

Certificate in Physician Leadership for Hospital Medicine

Capstone Project Proposal

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Project Title:

Tube thoracostomy (TT) management in hospitalized patients: Standardizing the management by hospital medicine providers of para-pneumonic effusions (PPE) requiring pleural drainage (PD) in a safety-net, academic, urban institution.

Project Description

As of 2015, over 1 million adults are hospitalized for pneumonia every year in the US; 50 thousand of those patients die from complications of the disease. Para-pneumonic (PPE) effusions occur in up to 20-40% of patients hospitalized for pneumonia. Small, freely flowing PPE can be drained by therapeutic thoracentesis; however, complicated para-pneumonic effusions or empyemas require drainage by tube thoracotomy (TT).

In 2011, an article published in the New England Journal of Medicine by Rahman et.al.¹ concluded that intrapleural t-PA-DNase improved fluid drainage in patient with pleural infected effusions and reduced the frequency of surgical referral as well as hospital stay duration. They also proved the ineffectiveness of each agent treatment used alone. In 2012, Safiyeh and Huang² published their randomized trial of 210 patients “New strategies to manage complicated pleural effusions” in the journal *Critical Care*. In this trial they found that instillation of alteplase and DNase in patients with documented pleural effusion produced significantly greater drainage of effusion, less need for surgical referral or surgical intervention, shorter hospital stays, and a decrease in pleural fluid inflammatory markers compared with placebo. Also in 2012 and published in *Respiratory Medicine*, Thommi, et.al.’s³ “A double blind

randomized cross over trial comparing rate of decortication and efficacy of intra-pleural instillation of alteplase vs placebo in patients with empyemas and complicated para-pneumonic effusions”, concluded that intra-pleural instillation of alteplase is safe and significantly more effective than placebo in patients with empyema and para-pneumonic effusions (95% vs.12%). Commonly described side effects of intra-pleural administration of fibrinolytic therapy included chest pain, fever, and allergic reactions. In the above studies, pleural hemorrhage has only occurred in patients with systemic anti-coagulation.

At our institution, there were 714 adult patients hospitalized for pneumonia in 2017, and 20 (2.8%) required TT. The management of chest tubes placed for PPE has historically been “owned” by the service that placed them. Pulmonary and Critical Care, Interventional Radiology (IR), and General Surgery are the services involved with chest tube placement for PPE in our Institution. These guidelines were poorly enforced during evening hours, leading to confusion, delay in doses and unintended complications related to lack of operator’s expertise.

In 2016, Division of Hospital Medicine leadership met with the stakeholder services, and drafted guidelines agreed upon by all participants. These guidelines stipulated that administration of alteplase and DNase was to be performed by the service that placed the chest tube. Because of the bi-daily administration of therapy and lack of 24 hour in-hospital coverage by two of the three services (Pulmonary and IR), Hospital Medicine was often asked to perform the administration of intra-pleural fibrinolysis (IPF). Many hospital medicine providers felt that they lacked the training to perform IPF safely due to the variability in the types of tubes and associated connectors used by each of the three services.

In order to standardize TT management, in early 2018, we initiated a proposal for Hospital Medicine to take over TT management regardless of TT placement service. We discussed a plan with key stakeholders in Pulmonary, IR and General Surgery, and all services supported the opportunity to improve patient care and decrease conflict. Upon revision of hospital practices and procedures, we realized there were no uniform recommendations, order sets, nor any other procedures in place to systematize IPF administration. We created a workgroup to perform a current status and ideal status analysis and determine gaps and steps necessary to achieve our goal of safe and standardized management of TT for PPE and empyema.

Methodology

The initial step was to involve a joint meeting with the leadership of the division of Hospital Medicine, Pulmonary & Critical Care and Interventional radiology to discuss these issues, highlight their importance to patient care and inter-professional as well as inter-departmental relations, and assess interest and motivation in addressing them as well as the creation of a workgroup to address this issue.

Out of the 3 services who regularly place TT, General Surgery is the only one who provides 24/7 coverage with in-house providers (both house-staff and faculty). Because TT management contributes to the education of surgical residents, it was felt that chest tubes placed by general surgery were going to be managed by surgical residents. Hospital Medicine will only assume management of TT placed by Pulmonary and IR.

After gauging stakeholders' interest we formed a Hospital Medicine Work Group (HMWG) that was composed of 5 hospitalists and 2 Advanced Care Providers (APPs) who expressed interest in the project. A group leader was identified and tasks assigned. A Gap analysis was conducted and included literature review as well as our local current vs. ideal status.

The HMWG tasks included:

- Identify workflow issues to better understand and assess specific interventions that would enable a more consistent IPF process
- Develop an agreed upon standardized guidelines a for IPF administration and TT management with 2 other involved services (Pulmonary and IR)
- Develop standardized and required training for HM providers and nursing staff on TT management and IPF administration. Pulmonary and IR agreed to participate in initial in-person training session
- Create a standardize order set for TT and IPF that is to be agreed upon by Pulmonary, IR and Pharmacy. In order to achieve this point, Alteplase and DNase for IPF are to be added to our institution's inpatient formulary
- Examine ways in which technology (i.e. order set, the electronic health record, online training modules.) may be utilized to facilitate continuous training
- Develop a "dot phrase" to standardize IPF administration documentation in EMR. Dot phrase will include time-based codes to facilitate billing for procedure as well as accepted verbatim
- Once specific interventions have been agreed upon to address these issues, develop problem-specific metrics to allow measurement of success of the actions, as well as creation of a post-intervention survey of hospitalist, IR, Pharmacy and Pulmonary assessing perceived effectiveness of the process, satisfaction with the outcomes, and measures of professional collegiality
- Request approval of protocol as a hospital policy.

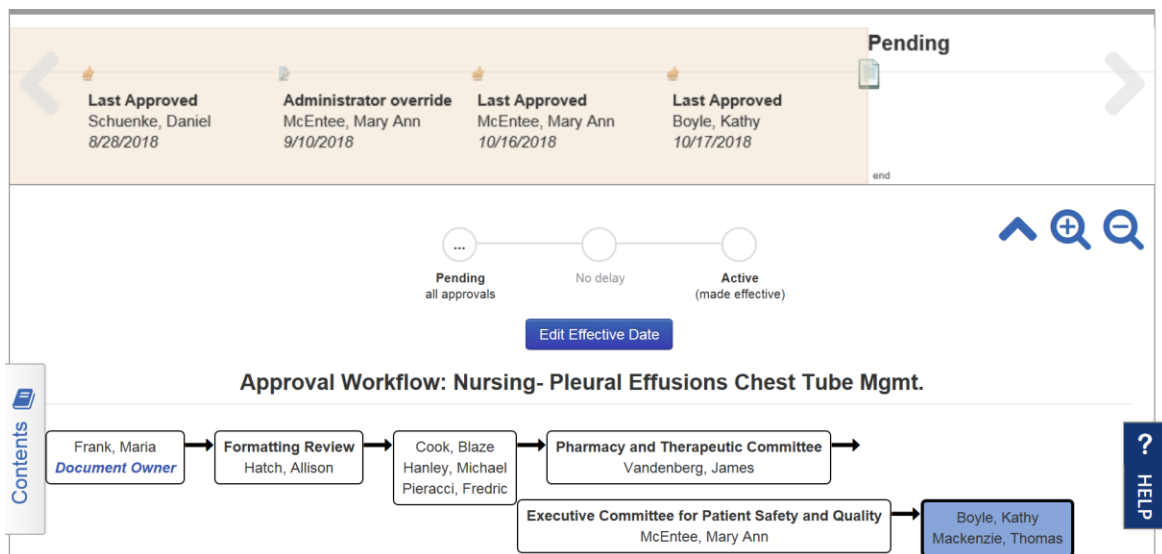
Results

During March through May the workgroup met in person in a weekly basis and identified and addressed the following issues:

- Conflicts in communication when contacting fellows after hours. Because the “owner” of the procedure was in charge of TT management and normally Pulmonary and IR fellows are not in house afterhours, calling them to come to hospital and administer the evening dose of IPF generated conflict and stress to providers on both ends. By initiating the protocol, calls to consultants decreased significantly leading to a perceived improved collegiality.
- Lack of a standardized process. We identified a great variability in consultants’ practices. We identified there were different tube-sets used and different recommendations for management based on which specialty “owned” the TT. Recommendations on what to do after IPF is infused into the pleural cavity were variable and sub-specialty dependent. We developed a protocol based on literature review and local consensus to be followed by all specialties.
- Lack of an order set. Because of the absence of an order set, for each administration of IPF the provider needed to call the pharmacy, ask them to mix DNase/ alteplase and bring it to the bedside. DNase/ alteplase for intra-pleural use was not part of the inpatient pharmacy formulary so it necessitated to be mixed, which can be done by verbal order. Therefore, medications were approved by the administration to be added to the Pyxis. Also, an order set was created in our EMR (Epic), which is more time and resource efficient as well as standardized for patient safety.
- A “dot phrase” to standardize IPF administration documentation in our EMR (Epic) was developed and distributed among HM providers. This dot phrase also included time-based codes to facilitate billing for procedure as well as accepted verbatim.
- Lack of training in this procedure for hospitalists. To reduce stress and conflicts with consultants, hospitalists would frequently agree to administer IPF after verbal instructions from the sub-specialty provider. Many Hospital Medicine providers felt that their training was inadequate to safely administer IPF and perform subsequent TT care. This issue caused stress and anxiety in many providers. We developed a training module, with participation of IR and Pulmonary services, to be used by providers and nursing. After an initial in-person training session, where hospitalists and APPs could interact and practice different tube manipulation, the module was added to our HM Epic dashboard for easy, a-la-carte access.
- Safety concerns related to lack of training. There was at least one patient safety event reported in the first quarter of 2018. A HM provider administered IPF and clamped TT, however did not write order to unclamp TT, so it remained clamped overnight. Patient suffered no injury; however this was as an error related to insufficient training in topic.

Safety concerns were addressed by training as well as the order set, which includes nurse to unclamp TT after the determined period of time.

- The IPF protocol for PPE includes intra-pleural dosing every 12 hours for a total of 3 days. We estimated that due to confusion on who was expected to administer dose, time inefficiency, and lack of training, at least 30% of nocturnal doses were missed after mixed in the last year. Our pharmacy’s cost per dose of 5 mg dornase and 10 mg alteplase in 30 ml is approximately U\$S 1,000. The calculated cost per year (for 20 patients) at 6 doses per patient is U\$S 120,000. The missed 30% nocturnal doses would result in approximately U\$S 18,000 per year. With the order set, clear roles in TT management and appropriate training, no doses are expected to be missed after launching of protocol.
- It was also assessed that before protocol, HM providers would spend between 30-60 minutes to accomplish IPF. The process of achieving IPF would vary between: 1) assessing patient at the bedside, discussing patient with pharmacy and place a verbal order, wait to medications to be mixed and brought to the bedside, quick review a “how-to- administer – IPF”, administer it, clamp TT and return to 30-60 minutes to unclamp; 2) contact consulting service to request help. Either scenario led to inefficient use of physician’s time. About 30-60 hours a year that could be used directly in patient care. These inefficiencies were addressed and solved by protocol.
- The protocol, developed with consensus of multiple specialties, including order sets, Epic dot phrase, and training modules was submitted for approval as a hospital policy in late May and is due to be approved by Chief Quality Officer on November 1st. The chart below illustrates the steps and multiple approving entities within our organization to sign protocol into a hospital policy.



Discussion/ Impact

Even though para-pneumonic effusions requiring intra-pleural fibrinolysis are not highly prevalent, the cases in which it was required led to confusion, stress and frustration among our hospitalists and led to conflict with peers from other specialties. The lack of standardization of PPE and IPF management led also to patient quality and safety concerns; as well as a financial impact when already mixed doses were missed, documentation was not clear and physician's time ineffectively used.

During this project we were able to:

- In collaboration with Interventional radiology and Pulmonary/ Critical Care, streamline a process leading to minimization of unnecessary calls to consultants or pharmacy. Via the creation of a standardized procedure and appropriate training we were able to optimize time management of cross-cover providers during evening shifts
- In collaboration with Pharmacy, Nursing and IT, standardize a procedure by creating an order set to ensure patient timely clinical care and safety. The order set assures that that all pertinent clinical information is available to the HM provider, and all necessary medications are available at the bedside in a timely manner; as well as minimize repeated or duplicate testing or evaluation, and avoid potential treatment errors.
- Guarantee training of all Hospital medicine physicians, which will likely lead to decrease errors as well as provider anxiety over unfamiliarity with procedure. This protocol will also provide access to 24/7 training content and materials

This project gave us the opportunity to develop lasting relationships with colleagues from different departments and services in our hospital. It fostered interprofessional and interdepartmental collaboration and improved collegiality between hospitalists and consulting services at Denver Health Hospital Authority.

References

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Advisor Comments

I currently serve as the Division Chief of Hospital Medicine at University of Colorado Hospital and have worked closely with Dr. Frank on development of this project. She has identified several key issues affecting the quality and efficiency of patient care related to tube thoracostomy (TT) management and the important interprofessional relationships that are critical to optimizing our hospital-based TT care efforts.

Because this project involves different professional groups within the hospital with interests that may not always align and may be a source of significant tension, as well as directly affecting patient care, successful completion of this project will require essential leadership skills, particularly communication, negotiation, and organizational change strategies. In my current role, I have helped Dr. Frank develop her approach to addressing these issues, and anticipate continuing to assist her in implementing the project through the unanticipated challenges that will undoubtedly arise.

The successful completion of the project provided a significant opportunity to improve our patient care efforts and institutional culture, and demonstrated accomplished leadership skills by Dr. Frank.