NEBRASKA METHODIST COLLEGE
The Josie Harper Campus

Infection Rates in Postoperative Pediatric Patients with Congenital Heart Defects

Allie Meyer RN, BSN, Hallie Knutson RN, BSN, & Jerrad Roberts RN, BSN
Nebraska Methodist College, Omaha, NE

Problem & Purpose

- Problem: Postoperative infections in pediatric patients may be more difficult to detect due to immature language skills or vague symptoms. Any delay in treatment for a postoperative infection can result in negative outcomes such as increased cost, longer hospital stay, re-operation, morbidity and mortality.

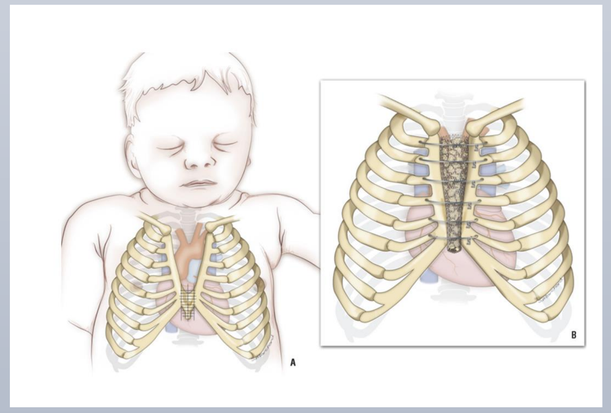
- Purpose: The purpose of this evidence-based project is to determine how different approaches to sternal closures affect the likelihood of developing postoperative infections in pediatric patients with CHD.

PICO(T) Question

In the pediatric patients with CHD, how does delayed sternal closure compared to primary sternal closure impact the likelihood of developing a postoperative infection?

Search Methods

- Database searches were completed on the computer, via the web
- Databases used:
  - Academic Search Elite
  - Cumulative Index to Nursing and Allied Health Literature (CINAHL)
  - MEDLINE Complete
- Filters used were peer-reviewed:
  - Full text
  - Academic journals
  - Publication dates 2015-2025
  - English language.



Sternal closure
(Al-Yamani et al., 2016)

Data Analysis

Article One: Hurtado-Sierra, D., Calderón-Colmenero, J., Curi-Curi, P., Cervantes-Salazar, J., Sandoval, J. P., García-Montes, J. A., Benita-Bordes, A., & Ramírez-Marroquin, S.
- 2325 participants; 259 DSC, 2066 PSC
- Patients aged zero to 18
- Database of the Department of Pediatric Cardiology institute for congenital heart disease surgical treatment
- Enrolled from January 2003 to December 2012
- Processed data using the SPSS statistical software v.21.0
- Pearson's Chi-Square test to compare variables
- Mann-Whitney *U* test to compare continuous variables
- *P* values <0.05 were considered statistically significant

Article Two: Iguidbashian, J., Feng, Z., Colborn, K. L., Barrett, C. S., Newman, S. R., Harris, M., Campbell, D. N., Mitchell, M. B., Jaggers, J., & Stone, M. L.
- 2492 patients; 195 DSC, 2387 PSC
- Children's Hospital in Aurora, Colorado
- Enrolled from January of 2015 to December of 2020
- Student T Test to compare continuous variables
- Fisher Exact Tests or Chi-Square Tests to compare categorial variables
- *P* values <0.05 were used to show significance

Article Three: Von Stumm, M., Leps, Y., Jochheim, L., Van Rüth, V., Gottschalk, U., Mueller, G., Kozlik-Feldmann, R., Hazekamp, M. G., Sachweh, J. S., & Biermann, D.
- 358 patients; all DSC
- STS-EACTS Congenital Heart Surgery Mortality Categories and Aristotle Score calculated
- Mann-Whitney-U-Test and the binary variables were the number of cases and relative frequencies reported
- Binary variables were compared using Fisher's exact test.
- *P* values of <0.05 were used to show significance

Results

- **Article One:** (Hurtado et al., 2018)
  Increased mortality rates (22% as opposed to 8%) for DSC as opposed to PSC, increased mediastinitis risk when DSC lasted greater than 4 days.
- **Article Two:** (Iguidbashian et al., 2022)
  47 surgical infections were noted, of which 30 were PSC (1.3% of all PSC) and 17 were DSC (8.7% of all DSC) suggesting that DSC exposed patients to increased risk for infection.
- **Article Three:** (Von Stumm et al., 2022)
  5 surgical procedures (5.9%) resulted in sternal wound infections after procedure was completed. Of these 15, 6 of them (2.4%) were deep wound infections. Ability to deliver oxygen post operatively was identified as a key factor in infection risk in neonates.

Discussion of Evidence

- Outcomes of this evidence-based project:
  - Determine the approach to limit postoperative infections in pediatric patients with CHD
  - Determine ways that nursing practice can influence the postoperative infection rates for patients with DSC or PSC.
- Themes within the articles:
  - DSC has increased infection risk
  - DSC is valuable in pediatric surgical recovery

Conclusions

- There are two types of sternal closure techniques: DSC or PSC
- Type of closure can influence:
  - Wound healing
  - Pain management
  - Postoperative infection risk
  - Length of stay
  - Cost of care
- Findings concluded that:
  - DSC had higher postoperative infection rates
  - DSC was beneficial for hemodynamically stable but still had an increased likelihood of mediastinitis after four days postoperative
- Our hope:
  - Assist with leading best practice guidelines for pediatric patients with CHD
  - Lower postoperative infection rates and improving care
- Type of sternal closure is not determined by nursing staff
- Nursing recommendations:
  - Understand why the sternal closure technique was chosen
  - Educate patient and family
  - Manage pain control
  - Promote a healing environment

References

Al-Yamani, M., Lavrand, F., Thambo, J.-B., & Roubertie, F. (2016). Upper sternal cleft with a complex congenital heart defect: Repair in a single stage. *The Society of Thoracic Surgeons*, 760-762. https://www.annalsthoracicsurgery.org/article/S0003-4975%2815%2900485-3/pdf

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