Alberta Health Services

Bone & Joint Health Strategic Clinical Network™

# Briefing Report for the Fragility & Stability Program of the Bone & Joint Health Strategic Clinical Network

## Use of Peripheral (Femoral) Nerve Blocks in Alberta for Acute Hip Fracture Patients

### *Findings of a literature review* and *environmental scan*


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**Introduction**

The Fragility and Stability Program (F&S Program) of the BJH SCN is committed to supporting on-going quality improvement of health care services in Alberta, specifically in area(s) of osteoporosis and fragility fractures. To that end, the clinical committee and working group of the Fragility & Stability Program is currently developing best practice guidelines for Alberta specific to the management and prevention of hip fractures. One aspect of this guideline would be the inclusion of a standardized protocol for the use of peripheral nerve blocks (PNBs), specifically femoral nerve blocks, in the treatment of acute hip fractures in older adults. This would be a new initiative informed by the work that has been completed over the last year. The work undertaken over the last year to help inform Alberta's best practice guidelines has consisted of two parts:

1. A literature review to understand current knowledge regarding the benefits of peripheral (femoral) nerve blocks in the treatment of acute hip fractures.
2. An environmental scan to understand current practices in Alberta specific to the use of PNBs in the treatment of patients with acute hip fractures.

The following provides an overview of the findings from the literature review and the environmental scan.

**PNB Literature Review**

It is noted in the literature that the use of regional anesthesia for perioperative management, particularly of pain, has increased significantly with the use of ultra sound guided techniques, and is "gaining support as the 'gold standard' analgesic technique following hip fracture". [1] To synthesize the literature regarding PNBs in the treatment of acute hip fracture patients, the two main questions guiding the scope of the review were:

1. What is the clinical effectiveness (on pain, delirium and length of stay) of peripheral nerve block for the treatment older adults with acute hip fracture?
2. What are the evidence-based guidelines regarding the use of peripheral nerve block for the treatment of older adults with acute hip fractures?

The literature review was conducted between April and June 2016. The results are based on literature published in the English language between 2005 and 2016. The literature search was conducted by Ania Kania-Richmond (AKR), Canadian Agency for Drugs and Technologies in Health (CADTH), and Alberta Health Services Knowledge Management librarian. It also incorporated the findings of a literature review completed by a medical resident at U of Alberta (Khalid Almaazmi), co-authored by his supervisors, Dr. Beaupre and Dr. Menon. See Appendix 1 (separate attachment) for the power point presentation made by Mr. Almaazmi at the 2016 Ortho Research Day. The final results are based on a cross reference of the output from these four search outputs.

[1] https://www.nursingtimes.net/nurse-administered-femoral-nerve-block-after-hip-fracture/203664.article - citing Martin and Ali, 2002; NHS Modernisation Agency, 2001; Parker, 2000

***Results:***

Through the literature search, four systematic reviews, one Cochrane review, 14 other reviews, 22 clinical trials, and 31 other study types (prospective and retrospective) were identified. Abstracts for the reviews and clinical trials are provided Appendix 2 (separate document). In addition, four guidelines were identified[2]:

- Scottish Intercollegiate Guidelines Network (SIGN) – 111- Management of hip fracture in older adults
- NICE clinical guidelines – CG124 – Hip Fracture Management
- Association of Anesthetists of Great Britain and Ireland (AAGBI) – Management of Proximal Femoral Fractures (2011)
- Australian and New Zealand Hip Fracture Registry (ANZHFR) Steering Group (2014)

The majority of the studies were conducted within an emergency department. The top three outcomes of interest assessed were: pain, drug use, and occurrence of adverse events. Based on the four systematic reviews and one Cochrane review, PNBs are effective in decreasing acute pain, opioid consumption, use of rescue analgesia, and risk of adverse events. Additional comments made by my review authors that flag potential limitations of research to date, that may be of relevance were: minor complications were under reported (Ritcey *et al.*) and high quality evidence is inconclusive (Abou-Setta *et al.*; Oliver *et al*.). The 2017 updated Cochrane review[3] concludes: "*high quality evidence shows that regional blockage reduces pain on movement within 30 minutes after block placement. Moderate quality evidence shows reduced risk for pneumonia, decreased time to the first mobilization, and cost reduction of the analgesia regimes (for single shot blocks).*" Not surprisingly, results of clinical trials demonstrate similar findings as those of the reviews. However, highlight lack of clarity regarding impact on the following factors: reduced opioid consumption, delirium occurrence, and decrease length of stay.

**Environmental Scan of current PNB Practices**

Recognizing the clinical benefits of PNBs, the Clinical Committee took up the recommendation that an environmental scan would be beneficial to understand if and how PNBs are currently administered in surgical and transferring sites across Alberta admitting and treating acute hip fracture patients, and potential for uptake in the Alberta context.

The environmental scan was conducted as a survey of surgical and high volume transferring sites. The survey to capture this information was developed by AKR and Gillian Richmond, with input and face validation from expert members of the F&S Program. The survey elicited information about where blocks are currently administered, details around PNB administration, facilitators and barriers to PNB delivery, and potential capacity and/or readiness within Alberta for PNB delivery. It was conducted in October and November 2016, and follow up to address specific questions was conducted between April and May 2017. The survey was administered online, managed by GR. Its administration was facilitated by the F&S Working Group co-leads and Nurse Clinicians, who helped identify the appropriate sites/individuals to complete the survey and/or administered the survey by phone telephone with select sites.

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[2] *National Guideline Clearinghouse – Hip Fracture Management in Adults* were identified however not included in this list as they "summaries systematically derived from original guidelines" (https://www.guideline.gov/summaries/summary/50076/fractures-complex-assessment-and-management?q=hip+pain)

[3] Guay, J., Parker MJ., Griffiths, R., Kopp, S. Local anesthesia nerve blocks for people with hip fractures. Cochrane Database of Systematic Reviews 2017, Issue 5. Art. No.: CD001159. DOI: 10.1002/14651858.CD001159.pub2

Forty-two sites from across Alberta were identified. These include all 13 surgical sites (SS) and 29 transfer sites (TS), which have been designated as high volume with 11 or more transfers to surgical centers per month. [4]

A total of 26 sites completed the survey representing a 92% (12/13) and 48% (14/29) response rates at the SS and TS, respectively, and an overall response rate of 62% (26/42). The geographic distribution across the five zones of sites which completed the survey was: Central 35% (9/26), Calgary 27% (7/26), Edmonton 19% (5/26), North 12% (3/26) and South 8% (2/26).

PNB for pain management of acute hip fracture is currently administered at two sites (both surgical) in Alberta: SHC and UAH. Details about the current PNB practices at the two sites are provided in Appendix 3. Overall, there are differences in the PNB protocols at these two sites (summarized below), however, both sites indicated satisfaction with the use of PNB and plan to continue using them in the future.

- **UAH** - The PNB intervention is integrated into the perioperative care pathway following acute hip fracture. Patients are identified in the emergency department and the acute pain service is consulted. Consult includes medical optimization, pain control and fast track to operation. Currently over 90%+ of acute hip fracture patients are seen by APS and receive PNBs to control pain pre-operatively. PNBs are delivered via catheter infusion (most common) in a dedicated block room attached to the main operating suite.
- **SHC** – the PNB intervention is not the standard intervention for acute hip fractures - of the 5 to 6 acute hip fracture patients seen per week in the OR by anesthesiology, approximately 10-25% are seen receive PNBs. Single shot administration is used and more commonly immediately prior to surgery in the PACU (recovery area). A pathway has not been developed for PNBs for acute hip fractures (but it has for other patient population receiving PNBs). Members of the anesthesia department at SHC are quite interested in developing a standardized program similar to that at UAH and other major centers.

PNBs are not used at 85% (22/26) of the sites; however, 15% (4/26) indicated that they have used PNBs in the past (listed in Appendix 4). Numerous reasons were given for stopping PNB, including lack of access to equipment, trained personnel, and protocols/guidelines. Two sites, accounting for 8% (2/26), were unsure if PNB for acute hip fractures were used at their sites.

At the 22 (85%) of sites which did not currently administer PNB for pain management in patients with acute hip fractures, reasons for not administering PNB were as follows:

- Never considered utilizing PNB 37% (8/22)
- Lack of trained personal 33% (7/21), mainly anesthesiologists 37% (8/22)
- Lack of equipment 37% (8/22) (see Addendum for additional information)
- No reason provided 27% (6/22)
- No established protocol or guideline 14% (3/22)

Sites selected on average 1.5 reasons from the given answer choices.

Many sites not offering PNBs, 38% (9/22), named particular concerns unique to their facility including preference indicated by anesthesia, unfamiliarity with the procedure, and inconsistent results due to physician ability/training.

[4] The cut off of 11 or more transfers was selected for inclusion in the survey as this was the point of transition from 1 or 2 transfers to a larger number is observed. In addition, these sites represent around 25% of hip fracture transfers in the province.

For some transfer sites, the short duration of stay before a transfer of patients was stated as the key factor limiting their ability to administer PNB.

The reasons above were subsequently the majority of the barriers to implementation of PNB protocols. Factors enabling future application identified were:

- Training for interested staff;
- Physician involvement and education;
- Standardized guidelines; and,
- Access to ultrasound equipment.

Almost half of the sites currently not providing PNBs, 45% (10/22), indicated some level of interest in using PNB for pain management for acute hip fractures now or in the near future (see Appendix 5). Currently, 18% (4/22) of sites state they have capacity to administer PNB for acute hip fracture patients (see Appendix 6). Whereas 5% (1/22) are not interested, 18% (4/22) are neutral, and 32% (7/22) indicated they are unsure of interest.

**Conclusion:**

The majority of surgical and transferring sites in Alberta surveyed do not administer PNB for pain management of acute hip fractures. Currently, PNBs are administered to acute hip fracture patients at two surgical sites in the province, both of which appear to utilize different approaches in PNB administration; one site (UAH) has a well-defined pathway for this intervention. There is interest in almost half the sites surveyed for PNB in the future and four indicated they have the capacity to administer PNBs. The main barriers to implementation of PNB are unfamiliarity with the protocols, procedures, and a lack of equipment, guidelines, and trained personnel.

**Addendum- question regarding ultra sound access from Nov 2016 Clinical Committee meeting:**

Thirty eight percent (8/21) of sites identified lack of access to equipment as a limitation for PNB. To clarify what this perceived limitation was based on, follow up was conducted April to May 2017. Of the eight sites, six (75%) had agreed to be contacted for further follow-up and 83% (5/6) of sites completed the follow-up survey conducted via email. Sites were queried about the type and number of ultrasound machines available at their facility. Three sites, High River General Hospital, Red Deer Regional Hospital and Rocky Mountain House Health Centre, have access to two ultrasound machines. One machine at each location is designated to the emergency department. The second machine is in obstetrics use at High River General Hospital and surgical use at Red Deer Regional Hospital. The second ultrasound at Rocky Mountain House Health Center is available three days/week for routine appointments. Peter Lougheed Centre and Stettler Hospital and Care Centre have access to a single ultrasound machine for anesthesiology. All machines were GE Healthcare LOGIQe except High River General Hospital which utilizes Sonosite. All sites had access to ultrasound machine with the capability to guide PNB administration.

**Path forward – Recommendations:**

Given the evidence regarding effectiveness and safety and increasing consensus about PNBs being a gold standard for analgesic management of acute hip fracture patients, the Clinical Committee endorsed PNBs as best practice for pre-operative acute hip fracture care at the November 2016 meeting. It is important to highlight that in addition to the evidence of effectiveness, the current opioid crisis makes the use of PNBs for pain management even more compelling.

The environmental scan indicates that, although currently used at only two sites, there appears to be potential for a provincial standardized protocol for PNB delivery in the care of acute hip fracture patients as almost half of the sites completing the survey (10/22) indicated some level of interest and some (4) already have capacity. Further, based on the information gathered, barriers identified are not insurmountable based on current state and resources already existing in Alberta:

- Lack of knowledge
  - Information regarding best practice can be disseminated through the program experts, the BJH SCN, and through the best practice guidelines currently in development.
- Lack of trained personnel
  - There is capacity in the province to create, lead and deliver PNB training opportunities – both Drs Green and Endersby have both taught such courses.
- Lack of guidelines/standard protocols
  - The development of a province wide best practice guidelines for the management of hip fractures is already identified PNB for acute hip fracture patients as a new initiative for 2017/2018.
  - One site in Alberta has a well defined pathway that maybe used as a template if not a starting point for a provincial standard protocol.
- Other:
  - Although not identified through the survey, in follow up discussions with the two sites administering PNBs for acute hip fracture patients, funding was identified as a key issue that requires attention for success.

Recognizing the challenge of a province wide initiation, the recommendation is to take a phased approach and begin this piece of work by:

- Disseminating information province wide regarding the evidence for PNBs (education).
- Creating and validating a provincial pathway, which would include a funding model.
  - Consideration of a multi-disciplinary funding approach is suggested, potentially based on the concept of a “pre/post-operative home”.
- Implementing the protocol at the sites that have indicated interest and capacity to uptake this protocol. This may be initiated with a readiness assessment.

Lastly, although this area appears to fall within the domain or scope of anesthesia in Alberta, it may be worthwhile considering that in other jurisdictions (e.g Europe), PNBs are administered by other health care professionals, for example, advanced nurses[5], paramedics and emergency doctors.

[5] https://www.nursingtimes.net/nurse-administered-femoral-nerve-block-after-hip-fracture/203664.article

**Appendices:**

Appendix 1 – Presentation by Khalid Almaazmi (separate document)
Appendix 2 – Results of the literature search (separate document)
Appendix 3 – Overview of PNB delivery at SHC and UAH
Appendix 3a – UAH Perioperative Hip Fracture pathway
Appendix 4 – List of sites that have administered PNBs for acute hip fracture patients in the past
Appendix 5 - List of sites interested in PNBs
Appendix 6 – List of sites that are not administering PNBs but have capacity

**Appendix 1 – Presentation by Khalid Almaazmi (separate document)**

**Appendix 2 – Results of the literature search (separate document)**

**Appendix 3 – Overview of PNB delivery protocol at SHC and UAH**

| **Component** | **U of A Hospital**<br>**(Dr James Green)** | **South Health Campus**<br>**(Dr. Endersby; Rosa Reza)** |
|---|---|---|
| Who receives PNB at U of A Hospital | • Of the acute hip fracture patients (approx.. 400 annually; 8 per week) admitted ~+90% seen by acute pain services and receive PNBs<br>(aiming for 100%; improvement of referral system)<br><br>NOTE: other patients:<br>Acute hip fracture patients (90% of patients who receive PNBs); other (10%) | • ER - anesthesia see 5-6/week in the OR but 10-25% receive PNBs (rough estimate)<br>• Unit 78 - 3 to 4 consults for PNB over the last 3 years.<br><br>NOTE: other patients (no estimate available but much higher numbers): joint replacement; shoulder reconstruction; hysterectomy; abdominal surgery; hand reconstruction<br>There is also pathways developed for these patients |
| | | |
| Administered by: | • Acute pain services (10)<br>• Anesthesiologists (40) | • Anesthesiologists (21 total; most can do blocks; some do blocks; 3 do NOT do PNBs; 7 have a strong interest in regional anesthesia)<br>• Acute pain service (3 Fellowship level trained anesthesiologists)<br>• Emergency medicine – trained but not common and not consistent |
| | | |
| Training: | Anesthesia:<br>• Residency (anesthesia) – all receiving training (e.g. single shot femoral nerve blocks)<br>• Fellowship (Internationally recognized regional anesthesia and acute pain fellowship program) - to learn advanced blocks and nerve catheter techniques | Anesthesia<br>• Residency – all<br>• Fellowship level training (3)<br><br>Emergency Med:<br>• Fellowship in US<br>• Do a course (taught by anesthetist)<br>• In scope of practice to administer blocks |
| Training requirements (for site) | • No set criteria/requirements to place single shot blocks - anesthesia residency provides adequate training<br><br>BUT to be in UAH acute pain service – fellowship level training is required. | • No set criteria/requirements<br>• anesthesia residency provides adequate training |

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| Block room /PNB administration components: | | | |
| Guidelines: | • department protocol – not based on any specific guidelines<br>• Perioperative hip fracture pathway – Appendix 3a | | • best practice<br>• department protocol – no standardized protocol for acute hip fracture patients (but there is for hip and knee arthroplasty patients)<br>• no specific guidelines |
| Where (location) are PNBs administered: | ***Current space***:<br>Specific room ('block room')<br>-1 or 2 US machines; 3 beds<br>(close to OR) | ***New space***:<br>Dedicated 'block room'<br>4 beds<br>2 (min) to 3 US machines<br>(close to OR) | In the PACU (recovery room) in a dedicated block area. It has 4 beds and 2-3 ultrasound machines<br><br>OR – equipment to do blocks all located in the OR + assistance from RT/Anesthesia Assistants or Colleagues (if needed) |
| When are PNBs administered | • Pre-op (all) | • *Pre-op (rare);<br>• Peri-op right before (most common);<br>• *Post-op (less common)<br>(*consultation based) | |
| What type of PNBs are used (Location of administration) | • Regional – femoral nerve block (FNB)<br>• Lateral Femoral Cutaneous nerve block (LFCNB) also often done pre-op for incisional pain | | • Regional – FNB, Fascia Iliaca Nerve Block (FINB)<br>• Regional – LFCNB – numbness over surgical site (not the deep)<br><br>Interested in new blocks (advances in regional anesthesia): QL, ES |
| Administration approach | • Multi-modal – various combinations: FNB; FNB+sLFCNB;<br>• Catheter infusion or single shot | | • single shot FNB, FINB, LFCNB, FNB +LFCNB<br><br>Interest in - continuous (catheter) - new program (at some sites across Canada) |
| Medication used in block | • Ropivacaine<br>• Bupivacaine | | • Bupivacaine +Dexamethasone (makes it longer lasting) |
| Equipment for administration | • Ultrasound | | • Ultra sound<br>• Sometimes Ultra sound with Peripheral nerve stimulator (PNS) |
| Protocols: | | | |
| **Time in relation to surgery** | **UAH** | | **SHC** |
| **Pre-operative** | Patient admitted to ER<br>↓<br>Referral to APS | | Patient admitted to ER<br>Or<br>Unit 78 (non-emergency admission)<br>▪ Admitted into Unit 78<br>▪ 12-48 hour wait for surgery<br>▪ Monitoring<br>↓ |

| | | |
|---|---|---|
| | | Sometimes anesthesia consult request pre-op for hip fracture patients (e.g. complex patient) – not a standard protocol |
| | ***Almost all blocks administered at this point***<br><br>PNB administration administered in a designated "block room"<br><br>Time to OR (fast track) – 12 - 24 hours (ideally)<br><br>**What is administered:**<br>Femoral nerve catheter and infusion runs up to OR time;<br>Single shot blocks placed if fast track straight to the OR (can happen)<br><br>**Where is administered:**<br>Designated block room | In the ER - Blocks very uncommon at this point (estimate not available)<br><br>Through unit 78:<br>Have received 3-4 patients in the last 3 years; of these, 1 to 2 received FNBs resulting from the consult<br><br>**What is administered:**<br>Single shot (+dexamethasone – longer lasting effect of block)<br><br>**Where is it administered:**<br>Block Area in PACU (recovery room) |
| **Surgery**<br><br>**Inter-operative PNB administration (right before surgery)** | Occasionally nerve blocks are placed in the OR by the attending anesthetist if APS has not been able to see the patient pre-op | ***Most common time for block administration***<br>(80-90% of blocks done at pre-operatively at this stage)<br><br>**What is administered:**<br>Single shot (+dexamethasone – longer lasting effect of block) – almost 100% of blocks done in this way<br><br>**Where is it administered:**<br>PNB administered in the Block Area the in PACU (recovery room) before surgery |
| **Post-operative** | Next day follow up – APS to ensure successful transition to oral analgesia following resolution of nerve block<br><br>No blocks post-operatively | 10% of blocks done post-operatively<br><br>**What is administered:**<br>Single shot (+dexamethasone – longer lasting effect of block) – almost 100% of blocks done in this way<br><br>**Where is it administered:**<br>PNB administered in the Block Area the in PACU (recovery room) before surgery<br><br>Next day follow up if nerve block preformed – APS to ensure successful transition to oral analgesia following resolution of nerve block |

Source of additional information:
UAH: Dr. James Green

SHA: Dr. Ryan Endersby and Rosa Reyes

**Appendix 3a – UAH Perioperative Hip Fracture pathway**

All hips get APS consult ( only a few are missed now so over 90% seen - I don't have exact numbers as unfortunately we don't have a database to record this yet - this is on my wish list of improvements to target!)

APS consult is done by the APS physician who is an anesthetist and consists of:

1. Anesthesia assessment - are they fit for surgery? This is then communicated to the OR anesthetist and surgical team

2. Medical assessment including ultrasound guided targeted fluid resuscitation, management of coagulation problems etc

3. Acute pain history and multi modal pain control. This usually involves femoral nerve block catheter placed in the block room and an infusion runs up to OR time although sometimes single shot blocks are placed if we can fast track straight through to the OR - time of presentation in ED impacts exactly what time in the day we see them - block room is staffed from 7am until around 4 pm although often we are around until 6 pm

We use the block area as all our equipment is there and this works well in our hospital

Other hospitals could do this in the ED or some other location potentially

Occasionally nerve blocks are placed in the OR by the attending anesthetist if APS has not been able to see the patient pre-op - this practice is likely more common in other hospitals where the patients are not seen by APS pre-op

**Appendix 4 – List of sites that have administered PNBs for acute hip fracture patients in the past**

1. Rockyview Hosptial
2. Leduc Community Hospital
3. QEII Regional Hospital
4. Canmore General Hospital

**Appendix 5 - List of sites interested in PNBs**

Transferring sites:

1. Rocky Mountain House Health Centre
2. Innisfail Hospital (Health Centre)
3. Leduc Community Health Centre
4. Sturgeon Community Hospital
5. Canmore General Hospital

Surgical sites:

1. Medicine Hat Health Centre
2. Chinook Regional Hospital
3. Misericordia Community Hospital
4. Peter Lougheed Centre

5. QEII Regional Hospital

**Appendix 6 – List of sites that are not administering PNBs but have capacity**

1. QEII Regional Hospital
2. Stettler Hospital
3. Leduc Community Hospital
4. Red Deer Regional Hospital Centre