Nurse Practitioner and Physician Placed Chest Tubes: Is There a Difference?

Julie Chesterton, APRN
Ann & Robert H. Lurie Children’s Hospital of Chicago | 225 East Chicago Avenue, Chicago, IL 60611

Background

- Due to the increasing number and complexity of procedures performed in interventional radiology, it has become advantageous to hire, train, and privilege nurse practitioners to perform some of the less complex invasive and image-guided procedures such as chest tube placement.
- Chest tube placement at our institution had previously been performed only by physicians.

Purpose

- This study sought to determine if there was an increased complication rate associated with chest tubes placed by a trained nurse practitioner compared to that of physicians-placed chest tubes.
- The study also looked at the American Society of Anesthesiology (ASA) patient health status classification assigned to each patient prior to chest tube placement to assess for significant health status differences associated with those patients treated by the nurse practitioner versus a physician.

Methods and Materials

- This was a single-center retrospective review of patient medical records and images to determine if there was an increased complication rate or a difference in patient acuity (ASA classification) associated with nurse practitioner-placed chest tubes compared to those placed by a physician between August 2007 and April 2014.
- This study was approved by the Institutional Review Board at the Ann & Robert H. Lurie Children’s Hospital of Chicago(#2014-15935).

<table>
<thead>
<tr>
<th>ASA Classifications I-IV</th>
<th>Nurse Practitioner 1 NP</th>
<th>Physicians 56 Fellows 7 Attendings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Chest Tubes Placed</td>
<td>57</td>
<td>344</td>
</tr>
<tr>
<td>Number of Patients Requiring Chest Tubes</td>
<td>55</td>
<td>251</td>
</tr>
<tr>
<td>Mean Number of Chest Tubes Placed by Provider Type</td>
<td>m=57 Total m=5.46 Fellow m=3.39 Attending m=22</td>
<td></td>
</tr>
<tr>
<td>Patient Age Range and Mean Age</td>
<td>24 days – 29 years m=7.01 years</td>
<td>3 days – 24 years m=6.72 years</td>
</tr>
<tr>
<td>Number of Patients with ASA I</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Number of patients with ASA II</td>
<td>21</td>
<td>111</td>
</tr>
<tr>
<td>Number of Patients with ASA III</td>
<td>35</td>
<td>197</td>
</tr>
<tr>
<td>Number of Patients with ASA IV</td>
<td>1</td>
<td>33</td>
</tr>
</tbody>
</table>

ASA Classifications I-IV

- ASA I: A healthy patient
- ASA II: A patient with mild systemic disease
- ASA III: A patient with severe systemic disease
- ASA IV: A patient with severe systemic disease that is a constant threat to life

Results

- Of the 401 chest tubes placed in interventional radiology for pleural effusions between August 2007 and April 2014:
  - 14% (n=57) were placed by the nurse practitioner
  - 86% (n=344) were placed by physicians
- There was no statistically significant increase in post-procedure complications associated with the nurse practitioner compared to physicians, ($\chi^2(1, n=401)=1.782, p=0.182$).
- There was no statistically significant association between patient ASA classification and provider type placing the chest tube ($\chi^2(3, n=401)=11.369, p=0.224$).

Discussion

- The increasing need and utilization of advanced practice providers to perform invasive image-guided procedures in interventional radiology is well documented.
- There have been multiple studies favorably comparing the procedural outcomes of advanced practice providers to those of their physician colleagues.
- This study contributes to those findings of safe practice by the trained nurse practitioner when performing image-guided chest tube placement in interventional radiology.

Conclusions

The use of a well-trained nurse practitioner to place image-guided chest tubes for pleural effusions does not result in increased post-procedure complications nor is the nurse practitioner limited by patient selection based upon acuity.

Limitations of the study include:

- The subjective nature of assigning ASA classification as evidenced by 3 “Healthy patients” needing chest tubes.

Acknowledgements

- Thank you to all of the physicians in Interventional Radiology at Ann & Robert H. Lurie Children’s Hospital who have patiently trained the Nurse Practitioners, Sharon Knutson, Beverly Tarrants, Benji Gavlik, and Jeanne Castagnola.
- Thank you to Renee C.B. Manworren, PhD, APRN, FAAN for her support and guidance.

References

**Purpose:** The purpose of this study is to evaluate the safety of image-guided chest tube placement by a trained pediatric nurse practitioner when compared to those placed by attending and fellow physicians in Interventional Radiology.

**Background:** As the number and complexity of cases performed in Interventional Radiology have increased, some of the more routine procedures, such as chest tube placement, have been mastered by non-physician practitioners. At our institution, a pediatric nurse practitioner has been employed to provide inpatient and outpatient management as well as to perform a number of image-guided procedures, including chest tube placement. To date there is little research evaluating the safety of advanced practice provider-performed chest tube placement, particularly in the pediatric population.

**Problem Statement:** Due to the increase in the number and complexity of cases performed in Interventional Radiology, it has become advantageous for advanced practice providers to be hired, trained, and privileged to perform some invasive, image-guided procedures, such as chest tube placement, that have previously been performed only by physicians.

**Hypothesis:** Image-guided chest tube placement by a trained nurse practitioner in Interventional Radiology is performed as safely and with no greater need for post-placement interventions, such as chest tube repositioning, as those placed by physicians.

**Methods:** A retrospective review of the medical records and data collected from the picture archiving and communication system was performed for all patients who had chest tubes placed for pleural effusions of any etiology in Interventional Radiology from August 2007 through April 2014. Patient medical records were reviewed to determine if there was an increased complication rate associated with chest tubes placed by a trained nurse practitioner compared to that of physician placed chest tubes. Medical records were also reviewed to determine the American Society of Anesthesiology (ASA) patient health status classification assigned to each patient prior to chest tube placement to assess for significant health status differences associated with those patients treated by the nurse practitioner versus a physician.

**Results:** Of the 401 chest tubes placed in Interventional Radiology for pleural effusions between August 2007 and April 2014, 14% (n=57) were placed by the nurse practitioner with 86% (n=344) being placed by physicians. There was no statistically significant increase in nurse practitioner post-procedure complications compared to physicians, (χ²(1, n=401)=1.782, p=0.182). Nor was there a statistically significant association with patient ASA classification and provider type placing the chest tube (χ²(3, n=401)=11.369, p=0.224).