Evaluating a Post Dural Puncture Headache Protocol: A Quality Improvement Project

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This project is in partial fulfillment of the degree requirements for the Doctor of Nursing Practice at Touro University of Nevada.

Introduction

- Post Dural Puncture Headaches (PDPH) are a debilitating complication that can occur after neuraxial anesthesia
- There are various non-invasive treatment options, but the gold standard is the Epidural Blood Patch (EBP) (Ioscovich et al, 2018; Shaparin et al., 2014)
- Project:
  - Development of PDPH and EBP protocol at the practice site
  - Educational intervention to anesthesia providers
  - Pre- and post- intervention assessments
  - Post-implementation evaluation tool

Figure 1. Epidural Blood Patch, McDonald, *K. (2016)* Retrieved June 8, 2020 from https://coreem.net/core/post-dural-puncture-headache/

Terms

PDPH: puncture of the dura mater causes leakage of Cerebrospinal Fluid (CSF) resulting in a severe headache

- **Most commonly occurs after an unintentional dural puncture during labor epidural placement (Bateman et al., 2019)**
- **Headache lasts 7-14 days. Usually self-resolves, but can be debilitating**

EBP: gold standard treatment for PDPH

- **Injection of autologous blood at site of puncture to "seal" hole**

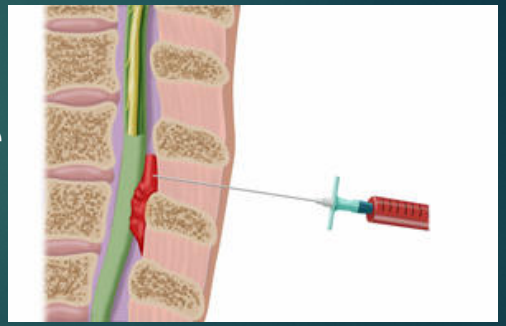


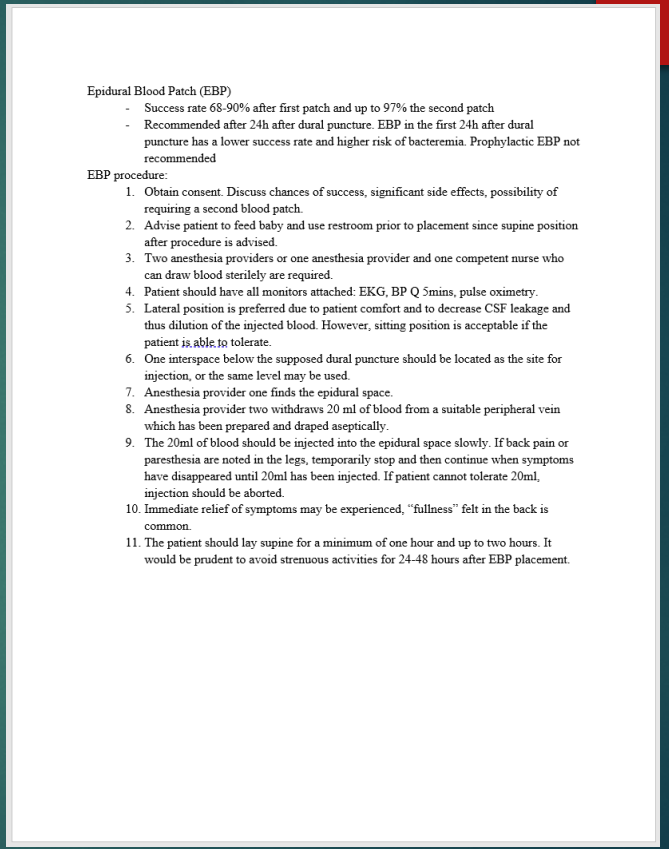
Figure 2. Epidural Blood Patch Procedure, Illustration, Schroeder, (n.d). Retrieved June 10, 2020, from https://www.sciencesource.com/Folder/2OPEBM9MLQ26

Project Problem/Purpose

- Identify and develop an evidence-based protocol or decision-making pathway to treat patients suffering from PDPH
- Secondly, increase the requisite knowledge of anesthesia providers caring for PDPH patients
- Facilities that have adopted protocols improve patient care and outcomes (Gaiser, 2017)
- Development of a protocol or decision-making pathway will streamline the process, guide anesthesia providers and improve patient care

Project Question

Will anesthesia providers, using an evaluation tool support the recommendation of the use of an EBP PDPH protocol at the practice site?



Epidural Blood Patch (EBP)

- Success rate 68-90% after first patch and up to 97% the second patch
- Recommended after 24h after dural puncture. EBP in the first 24h after dural puncture has a lower success rate and higher risk of bacteremia. Prophylactic EBP not recommended

EBP procedure:

1. Obtain consent. Discuss chances of success, significant side effects, possibility of requiring a second blood patch.
2. Advise patient to feed baby and use restroom prior to placement since supine position after procedure is advised.
3. Two anesthesia providers or one anesthesia provider and one competent nurse who can draw blood sterilely are required.
4. Patient should have all monitors attached: EKG, BP Q 5mins, pulse oximetry.
5. Lateral position is preferred due to patient comfort and to decrease CSF leakage and thus dilution of the injected blood. However, sitting position is acceptable if the patient is able to tolerate.
6. One interspace below the supposed dural puncture should be located as the site for injection, or the same level may be used.
7. Anesthesia provider one finds the epidural space.
8. Anesthesia provider two withdraws 20 ml of blood from a suitable peripheral vein which has been prepared and draped aseptically.
9. The 20ml of blood should be injected into the epidural space slowly. If back pain or paresthesia are noted in the legs, temporarily stop and then continue when symptoms have disappeared until 20ml has been injected. If patient cannot tolerate 20ml, injection should be aborted.
10. Immediate relief of symptoms may be experienced, "fullness" felt in the back is common.
11. The patient should lay supine for a minimum of one hour and up to two hours. It would be prudent to avoid strenuous activities for 24-48 hours after EBP placement.

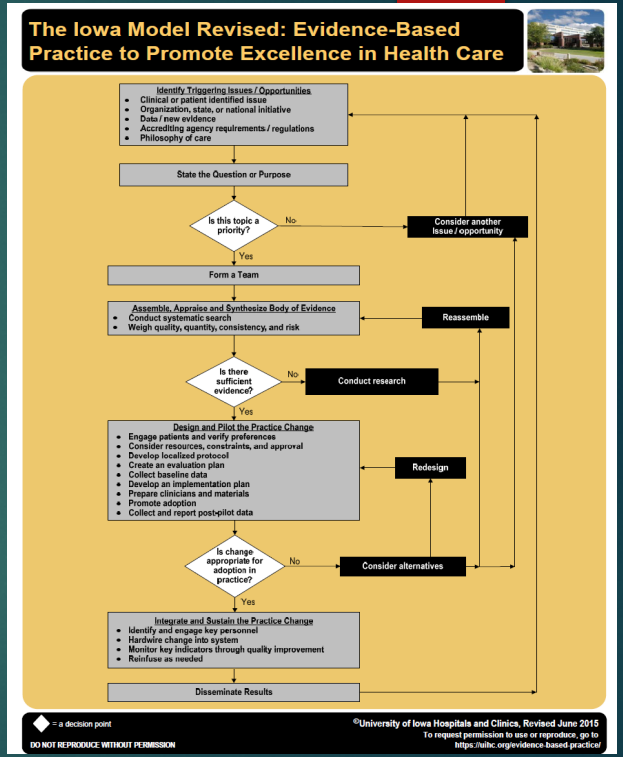
Figure 1: EBP protocol, p 5

Project Objectives

- Develop an evidence-based protocol and decision-making protocol for the management of all patients presenting with PDPH
- Provide educational training to anesthesia providers regarding the standards of care for PDPH patients, utilization of PDPH protocol and decision-making pathway
- Evaluate feedback and recommendations from anesthesia providers for the implementation of the PDPH protocol
- Disseminate PDPH protocol information to all staff who may care for PDPH patients

Theory Application

- Iowa Model: outlines steps of implementing evidence-based practice (Buckwalter et al., 2017)
  - Knowledge-focused trigger: lack of protocol at the site
  - Determine the priority for the organization
  - Form a team
  - Gather relevant and recent research
  - Appraise research
  - Pilot the practice change
  - Evaluate the pilot
  - Integrate and sustain the practice change



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Tools and Instruments

- Protocol
- Educational Presentation
- Pre- and Post- Knowledge Assessment
- Post-Implementation Evaluation Tool

PDPH management and EBP provider survey

1. How many years have you been practicing anesthesia? _____ years

2. What percentage of your clinical time do you spend practicing obstetric anesthesia?
   a. <20%
   b. 21-40%
   c. 41-60%
   d. 61-80%
   e. >80%

Accidental Dural Puncture Management

3. Following ADP, what percentage of the time do you:
   a. Place an epidural _____
   b. Place a catheter intrathecally _____

4. When you place the epidural catheter, the best location is
   a. the same interspace as where the ADP occurred
   b. a different interspace
   c. May use either one

5. Following ADP, the amount of epidural drug you use for labor or surgery is:
   a. Reduced
   b. Kept the same

6. When an ADP occurs, after delivery the epidural catheter is
   a. Removed immediately
   b. Capped off and left in place for a period of time
   c. Bolused with crystalloid/colloid and removed immediately
   d. Infused with crystalloid/colloid for a period of time
   e. Injected with autologous blood (prophylactic blood patch) and removed

Post Dural Puncture Headache (PDPH) Management

Prophylactic therapy after ADP, before onset of PDPH

7. Prophylactic measures you routinely employ after ADP to reduce PDPH include: please check yes or no for all:

	Yes	No
Abdominal binder		
Oral hydration		
IV hydration with crystalloid		
IV or oral caffeine		
Prophylactic Epidural Blood Patch prior to removal of epidural catheter		

Figure 2: Pre- and Post- assessment, p 1
Adapted with permission from Baysinger, Pope, Lockhart, & Mercaldo, 2014.

Methodology/Project Plan

- Development of evidence-based research PDPH EBP protocol in collaboration with Project Expert
- Select group of 18 anesthesia providers at the 350-bed Northern California hospital
- Implementation of protocol through PowerPoint presentation to stakeholders
- Data collection from a pre-presentation knowledge assessment and post-presentation knowledge assessment
- SPSS analysis of assessments
- Post-implementation provider evaluation tool

Results

- Statistically significant difference between pretest and posttest knowledge showing improved knowledge of the providers after the intervention presentation
- In the post evaluation tool, providers rated all aspects of the protocol as relatively high
- Mean difference between pretest knowledge and posttest knowledge percentile scores was -12.65, showing posttest scores were significantly higher than pretest
  - Pretest mean scores: 77.78, SD 10.08; Posttest mean scores: 90.43, SD 5.97
- Six of the eighteen providers recommended a checklist type format

Descriptive Statistics of Relevant Variables of the Post-Evaluation Tool

Item	*M*	*SD*
Ease of Use	3.72	0.67
Ease of Implementation	3.89	0.68
Comprehensiveness	4.06	0.54
Ease of Understanding	4.28	0.67

$N = 18$

Discussion

- The overall goal was to implement an evidence-based practice protocol for managing patients who suffer from PDPH
- The 18 key stakeholders indicated significant increase in posttest knowledge compared to pretest knowledge
- The post evaluation tool collected approximately two weeks after the protocol presentation revealed what changes the providers recommend with the majority not having any recommendations for improvement

Key Conclusions

- One source states that over 90% of patients who receive an EBP, have been shown to have reduced hospital stays, emergency room visits and more rapid ability to resume activities of daily living ("Epidural Anesthesia and Analgesia," 2019).
- There is no one-size-fits all approach
- This project will provide a guiding reference to assist an anesthesia provider in providing individualized care

Limitations

Project design:

- Small number of participants
- More challenging to generalize results
- Limited timeframe for implementation

Collection methods:

- Collection of the post-intervention evaluation tool was delayed and challenging to obtain in the limited timeframe of the project

Sustainability

- PDPH and EBP guidelines will be posted on the anesthesia department's intranet site
- Project leader will serve as a consultant when any questions arise related to PDPH and EBP
- Any new feedback received from anesthesia providers will be considered for incorporation into the workflow and practice setting
- As new research evolves, the protocol may be edited to reflect evidence-based practices
- The project findings will be shared with state and national nurse anesthesia associations

Acknowledgements

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Project Expert: Eric Hunt, MD PhD

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