TKA in Denmark. MATERIALS AND METHODS: All hospitals in Denmark report to the National Patient Registry, linking the type of surgery and LOS with a unique individual social security number. This study is based on primary THA and TKA from a 5.5 million population from 2000 to the end of 2009. RESULTS: The number of performed primary unilateral THA and TKA has increased from around 7,200 in 2000 to 13,800 in 2009 with a concomitant reduction in LOS from median 10-11 days in 2000 to 4 days in 2009. CONCLUSION: Fast-track surgery has been successfully implemented in the orthopedic departments in Denmark through a multi-disciplinary educational and multi-institutional effort. These implementation principles may be transferred to other countries and other specialties.	A retrospective cohort study of patients with THA and TKA between 2000-2009 from the Denmark National Patient Registry studying the results of implementation of fast track hospital care. Intervention was associated with a reduction in hospital stay. --> Supports the use of standardized fast track protocols to reduce length of stay for total knee and total hip replacement.

Methodology for Evidence Table Updates

During 2017, an extensive evidence review was conducted, which included a literature review through September 2017. Literature included was derived from
research involving human subjects, published in English, and indexed in MEDLINE (through PubMed), the Cochrane Library, Agency for Healthcare Research and Quality Reports, NICE, and other selected sources.
The 2013 version of the Bree Collaborative joint replacement bundle was reviewed line by line as individual topics
Individual citations were appraised by an initial reviewer using SORT methodology and verified by a second, independent reviewer using the same method. Any differences in appraisal were resolved to achieve a single
The evidence table was subject to public comment. The workgroup reviewed selected citations in detail.
The completed table was published in the public domain

Evidence grade follows the SORT method available at:
http://www.aafp.org/afp/2004/0201/p548.html
Strength of recommendation taxonomy (SORT): a patient-centered approach to grading evidence in the medical literature. Ebell MH, et.al. Am Fam Physician, 2004 Feb 1; 69(3): 548-56.

Special Source Designations:
Tier-1 Sources include: Systematic Reviews, Technology Assessments, and Statements Originated from National
Tier-2 Sources include: Clinical Guidelines, Meta-Analyses, Systematic Reviews, Randomized Control Trials
Tier-3 Sources include: Primary Literature and other documents

; for evidence search and appraisal.