

Appendix B: The final level of agreement for each statement and recommendation (Supplementary file)

Statement/Recommendation	Approve	Disapprove	Abstain
Question 1: When should post-dural puncture headache be suspected?			
Statement: PDPH should be suspected if headache, often relieved when laying flat, or any neurological symptom occurs within five days after a neuraxial puncture. (Moderate Level of Certainty).	90%	5%	5%
Recommendation: Inpatients who have received a neuraxial block should be reviewed and asked for symptoms of PDPH. Outpatients should be instructed to report symptoms of PDPH to their physicians, should they occur (Grade A; High Level of Certainty).	100%	0%	0%
Question 2: What patient factors are associated with the incidence of post-dural headache?			
Statement: The preponderance of evidence suggests that in the adult population, younger age may be associated with an increased risk of PDPH (High Level of Certainty).	100%	0%	0%
Statement: Some evidence suggests that adolescents have more susceptibility to PDPH than young or middle-aged adults (Low Level of Certainty).	90%	5%	5%
Statement: The preponderance of evidence suggests that female sex is associated with an increased risk of PDPH (High Level of Certainty).	100%	0%	0%
Statement: The studies reviewed do not suggest that BMI has consistent correlation with the risk of PDPH (Moderate Level of Certainty).	95%	5%	0%
Statement: The preponderance of evidence suggests that headache (chronic, contemporaneous, or prior PDPH) may be associated with an increased risk of PDPH. The association specifically with migraine is less clear (Moderate Level of Certainty).	90%	0%	10%

Statement: Cigarette smoking might be associated with a lower risk of PDPH (Low Level of Certainty).	95%	0%	5%
Statement: There is insufficient evidence to conclude that depression is a risk for PDPH (Low Level of Certainty).	90%	5%	5%
Statement: The preponderance of evidence suggests that pushing during labor after a witnessed dural puncture with a large gauge (e.g. 17-18G Tuohy) increases the risk of PDPH (Low Level of Certainty).	90%	5%	5%
Question 3: What are the performer and procedural characteristics associated with the risk for post-dural puncture headache (PDPH)?			
Statement: Compared to cutting needles, non-cutting spinal needles are associated with lower PDPH risk. However, there is limited evidence regarding the choice of non-cutting spinal needle (High Level of Certainty).	85%	10%	5%
Recommendation: Routine use of non-cutting spinal needles for LP for all populations is recommended (Grade A; High Level of Certainty).	Accepted in first round with 100% agreement		
Statement: When using cutting needles, the risk of PDPH is significantly reduced with narrower gauge needles. (High level of certainty)	100%	0%	0%
Statement: For non-cutting needles, limited evidence suggests a protective role for narrower gauge needles to reduce the risk of PDPH. (Moderate level of certainty)	100%	0%	0%
Recommendation: If using a cutting needle for LP, the use of a small-gauge needle is recommended (Grade A; High Level of Certainty).	95%	0%	5%

Recommendation: Limited evidence supports the preferential use of narrow gauge non-cutting needles over wider-gauge needles for LP (Grade C; Moderate Level of Certainty).	100%	0%	0%
Statement: Evidence does not support the paramedian approach over the standard midline approach to reduce the incidence of PDPH when performing LP. (Moderate Level of Certainty)	100%	0%	0%
Recommendation: If using a cutting needle, insertion with the bevel parallel to the long axis of the spine is preferred as it may reduce PDPH risk. (Grade B; Moderate Level of Certainty)	90%	5%	5%
<u>Statement: Evidence is insufficient to confirm benefit of any technique used to identify the epidural space on reduction of the incidence of PDPH (Low Level of Certainty).</u>	Added during the manuscript review process. All authors' approval obtained		
Statement: Evidence suggests an association between the number of attempts and PDPH risk (Moderate Level of Certainty).	100%	0%	0%
Statement: Evidence suggests that operator experience level reduces the incidence of PDPH, but the net benefit may be small (Moderate Level of Certainty).	100%	0%	0%
Statement: Evidence suggests that all neuraxial techniques (i.e., spinal, epidural, and CSE) have similar PDPH risk profiles (Moderate Level of Certainty).	95%	0%	5%
Statement: Evidence does not suggest an association of PDPH with the level of epidural insertion (Moderate Level of Certainty).	100%	0%	0%

Statement: Evidence suggests a lower risk of PDPH with lateral decubitus position. (Moderate Level of Certainty)	80%	10%	10%
Statement: Limited evidence suggests that the choice of needle in spinal anesthesia does not alter the risk of traumatic tap (Moderate Level of Certainty).	95%	0%	5%
Question 4: What prophylactic measures may be used to prevent post-dural puncture headache?			
Statement: Following inadvertent dural puncture during attempted epidural catheter insertion, current evidence is insufficient to confirm that placement of an intrathecal catheter reduces the incidence of PDPH and EBP (Low Level of Certainty).	100%	0%	0%
Recommendation: After inadvertent dural puncture during epidural catheter placement, an intrathecal catheter may be considered to provide anesthesia/analgesia. This decision must also consider the potential risks associated with intrathecal catheters. (Grade B; Low Level of Certainty)	100%	0%	0%
<u>Statement: Prophylactic EBPs via an existing epidural catheter or as a stand-alone procedure have been performed following inadvertent dural punctures in both obstetric and non-obstetric populations with variable success. Not every patient who experiences a dural puncture develops a PDPH. Therefore, a policy of routine prophylactic blood patching exposes some patients to unnecessary potential risks.</u>	Converted from summary to statement during the manuscript review process. All authors' approval obtained		
Recommendation: While there appears to be some benefit in reduction in incidence, duration and severity of PDPH, a prophylactic EBP cannot be recommended as a routine as there is insufficient evidence to support its effectiveness in preventing PDPH (Grade C; Low Level of Certainty).	100%	0%	0%
Statement: Evidence of a reduction in severity of PDPH with prophylactic bed rest is mixed (Moderate Level of Certainty).	95%	5%	0%
Recommendation: Bed rest has not been shown to be beneficial in reducing the incidence of PDPH and is not routinely recommended as prophylaxis against PDPH. (Grade D, Moderate Level of Certainty).	Accepted in the first round with 100% agreement		

Recommendation: The routine use of injection of any substance intrathecally or epidurally to prevent PDPH is not recommended (Grade I; Low Level of Certainty).	Accepted in the first round with 100% agreement		
Recommendation: There is insufficient evidence to recommend routine systemic drug administration for PDPH prophylaxis (Grade I; Low Level of Certainty).	Accepted in the first round with 100% agreement		
Question 5: What conservative measures may be used to treat of post-dural puncture headache?			
Recommendation: Current evidence does not support the routine use of bed rest to treat PDPH but it may be used as temporizing measure for symptomatic relief (Grade C; Low Level of Certainty).	100%	0%	0%
Recommendation: Adequate hydration should be maintained with oral fluids; intravenous fluid should be used only when oral hydration cannot be maintained (Grade D; Low Level of Certainty)	100%	0%	0%
Recommendation: Current evidence does not support the routine use of abdominal binders to treat PDPH (Grade D; Low Level of Certainty).	95%	0%	5%
Recommendation: Current evidence does not support the routine use of aromatherapy to treat PDPH (Grade D; Low Level of Certainty).	95%	0%	5%
Recommendation: Regular multimodal analgesia including acetaminophen and NSAIDs should be offered to all patients with PDPH (Grade B; Low Level of Certainty).	100%	0%	0%
Recommendation: Short-term use of opioids may be considered in the treatment of PDPH, but long-term use is not recommended (Grade D, Moderate Level of Certainty).	80%	15%	5%
Recommendation: Caffeine may be offered in the first 24 h of symptom onset with a maximum dose of 900 mg per day (200-300 mg if breastfeeding) and avoiding multiple sources to prevent untoward side effects (Grade B; Low Level of Certainty).	100%	0%	0%
Recommendation: Current evidence does not support the routine use of hydrocortisone, theophylline and gabapentin in the management of PDPH (Grade D; Low Level of Certainty).	Accepted in the first round with 100% agreement		

Question 6: What procedural interventions have been shown to be of benefit in the management of post-dural puncture headache, and when should they be chosen over conservative and pharmacological measures?			
Recommendation: Current evidence does not support the routine use of acupuncture in the treatment of PDPH (Grade I; Low Level of Certainty).	Accepted in the first round with 100% agreement		
Recommendation: Current evidence does not support the routine use of SPGBs in the treatment of PDPH (Grade I; Low Level of Certainty).	90%	5%	5%
Statement: The efficacy of GONB for PDPH following dural puncture with larger gauge needles is unclear (Low Level of Certainty).	95%	0%	5%
Recommendation: GONBs may be offered to patients with PDPH following spinal anesthesia with a smaller gauge (22G or less) needle, although headache may recur in a significant proportion with more severe headache requiring an EBP. (Grade C; Moderate Level of Certainty).	90%	5%	5%
Recommendation: Current evidence does not support the use of spinal and epidural morphine to treat PDPH (Grade D, Low Level of Certainty).	Accepted in the first round with 100% agreement		
Recommendation: Epidural saline may be of temporary benefit but should not be expected to provide long lasting headache relief in the treatment of PDPH (Grade C; Low Level of Certainty).	95%	5%	0%
Recommendation: Current evidence does not support the routine use of epidural dextran in the treatment of PDPH (Grade I; Low Level of Certainty).	Accepted in the first round with 100% agreement		
Recommendation: Current evidence does not support the routine use of epidural gelatin in the treatment of PDPH (Grade I; Low Level of Certainty).	Accepted in the first round with 100% agreement		

Recommendation: Current evidence does not support the routine use of epidural HES in the treatment of PDPH (Grade I; Low Level of Certainty).	Accepted in the first round with 100% agreement		
Statement: The use of fibrin glue may be associated with anaphylaxis and aseptic meningitis, although it not possible to quantify the risk (Low Level of Certainty).	84%	11%	5%
Recommendation: Current evidence does not support the routine use of fibrin glue in the treatment of PDPH. (Grade I, Low Level of Certainty).	Accepted in the first round with 100% agreement		
Recommendation: Fibrin glue should be reserved for the management of PDPH refractory to EBP or when autologous blood injection is contraindicated. (Grade I; Low Level of Certainty)	Accepted in the first round with 100% agreement		
Question 7: Is imaging required in the management of post-dural puncture headache?			
Statement: Current evidence is insufficient to assess the balance of risk versus benefit routine cranial imaging prior to EBP for PDPH (Low Level of Certainty).	100%	0%	0%
Recommendation: Brain imaging is not likely to be contributory in most cases of typical PDPH but may be considered when non-orthostatic headache is present or develops subsequent to initial orthostatic headache. Imaging may also be appropriate when headache onset is more than five days after suspected dural puncture (Grade C; Low Level of Certainty).	Accepted in the first round with 100% agreement		
Recommendation: The presence of focal neurological deficits, visual changes, alterations to the level of consciousness, or seizures, especially in the postpartum period, should prompt neuroimaging to evaluate for alternative diagnoses (Grade A; Moderate Level of Certainty).	Accepted in the first round with 100% agreement		
Question 8: What are the contraindications to an epidural blood patch for PDPH?			
Statement: The risk of an epidural hematoma is low when performing neuraxial procedures on obstetric patients with a platelet count greater than or equal to 70,000 x 10 ⁶ /L providing there is no defect in platelet function(Moderate Level of Certainty).	95%	0%	5%

Statement: There is insufficient evidence for recommending prophylactic antibiotics prior to EBP (Low Level of Certainty).	Accepted in the first round with 100% agreement		
Recommendation: Clinicians should follow appropriate guidelines (such as ASRA Pain Medicine and SOAP) regarding neuraxial injection in patients on antithrombotics or with low platelet counts (Grade A; Moderate Level of certainty).	Accepted in the first round with 100% agreement		
Recommendation: Caution should be exercised when considering EBP in febrile patients or patients presenting with other systemic signs of infection. Deferring the procedure may be appropriate if there is risk of hematogenous infection. (Grade C; Moderate Level of Evidence)	100%	0%	0%
Q9: Epidural Blood Patch: When and how should an epidural blood patch be used in the treatment of PDPH?			
Recommendation: When PDPH is refractory to conservative therapy, and impairs activities of daily living an EBP should be considered a therapeutic option to treat headache and other neurological sequelae of intracranial hypotension (Grade: B; Moderate Level of Certainty).	95%	5%	0%
Recommendation: In patients with PDPH with severe neurological symptoms (e.g., hearing loss, cranial neuropathies), EBP should be considered as a therapeutic option (Grade: C; Moderate Level of Certainty).	100%	0%	0%
Statement: High success rates for EBP reported in early studies have not been reproduced in more recent publications with complete headache remission varying between 33% and 91% (Low Level of Certainty).	90%	10%	0%
Recommendation: If an EBP performed within 48 h of dural puncture patients should be counseled about potentially more likely need for repeat EBP to achieve symptom resolution (Grade B; Moderate Level of Certainty).	95%	0%	5%
Recommendation: Regular patient follow-up should be undertaken for the potential need for repeat EBP in cases of suspected persistent or severe CSF leak, until symptom resolution (Grade C; Low Level of Certainty).	Accepted in the first round with 100% agreement		
Recommendation: When the site of dural puncture is known, an EBP should be performed at or one space below the level of the original dural puncture. If that is not possible, the injection can be administered at other vertebral levels (Grade B; moderate Level of Certainty).	90%	5%	5%

Recommendation: Unilateral or bilateral transforaminal approach can be considered in cases of prior laminectomies near site of dural puncture or after unsuccessful interlaminar EBP (Grade: C; Moderate Level of Certainty).	90%	5%	5%
Statement: The optimal EBP volume is unknown and likely varies between patients due to patient factors such as size, age, degree of spondylotic spine changes and relative size of the dural hole.	100%	0%	0%
Statement: Despite lack of correlation between EBP volume and success rates, most recommended volumes are between 15-20mL	100%	0%	0%
Statement: Injection of >30 mL blood does not appear to increase the success rate of an EBP.	95%	0%	5%
Recommendation: The decision to perform EBP under radiological guidance (i.e., fluoroscopy, CT) should be individualized based on patient factors including age, degree of spondylotic change, context of dural puncture, and prior lumbar spine surgeries. (Grade I; Low Level of Certainty)	95%	5%	0%
Recommendation: Risk and benefit analyses, available resources and follow-up capabilities, and in cases where the provider determines that EBP cannot be safely performed with landmarks alone should also be considered. (Grade I; Low Level of Certainty)	100%	0%	0%
Recommendation: Ultrasound guided EBP has the utility for landmark clarification prior to EBP or for image guidance in patients unable to receive fluoroscopy or CT (Grade I; Low Level of Certainty).	95%	5%	0%
Recommendation: Current evidence does not support the routine use of blood cultures prior to an EBP (Grade D; Low Level of Certainty).	95%	0%	5%
Recommendation: Informed consent for an EBP should include the potential for repeat dural puncture, backache and neurological complications. (Grade A, High Level of Certainty).	100%	0%	0%
Recommendation: To minimize complications, blood should be injected slowly and incrementally while performing EBP. If the patient develops backache or headache (e.g., pressure paresthesia) while performing EBP, injection of blood should be stopped immediately, and resumed only if symptoms resolve (Grade A; Moderate Level of Certainty).	95%	5%	0%
Recommendation: After an EBP, if backache persists, increases in severity, or evolves, then other diagnoses should be investigated (Grade C; Low Level of Certainty).	95%	5%	0%

Recommendation: Patients with severe headache within the first 24 h of dural puncture, older patients, and those with a history of headaches or hypertension should be counseled that repeat EBP may be needed to alleviate severe symptoms or to treat breakthrough symptoms (Grade C; Moderate Level of Certainty).	95%	5%	0%
Recommendation: Evidence to guide timing of repeating EBP is insufficient and should be individualized based on risk benefit analyses. (Grade I, Low Level of Certainty).	100%	0%	0%
Statement: Timing of neuraxial blocks following EBP may impact clinical outcomes. Patients presenting for repeat neuraxial blocks ≤ 2 years following EBP may be counseled on the potential for decreased rates of success, although the evidence is very weak (Low Level of Certainty).	89%	11%	0%
Recommendation: Epidural analgesia and anesthesia can be effective and should not be withheld following EBP (Grade C; Low Level of Certainty).	100%	0%	0%
Question 10: What are the long-term complications of post-dural puncture headache and how should patients be followed-up?			
Statement: Current evidence shows an association between inadvertent dural puncture and/or PDPH with chronic headache, backache, neckache, depression, cranial nerve palsy, SDH or CVST (Moderate Level of Certainty).	Accepted in the first round with 100% agreement		
Statement: Evidence is insufficient to determine whether EBP mitigates, prevents, or treats these sequelae (Low Level of Certainty).	Accepted in the first round with 100% agreement		
Statement: PDPH is an independent predictor for the development of chronic headache (Moderate Level of Certainty).	85%	0%	15%
Recommendation: Prior to discharge, information regarding PDPH sequelae of PDPH needs to be conveyed to the patient along with appropriate follow-up and contact information with their anesthesia provider and other health care providers (Grade B, Moderate Level of Certainty).	100%	0%	0%
Recommendation: Patients, their obstetricians, and their primary care physicians should be counseled regarding the long-term potential for chronic headache so that appropriate referrals and care may take place (Grade B; Moderate Level of Certainty).	85%	5%	10%
Recommendation: Follow-up with patients who experience PDPH should be continued until the headache resolves to exclude severe complications such as SDH and CVST (Grade B; Moderate Level of Certainty).	95%	5%	0%
Recommendation: Following discharge from hospital, follow-up may be continued by the patient's primary care physician. Information regarding the diagnosis of a PDPH and/or inadvertent dural puncture should also be communicated to the patient's primary care physician and specialists and referrals to a pain or neurology specialist if indicated (Grade C; Low Level of Certainty).	Accepted in the first round with 100% agreement		

Recommendation: Urgent neuroimaging should be performed for any PDPH patient with worsening symptoms despite an EBP, new focal neurologic symptoms, or change in the nature of headache (Grade B; Moderate Level of Certainty).

