Empowering Patients to Reduce Lumbar Puncture Associated Spinal Headaches

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Background: A post-lumbar puncture headache (PLPH) is a common complication of a lumbar puncture procedure. The traditional treatments of fluids, rest and mild analgesics work inconsistently to relieve the headaches. The invasive treatment of a blood patch is the most consistently effective treatment. Patient education typically recommends the treatments that inconsistently work. Blood patches are avoided due to their invasiveness. There has been considerable research conducted on risk factors associated with developing PLPH, prevention measures, and treatment options. This information is not readily available to nurses or to the patients.

Objective: The aim of the project was to determine from the evidence the risk factors associated with PLPH, methods for preventing them, and effective interventions for reducing them. The aim of the project was to use the information found to educate nurses who provide patient education prior and post lumbar punctures.

Design: The design of the project was a systematic review of the research literature.

Setting: An extensive search of CINAHL complete, Medline complete, and Health Source: Nursing/Academic Edition databases provided the articles for review.

Participants: Forty-one published articles evaluating reviews of literature, randomized controlled trials, quasi-experimental interventions, case-control studies, and cohort studies targeted to lower post lumbar puncture headache incidences in adults, pregnant women, and children were reviewed. Included in the analysis are 9 systematic reviews with meta-analyses, 4 reviews of literature, and 28 single research studies.

Main Outcome Measures: The outcomes measured were study recommendations regarding risk factors, prevention measures, and effective treatment strategies. A staff education program and a patient education brochure were created from the findings of this project.

Analysis: Qualitative analysis of the recommendations from the reviewed literature including a secondary analysis from a faculty mentor served as the method of analysis.

Results: Low body mass index, female, and an age of younger than 35 years old were risk factors that increased incidences of the post-lumbar puncture headache. Prevention interventions included smaller gauge needles, use of atraumatic needles (pencil-point or Whitacre), and minimal fluid removal. Some medications were inconsistently effective. The traditional interventions of fluid replacement and rest were inconsistently effective and prolonged rest was found to be ineffective.

Conclusions and Implications: Much of the research has methodological limitations, rendering it difficult to deduce conclusions across studies and further research that includes comparisons is indicated. This especially is true regarding interventions to treat PLPH. Patients should be informed that the use of a small gauge atraumatic needle and removal of a little fluid as possible lowers their risk of experiencing a PLPH. This is most important for patients with the risk factors of being female, having a low BMI, and younger than 35 years of age.

Key Words: lumbar puncture, headache, risk factors, prevention, treatment, systematic review
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Keywords:
headache, lumbar puncture and systematic review

References:


Abstract Summary:
Risk factors for the development of post-lumbar puncture headaches (PLPH) and interventions to prevent and relieve them were determined and critically appraised through a systematic search and review of 13 reviews of literature and 28 single studies with the aim to use the information for staff and patient education.

Content Outline:
Introduction
A. A post-lumbar puncture headache (PLPH) is a common complication of a lumbar puncture procedure.
B. Traditional treatments of fluids, rest and mild analgesics inconsistently work.
C. Patient education is inadequate.
D. Conducted a systematic review of the research literature to determine risk factors, prevention strategies and treatment interventions.
E. Created staff and patient education tools.

Body
Main Point #1 Systematic review of the literature
Supporting point #1 Procedure for conducting the review
1. Databases searched
2. Search terms used
3. PRISMA flow chart
Supporting point #2 Article selection
1. Inclusion and external criteria
2. 13 reviews of literature and 28 single studies included
Supporting point #3 Critical analysis
1. a) Appraisal table
2. b) Recommendation table
3. c) Mentor verification
Main Point #2 Results
Supporting point #1 Risk factors
1. Low body mass index (Destrebeca et al., 2014; van Oostrhout et al., 2013, & Wu et al., 2016)
2. Female (Berreras et al., 2017; Bezov et al., 2010; Chordas, 2001; Crock et al., 2013; Destrebeca et al., 2014; Khlebtovskii et al., 2015; & Thammegowda et al., 2013)
3. c) Age of younger than 35 years old (Berreras et al., 2017; Bezov et al., 2010; Chordas, 2001; Khlebtovskii et al., 2015; Park et al., 2014; Thammegowda et al., 2013; & van Oosterhout et al., 2013)
Supporting point #2 Prevention strategies
1. a) Smaller gauge needles (Ayub et al., 2017; Bajwa et al., 2015; Chordas, 2001; Monserrate et al., 2015; Rusch et al., 2014; Thammegowda et al., 2017)

2. b) Use of atraumatic needles (pencil-point or Whitacre) (Abdullayev et al., 2014; Ayub et al., 2017; Castrillo et al., 2015; Chordas, 2001; Davis et al., 2014; Destrebeca et al., 2014; Kanojiya et al., 2016; Engedal et al., 2015; Omole et al., 2015; Nath et al., 2018; Rusch et al., 2014; Vidoni et al., 2013; Xu et al., 2017; & Zhang et al., 2016)

3. c) Minimal fluid removal (Monserrate et al., 2015 & Wang et al., 2015)

Supporting point #3 Treatment interventions

1. a) Blood patch most consistently effective (Destrebeca et al., 2014; Kapoor et al., 2015; Omole et al., 2015; & So et al., 2016)

2. b) Some medications effective; although inconsistent results: theophylline or aminophylline (Basurto et al., 2016; Destrebeca et al., 2014; & Sen et al., 2014), morphine (Basurto et al., 2016), pregabalin (Alireza-Mahoori et al., 2014), dexamethasone (Najafi et al., 2014 & Thereem et al., 2018), zolmitriptan (Riaz et al., 2014) and cosyntropin (Basurto et al., 2016 & Hanling et al., 2016)

3. c) Traditional interventions of fluids and rest effective, although inconsistent results and prolonged rest ineffective (Arevalo-Rodriquez et al., 2016; Choi & Chang, 2018; Omole et al., 2015; Rusch et al., 2014; & Sen et al., 2014)

Main Point #3 Conclusions

Supporting point #1 Strengths and limitations

1. Strengths
   1. Extensive research on use of atraumatic needles
   2. Several systematic reviews with meta-analyses

1. Limitations
   1. Inconsistent methodological designs
   2. Several treatments with few studies

Supporting point #2 Future research recommendation

1. More comparison studies of treatments
2. More studies on children

Main Point #4 Education tools

Supporting point #1 Staff education

1. a) One-hour online CEU created
2. b) Provided to local hospital

Supporting point #2 Patient education

1. a) Patient education brochure created
2. b) Provided to local hospital

Conclusion
1. Prevention measures of PLPH well-supported in the research literature as reported in the completed systematic review of the literature
2. Much of this research has methodological limitations, rendering it difficult to deduce conclusions across studies and further research needs to be done that includes subject
3. Staff and patient education tools developed

First Primary Presenting Author

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Professional Experience: I do not have professional experience or specific training related to this educational activity. I am currently a senior nursing student that is doing a research project in a program called EURECA (Enhancing Undergraduate Research and Creative Activities) through my university.

Author Summary: I am a senior nursing student conducting a systematic review of literature on post-lumbar puncture headaches. I have personally experienced a post-lumbar puncture headache. Therefore, I wanted to search what interventions are effective in preventing and treating the headache, and creating educational materials to both nurses and patients.