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Regional Anesthesia in Outpatient Total Joint Arthroplasty

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Regional Anesthesia in Outpatient Total Joint Arthroplasty
A Paper Submitted in Partial Fulfillment of the Requirements
For NURS 5382: Capstone
In the School of Nursing
The University of Texas at Tyler
by
Laci Caesar
December 2, 2022

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Acknowledgments

I would like to take this opportunity to thank all of those that have helped me along this educational path to achieving my Master of Nursing degree. I would like to especially acknowledge my professors who have guided me throughout every step of selecting and completing my evidence-based practice project. They have given me guidance when needed, constructive criticism to strengthen my leadership skills, and an overall a positive learning environment. As this journey comes to a close, I would like to thank my husband who has given me the courage to fulfill a lifelong dream of mine by obtaining my Master of Nursing degree.

Executive Summary

Within the past five years, outpatient total joint arthroplasties have increased three-fold due to the change in insurance companies' reimbursement plans. After continuous literature research collection, support for spinal anesthesia was higher than compared to general anesthesia (GA) for outpatient total joint arthroplasty procedures. Healthy patient who receives regional anesthesia showed decreased post-operative pain, increased rehabilitation, and, most of all, a decrease in facility stays (Macfarlane et al., 2009). This has allowed healthy patients who meet physician, anesthesia, and facility requirements to transition from hospitals to ambulatory surgery centers for total joint replacement procedures. With this new transition comes change for anesthesia guidelines to provide better patient outcomes for these specific patients. This evidence can allow facilities to transition this information into clinical practice to implement a policy change as well as a practice change for a new anesthesia guideline.

Thus, it is recommended that a regional anesthesia guideline implementation program for outpatient arthroplasty procedures be implemented in the ambulatory surgery center. This will occur over five steps such as the following: a 6-week trial with data collection; data collection and interpretation of data that is placed into a report; stakeholder presentation to secure buy-in from leadership, surgeons, and anesthesiologists; policy change and implementation of new guideline; dissemination of new guideline through educational in-services, classes, and skill check-off for anesthesiologists, staff, and surgeons. Lastly, the evaluation plan will be based on measured outcomes, interviews with staff and physicians, and patient satisfaction ratings.

Rationale for the Project

One topic that is important to nursing and lacks consensus is whether general or regional anesthesia is better in outpatient total joint procedures. Excluding outlier patients who have comorbidities that may hinder or influence their anesthesia care, the healthy patient who receives regional anesthesia has shown to have decreased post-operative pain, increased rehabilitation, and, most of all, a decrease in facility stay (Macfarlane et al., 2009). In 24 randomized control trials reviewed by Macfarlane et al. (2009) 87.5% of the trials supported that regional anesthesia patients had decreased pain levels not only for the first day but up to ten days post-operatively. With overwhelming evidence present in literature today showing benefits of regional anesthesia, healthcare still shows variable anesthetic practices due to the lack of an overall guideline and delay of evidence-based practice implementation.

Due to this lack of guidelines, it is imperative that a guideline implementation occur at the facility levels to provide the most up to date evidence-based practice for their patients. By focusing on not only an implementation change but policy changes for the facility can focus on adherence from all areas of care. This will provide high quality care for patients, decrease in facility cost, higher patient survey scores, and overall higher patient outcomes.

1.1 Project Goals

The goal of this benchmark study was to provide incite on the need for anesthesia guidelines at the ambulatory surgery center level for total joint procedures. Implementation of regional anesthesia for all qualifying outpatient total joint arthroplasty procedures will be successful if all five steps are strategically executed by all parties involved. The measured outcomes would show a decrease in total time to discharge from recovery, decrease in post-op

pain, decrease in post-op narcotic use, decrease in post-op nausea and vomiting, and increase in patient's overall experience with anesthesia and recovery. Interview with staff and physicians would hopefully show buy-in for the new process of regional anesthesia due to increased patient outcomes and high patient satisfaction scores. The overall goal for this project change is to develop a regional anesthesia guideline that will provide higher patient outcomes in ambulatory surgery settings.

Literature Synthesis.

All articles focused on total joint arthroplasty procedures conducted in an outpatient surgical setting such as our project at hand. The meta-analysis, systematic review and RCT studies all compared the effects of using spinal anesthesia versus general anesthesia with similar results. Pu and Sun's (2019) meta-analysis (MA) reviewed four articles between 2011-2016 with a total of 487 subjects who received total hip arthroplasty procedures. With the confidence interval at 95% and weighted mean difference (WMD) for length of stay at 1.0 shows the statistical support for the hypothesis that spinal anesthesia showed better patient outcomes than general anesthesia. The outcomes showed that spinal anesthesia had a significant reduction in post-operative nausea and reduction in length of facility stay compared to the control group who received general anesthesia.

Furthermore, a systematic review performed by Macfarlane et al. (2009) was chosen and rapid critical appraisal was conducted to determine the validity of the article. After rigorous search by Macfarlane et al. (2009) 28 studies were chosen with 1583 total patients who received total knee arthroplasty procedures. Twenty-one of the 24 RCTS that exclusively compared general and regional anesthesia showed results that regional anesthesia reduced pain scores specifically. In addition, there were 12 RCT's specifically that investigated length of stay

showed that RA could reduce overall length up to 1 day or 13 days if patients were placed into rehab centers. When total knee arthroplasty (TKA) patients were examined independently of total hip arthroplasty (THA) patients the pain scores showed significant reduction up to 48 hours when spinal anesthesia was performed.

RCT articles chosen, the first article was performed by Wulf et al. (1999) to evaluate pain and recovery in two groups with one receiving general anesthesia and the other spinal anesthesia in total hip arthroplasties. 90 patients were enrolled and randomly placed in the two groups with only 2 patients being excluded. By using intention to treat analysis (ITT) the study was able to show that patients who received spinal anesthesia had a decrease in postoperative pain, nausea, and vomiting as well as an increase in bowel function, and quicker readiness for discharge. These results are congruent with the PICOT question's outcome of postoperative pain and total recovery time until discharge. The second RCT chosen was performed by Gonano et al. (2006) in Austria to test whether spinal anesthesia is more efficient and less expensive than general anesthesia. 40 patients were enrolled and randomly selected to each group by using the sealed envelope technique placing 20 patients in either the general anesthesia (GA) or spinal anesthesia (SA) group. All exclusion criteria were used for selection guidelines with all 40 patient's data analyzed. All patients were evaluated for their postoperative pain level by using the visual analog scale (VAS) and the modified Aldrete score. For pain at admission to PACU the SA group showed a lower pain score ranging from 0.4 to 1.2 by VAS compared to the GA group whose pain score ranged from 4.7 to 4.0. In addition, the SA group required less need for analgesics than patients in the general anesthesia group. This was supported with the significance level, denoted as alpha or "*P*", equal to less than 0.01 confirming significant data. The outcomes

showed that not only was the hypothesis supported that SA and recovery was more cost effective it also provides patients with less post-operative pain than general anesthesia.

A cohort study by Donauer et al. (2018) compared RA and GA for total knee and hip replacements. Studies were selected by using the International PAIN OUT Registry with the use of exclusion criteria to identify 1713 TKA patients and 1681 THA patients. By using VAS and modified Aldrete the article studied opioid consumption and pain levels within the GA and RA group. OR and CI of 95%, and P value of less than 0.05 supported the hypothesis that regional anesthesia was associated with an overall reduction in opioid consumption and postoperative pain in total knee replacement patients. On the other hand, the total hip patients showed a reduction in opioid consumption in recovery. The supporting data showed allowed Donauer et al. (2018) cohort study to be valid evidence in support of the PICOT at hand.

Lastly, a qualitative study by Specht et al. (2016) performed in Denmark on the experiences of patients who received a total hip or knee replacement in a fast-track outpatient setting from their first visit to discharge. By performing interviews and observations through each point of care the researcher was able to collect data and analyze it to show the interpretation and experiences of the patients. The study results were broken down into pain management, feelings of confidence or uncertainty, and readiness for discharge. The results showed that patients were hesitant to taking pain medications postoperatively along with feelings of not having enough education about pain management (Specht et al, 2016). In addition, having a swift discharge was possible by the patients wanting to go home quickly was a positive experience noted by patients who were prepared to have home care and start their recovery process.

Project Stakeholders

To accomplish system-wide standard of practice change stakeholders must be correctly identified for continual success. Project stakeholders will include a vast array of people from patients, families, nursing staff, physicians, and more. All levels of engagement are necessary beginning with senior leadership managers such as the administrator, clinical director, and the medical director. Senior leadership buy-in for project change is vital for a successful transition by staff alike. In addition, mid-level management holders such as the perioperative nursing managers and nurse educators will be strong stakeholders for the project development and implementation. Physicians, anesthesiologists, and CRNA's will also have an important role to play as they will be the stakeholders who will be performing the guidelines on a daily basis. Lastly, the patients and families will be of utmost importance, as their decision to allow the guideline change to occur is how the success of the project will be mainly measured.

Implementation Plan

My regional anesthesia guideline implementation program for outpatient arthroplasty procedures will occur over a five-step process. The project plan will be implemented in the ambulatory surgery center setting for only patients who are receiving outpatient arthroplasty surgery. The regional anesthesia guideline implementation will be put into place for patients who meet the selection criteria by the anesthesiologist and the criteria guidelines. This plan will include the following: a 6-week trial with data collection; data collection and interpretation of data that is placed into a report; stakeholder presentation to secure buy-in from leadership, surgeons, and anesthesiologists; policy change and implementation of new guideline; dissemination of new guideline through educational in-services, classes, and skill check-off for anesthesiologists, staff, and surgeons.

4.1 6-week trial

This will be a trial implementation where all patients who meet selection criteria (ASA I-II, no history of difficult spinal procedures, no history of blood clots, no history of CHF) will be randomly placed in a general anesthesia control group and a regional anesthesia group for their total joint arthroplasty procedure. During this trial we will collect the following data: total time to discharge from recovery, post-op pain scores while in facility, narcotic use while in facility, post-operative nausea and vomiting, and patient's overall experience with anesthesia provided including recovery experience.

4.2 Data collection, interpretation, and report finalized

Next, the data will be collected and sorted based on each topic of interest. Once sorted it will be interpreted without bias to provide the facts as is. This will be placed into a final report with the data on each topic to present to the stakeholders on which anesthesia the data supported. The hypothesis is that the data will support that there are higher patient outcomes when regional anesthesia was provided to the patients.

4.3 Stakeholder presentation

Once all the data has been placed into a statistical report, we will then produce a presentation to provide all of the pertinent information to stakeholders to seek stakeholder buy-in on implementation change. This presentation will host the medical board director, head anesthesiologist, administrator, clinical director, regional vice-president, and governing board members. At the end of this presentation, the administrator will call for a vote to approve policy

change and implementation of regional anesthesia guidelines for total joint arthroplasty procedures.

4.4 Policy changes and implementation of guidelines

Following approval of policy and implementation change the clinical director will work with the medical board director and head anesthesiologist to construct a policy for regional anesthesia as the main anesthesia given for total joint arthroplasty procedures. This policy will include selection criteria requirements, reasons for not using regional anesthesia and choosing general anesthesia instead, and chain of command to follow when decision should be questioned, or procedure aborted. Next, the leadership team will gain approval by governing board of the new policy and then it will be ready for dissemination.

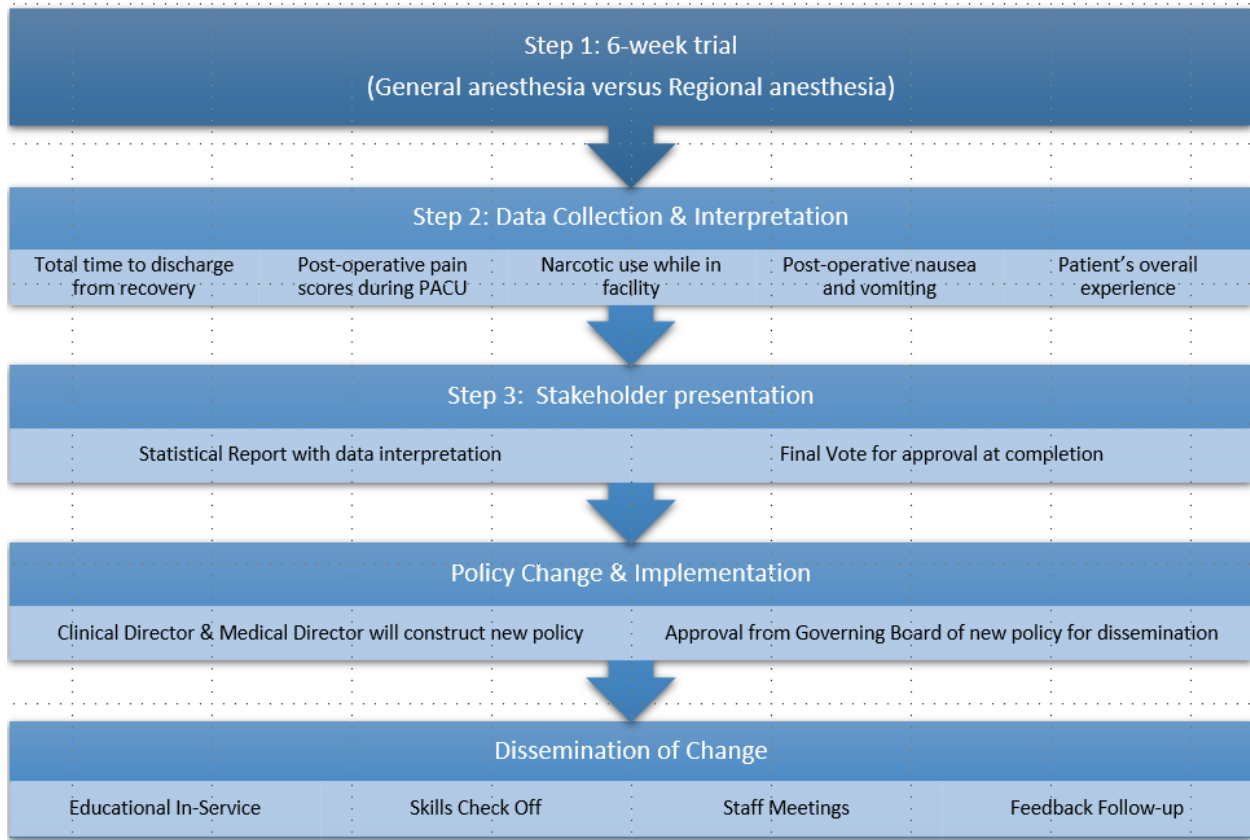
4.5 Dissemination of change

Finally, the leadership team will schedule various events to have full dissemination of the policy change and new guideline. There will be educational in-services for the anesthesiologists and surgeons held by the medical director and head anesthesiologists as well as in-services held by the clinical director for the facility staff. If any of the providers need skills check off to perform regional anesthesia, they will be held by the head anesthesiologist. Lastly, there will be staff meeting to answer any questions about the changes, detailed information on the implementation change, and any feedback will be taken at this time.

Flowchart

Pictured below you will find a flowchart that shows the steps for completion of the project.

(Appendix B)



Data Collection Methods

For my project my evaluation plan will be based on measured outcomes, interviews with staff and physicians, and patient satisfaction ratings. The measured outcomes would show a decrease in total time to discharge from recovery, decrease in post-op pain, decrease in post-op narcotic use, decrease in post-op nausea and vomiting, and increase in patient’s overall experience with anesthesia and recovery. Interview with staff and physicians would hopefully show buy-in for the new process of regional anesthesia due to increased patient outcomes and high patient satisfaction scores.

6.1 Measured Outcomes

Chart audits will be conducted by the management team to monitor measured outcomes that should indicate whether the process is working successfully or not. These measured outcomes that will be looked at will be the following: mode of anesthesia given, quantity of narcotic use in recovery, post-op nausea medication use, and total time to discharge. The charts will be randomly selected from the total joint arthroplasty patients and various performing physicians after the process implementation. The data will be collected in an excel sheet to be compared to the control group of patients who received the same care prior to process implementation. This data comparison will allow us to see if positive or negative outcomes are occurring.

6.2 Staff Interviews

The next step in my evaluation plan will be interviews conducted with staff, surgeons, and anesthesiologists. The interviews will focus on their interactions with the patients, their perspective of the process successful or failing, and recommendations. Interviews will be conducted at 2-week intervals for 60 days. The following table illustrates interview questionnaire to be used.

| |
|---|
| Do you feel the process change is working and if so how? |
| Do you feel the new anesthesia guidelines is increasing OR time, decreasing, or no change to OR time? |
| Do you feel the process change is increasing positive patient outcomes? |
| Do you feel the process change is providing a better overall patient experience? |
| When interacting with patients in recovery, are the patients recovering at a faster rate? |

When interacting with patients in recovery, subjectively do you think their pain control is more manageable?

6.3 Patient Satisfaction Surveys

The last step in my evaluation plan will include conducting patient surveys prior to discharge from the facility, 48 hours after discharge and 7 days after discharge. This survey will focus on the patient’s experience, pain control, post-op nausea and vomiting, and quickness of mobility post-operatively. This survey will be conducted by the management team and the total joint coordinator. The results will be collected in an excel sheet to compare statistics. The following questions will be used in the survey.

- | |
|--|
| How was your overall experience with your surgical day? |
| Do you feel that your pain was controlled with or without narcotics? |
| Have you had to use any post-operative narcotics, and if so how much? |
| Have you had any post-operative nausea and/or vomiting? If so, how many times? |
| How quickly were you able to begin your ROM and mobility exercises? |
| Do you feel that you were adequately prepared for your procedure? |

Cost/Benefit Discussion

The anticipated cost of this benchmark project would be analyzed in terms of staff resources operating room time, and recovery room time. In terms of staff resources there would not be an increase in staffing for the guideline change since anesthesia providers are scheduled for the surgery regardless of which type of anesthesia the patient is receiving. On the other hand, research shows that there is a decrease in recovery time and total time to discharge so there

would be a decrease in staffing hours and a decrease in overtime. Hu et al., (2009) reported a decrease in operating room time and overall cost to the facility. The intervention would be justified by the decrease in staffing hours, decrease in overtime by recovery nurses, and a decrease in overall operating room time.

Discussion of Results

Since this is a benchmark project, I was not able to implement this into action due to being on medical leave the past three months. As an administrator at a surgery center, I have started to implement this project with the support of my medical board. I am hopeful to see the results that the project can bring once it is complete in the upcoming months. I suspect that I will see an increase in patient outcomes as I have already begun to see a positive reaction from our total joint patients this past week.

Conclusions/Recommendations

After continuous literature research and internal evidence collection, it is evident that support for regional anesthesia is higher over general anesthesia for total joint arthroplasty procedures. Outcomes such as faster readiness for discharge, less postoperative pain, and less incidences of nausea and vomiting are among the most dominant outcomes noted in multiple studies of evidence. This evidence can help integrate a regional anesthesia guideline for patients that meet criteria. The current evidence-based practice should be updated to provide high quality care to patients and that is what this project can do. My recommendation is that the ambulatory surgery center implement the new regional anesthesia guideline after full completion of the trial, buy-in from stakeholders, and complete dissemination.

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Appendix A

Synthesis Table

| Citation: author(s), date of publication & title | Purpose of Study | C F | Design/ Method | Sample/Setting | Major Variables Studied and Their Definitions | Measurement of Major Variables | Data Analysis | Study Findings | Appraisal of Worth to Practice Strength of the Evidence = 1) <u>Level of evidence +</u> 2) <u>Quality [study strengths and weaknesses]</u> 3) <u>YOUR Recommendations</u> |
|---|---|------------------|---|--|---|---|---|--|--|
| Xiang Pu (2019) GA vs SA for PTs undergoing THA | Effects of SA & GA in THA PTs | N o n e | MA 5 databases searched: PubMed, Embase, Web of Science, CDSR, Google Databases RCT level of evidence used | N=4 studies Sample size ranged from 10-71 (487 total subjects) Mean Ages (65.1-72.2) Setting: Outpatient Facility | IV1: SA IV2: GA DV1: total BL DV2: DVT DV3: nausea DV4: total LS | PRT: VPS (0-10) | CI CI Interval RR Stata 12.0 Kappa values DSL method | CI=95% DV1: P=.524 DV2: P= .805 DV3: P= .000 DV4: P= .000 RR DV3: 3.04 CI Interval DV3: (1.69-5.5) CI Interval DV4: (0.59-1.41) | Level I Evidence Strengths: Similar study findings demonstration superior outcomes for SP vs GA Limitations: Only 4 studies used Financial Implication: Not Discussed Risk of Harm: Minimal to no Risk Recommandations: SA should be used over GA in outpatient THA Feasibility of use in practice: Extremely feasible with EBP change process implemented |
| Wulf (1999) Ropivacaine epidural anesthesia and analgesia versus general | Evaluate pain and recovery with GA vs SA in THA | N o n e | RCT Method: Group 1: EDA Group 2: GA BR & SR | N= 90 PTs G1= 43 PTs G2= 45 PTs | IV1: EDA IV2: GA DV1: Postop pain DV2: bowel function | PRT: VPS (0-10) Bromage Scale VAS | Stratified Wicoxon Sum Test ITT | DV1 G1: (P= 0.007) DV3 G1: 7 PTs DV3 G2: 13 PTs DV4 G1: 0 min | Level II Evidence Strengths: Similar study findings demonstration superior outcomes for SP vs GA Limitations: double blinding was unable to occur; no CI was used; |

REGIONAL ANESTHESIA IN OUTPATIENT TOTAL JOINT ARTHROPLASTY

| Citation: author(s), date of publication & title | Purpose of Study | C F | Design/ Method | Sample/Setting | Major Variables Studied and Their Definitions | Measurement of Major Variables | Data Analysis | Study Findings | Appraisal of Worth to Practice Strength of the Evidence = 1) <u>Level of evidence +</u> 2) <u>Quality [study strengths and weaknesses]</u> 3) <u>YOUR Recommendations</u> |
|--|---|-----|--|--|---|--------------------------------|---|---|--|
| anesthesia and intravenous patient-controlled analgesia with morphine in the perioperative management of hip replacement | | | ITT ICR | Setting: 4 surgical centers | DV3: Postop N/V DV4: Time to discharge | | | DV4 G2: 30 min | research took place at multiple places Financial Implication: Not Discussed Risk of Harm: Minimal to no Risk Recommendation: SA should be used over GA in outpatient THA Feasibility of use in practice: Extremely feasible with EBP change process implemented |
| Specht (2016) Patient experience in fast-track hip and knee arthroplasty-a qualitative study | Explore PTs experience receiving TKA or THA from the first visit to discharge | Non | Qualitative Method: PH approach Random selection of PT Semi-structured interviews Observations ICR | N= 8 PTs Age Range (42-82) Inclusions: 18 years or older, able to speak/read Danish, primary THA/TKA Exclusion: dementia, | IV: PT experience DV1: pain management DV2: feelings of confidence or uncertainty DV3: readiness for discharge | Interviews | Systemizing Database w/ 3 analytical levels | PT resistant to pain medications PT had increased confidence with full education at every encounter Early D/C due to increased confidence, optimal time use during PACU | Level VI Evidence Strengths: PT personal experience; interviewed by the same RN every time Limitations: sample size is too small Financial Implication: Not Discussed Risk of Harm: Minimal to no Risk Recommendation: full education for arthroplasty PTs at every |

REGIONAL ANESTHESIA IN OUTPATIENT TOTAL JOINT ARTHROPLASTY

| Citation: author(s), date of publication & title | Purpose of Study | C F | Design/ Method | Sample/Setting | Major Variables Studied and Their Definitions | Measurement of Major Variables | Data Analysis | Study Findings | Appraisal of Worth to Practice Strength of the Evidence = 1) <u>Level of evidence +</u> 2) <u>Quality [study strengths and weaknesses]</u> 3) <u>YOUR Recommendations</u> |
|---|---|------|---|---|--|--------------------------------|--|--|--|
| | | | | bilateral surgery Setting: Fast-track facility | | | | | stage of care; have support system to help with outpatient care Feasibility of use in practice: Extremely feasible with EBP change process implemented |
| Macfarlane (2009) Does regional anesthesia improve outcome after total knee arthroplasty | Answer if RA decreased mortality, DVT, PE, BL, LS, pain | None | Systematic Review 3 databases searched: Embase, Medline, and CCRCT RCT level of evidence used Evidence-based medicine literature review form | N=28 studies Sample Size range: (20-262 PTs) 1583 total PTs | IV1: RA IV2: GA DV7: Pain DV10: LS DV11: Rehab | PRT: VPS (0-10) VAS | Kappa values Jaded scores CI | DV7: P=<0.05 DV10: (P=<0.05, <0.1, <0.001) 21 out of 24 trials showed RA reduced pain scores vs GA | Level I Evidence Strengths: Similar study findings for RA decreasing length of stay and level of pain Limitations: English language only trials; no large trials (N>1000); Financial Implication: Not Discussed Risk of Harm: Minimal to no Risk Recommendations: RA should be used over GA in outpatient TKA and THA Feasibility of use in practice: Extremely feasible with EBP change process implemented |

REGIONAL ANESTHESIA IN OUTPATIENT TOTAL JOINT ARTHROPLASTY

| Citation: author(s), date of publication & title | Purpose of Study | C F | Design/ Method | Sample/Setting | Major Variables Studied and Their Definitions | Measurement of Major Variables | Data Analysis | Study Findings | Appraisal of Worth to Practice Strength of the Evidence = 1) <u>Level of evidence +</u> 2) <u>Quality [study strengths and weaknesses]</u> 3) <u>YOUR Recommendations</u> |
|---|--|------|--|--|--|--|---|--|---|
| Gonano (2006) Spinal versus general anesthesia for orthopedic surgery: anesthesia drug and supply costs | SA is less expensive and more efficient than GA for THA or TKA | None | RCT Method: Group 1: GA Group 2: SA RCT level of evidence used BR ICR ITT | N=40 PTs G1= 20 PTs G2= 20 PTs Age Range: (51-73) Setting: Outpatient Facility | IV1:GA IV2:SA DV1:Postop Pain DV2: PONV | PRT: VPS (0-10) VAS Modified Aldrete | t-test X squared P value <0.05 = significant ITT | DV1 G1: (4.7 +/- 4.0) DV1 G2: (0.4 +/- 1.2) DV1 P value = (< 0.01) DV2 G1: 15 PTs DV2 G2: 10 PTs | Level II Evidence Strengths: Similar study findings demonstration superior outcomes for SA vs GA; no PT enrolled was disqualified or dropped Limitations: double blinding was unable to occur; no CI was used; small sample size Financial Implication: Costs for anesthesia and recovery were less for SA vs GA Risk of Harm: Minimal to no Risk Recommendations: SA should be used over GA in outpatient TKA and THA for its efficiency and decreased VAS scores in PACU Feasibility of use in practice: Extremely feasible with EBP change process implemented |
| Donauer (2018) Regional versus | Outcomes of regional versus general | None | Cohort Study Studies searched: International | N=1713 TKA PTs N=1681 THA PTs | IV1: GA IV2: RA IV3: GA + RA | PRT=NRS Modified Aldrete | CI CI Interval | CI= 95% | Level III Evidence Strengths: Similar study findings demonstration superior outcomes for SA vs GA; |

REGIONAL ANESTHESIA IN OUTPATIENT TOTAL JOINT ARTHROPLASTY

| Citation: author(s), date of publication & title | Purpose of Study | C F | Design/ Method | Sample/Setting | Major Variables Studied and Their Definitions | Measurement of Major Variables | Data Analysis | Study Findings | Appraisal of Worth to Practice Strength of the Evidence = 1) <u>Level of evidence +</u> 2) <u>Quality [study strengths and weaknesses]</u> 3) <u>YOUR Recommendations</u> |
|--|---|-----|------------------------------|---|---|--------------------------------|---|---|--|
| general anesthesia for total knee and hip replacement: An analysis of postoperative pain perception from the international PAIN OUT registry | anesthesia regarding pain and morphine use on the first postoperative day | | PAIN OUT registry ICR | Age Range: (18-100) Inclusion: primary TKA or THA Exclusion: any with missing data; asthma, coronary problems | DV1: opioid consumption DV2: pain levels | | P value <0.05 = significant Chi Square Test Kruskal-Wallis Test OR | DV1 G2: (OR 0.2, 95% CI, P < 0.001) DV2 G2: (OR 0.53, 95% CI, P=0.001) | Limitations: Long term outcomes were not assessed, unable to quantify success or failure rates of blocks, possible selection bias due to voluntary participation Financial Implication: Not Discussed Risk of Harm: Minimal to no Risk Recommendations: SA should be used over GA in outpatient TKA Feasibility of use in practice: Extremely feasible with EBP change process implemented |

Appendix B

Flowchart

