Development of a Learning Resource Manual for Nurses New to Thoracic Surgery

by © Laura Malone

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Abstract

Background: Patients with lung and esophageal cancer often have surgery as a means of treatment. In Newfoundland and Labrador, patients with lung and esophageal issues are cared for on Six East, the General/Thoracic Surgery unit at St. Clare's Mercy Hospital. These patients frequently require chest tubes, which are managed and assessed by Registered Nurses (RNs) on the unit. For nurses new to thoracic surgery, fulfilling their new role and caring for chest tube systems can be daunting. ***Purpose:*** The purpose of this practicum project was to develop a learning resource manual for nurses who are new to thoracic surgery. Via self-directed learning, the manual can increase the knowledge and self-efficacy of nurses who are caring for thoracic surgery clients and assessing chest tube systems. ***Methods:*** An informal needs assessment, integrated literature review, and several consultations via in-person interviews were conducted. ***Results:*** Based on the findings from these methodologies, Knowles' Adult Learning Theory, and Benner's Novice to Expert Model, a learning resource manual was created. The manual was divided into chapters covering various aspects of patient and chest tube system care and assessment. ***Conclusion:*** For the purpose of this practicum project, no evaluation was conducted. However, a plan for future evaluation of the learning resource manual has been developed to determine if the manual assisted with increasing the knowledge and self-efficacy of nurses new to thoracic surgery. "Test Your Knowledge" questions were included at the end of each chapter in the manual as well as case study scenarios to allow for participant self-evaluation.

Key words: thoracic surgery; chest tubes; integrated literature review; learning resource manual.

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Development of a Learning Resource Manual for Nurses New to Thoracic Surgery

When transitioning into the role of a Registered Nurse (RN), new graduate nurses often lack confidence, have difficulty with organizing work-related tasks and communicating with the interprofessional team, and require clarification and guidance in their new, demanding roles (McPhee, 2015; Fero, Witsberger, Wesmiller, Zullo, & Hoffman, 2008; Dyess & Sherman, 2009). New graduates, however, are not the only RNs that experience uncertainty; many seasoned RNs feel challenged when faced with a role change in a new clinical environment in which they have little or no experience (Butt et al., 2002). Beginning work on a thoracic surgery unit is no exception to this, as caring for clients with chest tube systems is a unique skill that may feel daunting to those inexperienced in the field (Magner, Houghton, Craig, & Cowman, 2013). Working in a thoracic surgery environment requires the RN to be well versed in patient assessment and chest tube management to enhance critical thinking and provide safe and competent care (Fero et al., 2008; Dyson, Hedgecock, Tomkins, & Cooke, 2009).

Background

Many conditions of the lung require treatment with a chest tube; such conditions include a pneumothorax, hemothorax, or an empyema (Marhuenda et al., 2015; Wakai, 2008). These patients are frequently admitted to thoracic surgery units for inpatient care and, if necessary, undergo surgical procedures. In addition, much of the thoracic surgery population is made up of clients admitted post-operatively after various surgical procedures for the treatment of lung and esophageal cancers.

In Canada, lung cancer is the most commonly diagnosed type of cancer with an estimated 72 Canadians being given this diagnosis daily (Canadian Cancer Society,

2015). In Newfoundland and Labrador, lung cancer is the leading cause of cancer death for both men and women (Canadian Cancer Society, 2015). For those with non-small cell lung cancer, surgery may be used as a treatment option to remove a small portion of the lung (wedge resection), one lobe of the lung (lobectomy), or the entire lung (pneumonectomy) depending on the portion of lung affected. Patients with a diagnosis of esophageal cancer are also often operated on by thoracic surgeons to remove a portion of esophagus (partial esophagectomy) or the entire structure (total esophagectomy). Although this condition is less common than lung cancer, over 2000 Canadians are diagnosed with esophageal cancer each year (Canadian Cancer Society, 2015).

Six East is the General/Thoracic Surgery unit at St. Clare's Mercy Hospital (SCMH), a facility of Eastern Health in St. John's, NL. All of the aforementioned surgeries are performed at SCMH; it is also important to note that the thoracic surgeons at SCMH are the only physicians in Newfoundland and Labrador who perform some of these surgeries. Thus, this client population is very specific to Six East as this is where these clients are cared for in the post-operative period. At any given time, approximately 25 percent of the clients on Six East are being treated for various thoracic conditions. In general, almost all of these clients are treated with a chest tube; thus it is of utmost importance that the RNs working on this unit be competent and comfortable with assessing and caring for clients following thoracic surgery and their associated chest tube systems.

Rationale

As a nursing student I completed my third year preceptorship on Six East. Also, as a new graduate nurse I worked on Six East and have currently worked there

on a full-time basis for over four years. During these years, I have been a preceptor to three students and have mentored many independent nursing students and new graduate nurses. It has been my experience that nurses who are new to thoracic surgery often feel intimidated when caring for chest tube systems. Currently, there is no resource on the floor specifically pertaining to thoracic surgery or chest tube systems that nurses can use as a guide or reference when new to the unit.

Prior to beginning this practicum project I conducted an informal needs assessment. In doing so, I spoke with the unit manager, surgical clinical educator, the program coordinator for regional surgical services, and several nurses working on Six East. I discovered their experiences were similar to mine and there was, in fact, a need for a tangible resource regarding thoracic surgery and chest tube system care for the unit.

Practicum Project

Resource

For my practicum project I decided to meet the need for a resource for nurses working in thoracic surgery that could be used by nursing students on the unit, new graduate nurses, experienced RNs who have not worked with thoracic surgery clients, or any member of the health care team who wanted to know more about thoracic surgery and chest tube systems. As Six East is a busy unit and some individuals requiring the resource may need a great deal of instruction whereas others may only want information on specific aspects of thoracic surgery, it was decided that a learning resource manual would best meet the need of this population. Those using the manual may decide to focus on one particular chapter or complete the manual in its entirety depending on their own learning needs.

Contact Person

While developing a learning resource manual for thoracic surgery two individuals served as agency contacts: the unit manager of Six East, Ms. Pauline Taite, and program coordinator for regional surgical services, Ms. Carla St. Croix. Both individuals were in full support of this practicum project idea and have been updated throughout the process of creating the learning resource manual.

Ethical Approval

The Health Research Ethics Authority (HREA) Screening Tool was used to determine if this project should be submitted to a Research Ethics Board for approval. This screening tool, and the checklist as appropriate to this project, can be found in Appendix "B3" of this paper along with the consultation report. After completing this screening tool, it was determined this project does not need to involve the HREA, as it is not a research project (please see Appendix "B4").

Practicum Goals and Objectives

The main goals of this practicum project were:

-To complete an integrated literature review pertaining to the care of patients following thoracic surgery, the experience of new nurses, and the experience of individuals after a cancer diagnosis;

-To consult with those experienced in the care of thoracic surgery clients;

-To demonstrate Advanced Nursing Practice (ANP) competencies; and

-To create a learning resource manual for nurses new to thoracic surgery.

The overall goal for this practicum project was to create a learning resource manual for novice nurses or experienced nurses that are new to thoracic surgery. Several project goals pertaining to this included the following:

-To increase the knowledge level of nurses new to thoracic surgery;

-To enhance self-efficacy of nurses new to thoracic surgery;

-To enhance the confidence level of new nurses in caring for patients with chest tubes;

-To improve assessment skills relating to patients with chest tube systems.

Overview of Methods

Two main methods were used to better understand the care of thoracic surgery clients and how nurses new to thoracic surgery relate to caring for clients with chest tubes. First, an integrated literature review was conducted; results pertained to the experience of new graduate nurses, the experience of nurses caring for chest tube systems, the experience of being diagnosed with lung and esophageal cancer, and issues surrounding the care of chest tube systems. Two applicable learning theories were also researched during this literature review: Knowles' Adult Learning Theory and Benner's Novice to Expert Model. Second, a consultation process was completed via in person interviews with four individuals within the thoracic surgery program: the unit manager, the surgical clinical educator, a thoracic surgeon, and a RN experienced in thoracic surgery.

A summary of the results from these methods will be discussed in this paper. For the complete integrated literature review or consultation results, please see Appendices "A" and "B" of this paper respectively. The proposed learning resource manual was then created based on the results of the literature review and consultations. The completed learning resource manual for nurses new to thoracic surgery can be found in Appendix "C" of this paper.

Summary of Literature Review

Search Methods

To begin the integrative literature review process, a search was completed in PubMed and CINAHL using search terms related to chest tubes (and chest drains), and "nursing", "nursing care", and "nursing interventions". The experience of new nurses was also included in the search. The generated articles were reviewed for applicability with a focus on research studies completed in the last ten years. Quantitative studies were rated using the Public Health Agency of Canada (PHAC) quality-rating tool while the methodology, scientific merit, clarity, and rigor of qualitative studies was assessed. Once the articles were deemed appropriate and content analyzed, three general themes emerged: the experience of a cancer diagnosis, the experience of new graduate nurses, and issues surrounding the care of clients with chest tube systems.

Experiencing a Cancer Diagnosis

Studies examined from the literature review showed that experiencing a cancer diagnosis can be a very difficult time for individuals. In addition to being given a diagnosis that is potentially life threatening, the person must deal with a potential surgery, hospital stay, and treatment. Surgeries of the lung and esophagus can be very painful and result in multiple wounds and drains which can be frightening for the patient (Hodgson, 2006; Kol, Erdogan, & Karsh, 2012). Experiencing such a diagnosis, surgery, hospital stay, and treatment can negatively impact the patient's life-style as their physical and mental-health is being compromised (Lehto, 2013; Hodgson, 2006; McCarthy & Dowling, 2009). It is crucial that RNs caring for such patients be aware of the impact of their diagnosis and care for them with positivity

and open communication while fostering hope and discussing their beliefs (Wright & Bell, 2009; McCarthy & Dowling, 2009; Hodgson, 2006).

Experience of New Nurses

Multiple studies from the literature review focused on the experience of new graduate nurses. The transition from being a student to working independently is proven to be a very difficult time for new graduate nurses. New graduate nurses are inexperienced and lack a fully developed skill set; as these nurses are required to care for acutely ill clients to their full scope of practice often after a short orientation period, it can be a challenging and stressful time (Ketelaar, Nieuwenhuijsen, Frings-Dresen, & Sluiter, 2015; Honan Pellico, Brewer, & Tasone Koverner, 2009; Wangensteen, Johansson, & Nordstrom, 2008).

New graduate nurses are often uncomfortable communicating with the inter-professional team, which can impede appropriate patient care and create a safety issue (Dyess & Shermann, 2009; Casey et al., 2004; Pfaff, Baxter, Jack & Ploeg, 2014). Time management can also be a challenge for new graduate nurses, especially when demands on them are high due to issues such as understaffing and high nurse-patient ratios (Honan Pellico et al., 2009; Wangensteen et al., 2008; Casey et al., 2004). Some new graduates feel they were sheltered from caring for very acute patients during their student experiences and are therefore ill equipped to care for such patients as independent nurses (McCalla-Graham & De Gagne, 2015). In complex situations, it is often difficult for new graduates to act appropriately as they lack experience, nursing knowledge, and critical thinking skills (Fero et al., 2008; Casey et al., 2004; Dyess & Sherman, 2009). Research also shows that new nurses are uncomfortable with interventions involving chest tube systems (Casey et al., 2004).

Caring for Clients with Chest Tube Systems

The literature review revealed that nurses play an important role in the care and assessment of chest tube systems. Complications, such as subcutaneous emphysema and pneumothoraxes, can cause extreme respiratory distress; thus, knowing how to assess for and recognize such complications are invaluable skills (Cerfolio et al., 2005; Woodrow, 2013). As chest tubes are a potential infection source, knowledge of appropriate wound care and assessment is another important aspect of patient care (Kane, York, & Minton, 2013; Sullivan, 2008; Woodrow, 2013).

The literature also revealed pain control and ambulation to be important aspects of care for those with chest tubes in the post-operative period. Many thoracic surgeries require a thoracotomy; that is, an incision through the large muscle of the chest. Pain due to this type of incision can be quite severe (Kol Erdogan, & Karsh, 2012). The concepts of pain and ambulation are directly related as the patient's pain must be managed for them to deep breathe, cough, and ambulate. Without the proper pain control to perform these tasks, the patient is at risk for complications such as respiratory issues, blood clots, and increased hospital stay (Milgrom et al., 2004; Nesbitt et al., 2012; Nett, 2010). Nurses must be knowledgeable in pain management and be able to educate the patient and their family on the importance of post-operative ambulation.

Seasoned nurses experiencing job change may also have inadequate knowledge and skills related to their new clinical environments and require further education and skill upgrades (Butt et al., 2002). Nurses, at varying levels of experience, are often uncomfortable caring for clients with chest tube systems and

lack knowledge in chest tube assessment, care, and management (Lehwaldt & Timmins, 2007; Lehwaldt & Simmons, 2005; Magner, Houghton, Craig & Cowman, 2013). Thus, nurses new to thoracic surgery, even those who have been nurses for decades, may need education and instruction when caring for clients with chest tubes.

Summary of Consultations

Those interviewed during the consultation process were asked open-ended questions in a semi-structured style. Questions pertained to their experience working with new graduate nurses in relation to thoracic surgery clients. Results from the consultations confirmed the findings of the literature review and added some new information pertinent to the creation of the learning resource manual and what it should include.

Via the consultations, it was determined that those experienced in thoracic surgery feel that new graduate nurses lack confidence and are anxious when caring for thoracic surgery clients. Having experience as a student on Six East was deemed an asset to graduate nurses who are hired on the unit as they have greater exposure to chest tube systems. Several participants noted that nurses who are hired on Six East require more education regarding chest tube systems than what is learned during their undergraduate programs. Also, the importance of being exposed to complex thoracic surgery clients during orientation to facilitate their transition was discussed.

Participants identified various aspects of assessment that are critical when caring for thoracic surgery patients: taking vital signs, proper respiratory assessment, and patient inspection. Being able to troubleshoot a chest tube system in the event of an air leak, checking for fluctuation, proper dressing changes, monitoring drainage, and assessing for subcutaneous emphysema were also noted as important aspects of

care. Interviewees also mentioned the need for new nurses to follow policy and know when patients with chest tubes should be accompanied off the unit. It was noted many nurses require assistance with collecting drainage from chest tube systems and some are unsure when it is appropriate to clamp the chest tube; both of these activities being important teaching points.

Providing care with confidence and compassion was a resounding theme in all four consultations. Participants noted the significance of a trusting relationship between the nurse, patient, and the patient's family. The importance of providing the patient and their family with appropriate information and support was acknowledged; this was noted to be difficult if the nurse is unconfident in the care they are providing. As many patients travel across Newfoundland and Labrador to receive the surgical services at SCMH, the importance of recognizing this and assessing the need for support was identified.

Informed was gleaned regarding how new nurses are currently gaining expertise when beginning work on Six East. It was learned that policies regarding chest tube care are discussed during orientation and a teaching guide exists on the unit (with very little information regarding thoracic surgery, however). It was discovered that new nurses are mostly learning about chest tube care during their orientation when they are co-assigned to a senior nurse on the unit. As new nurses generally lack knowledge regarding thoracic surgery and this type of care is very specific to Six East, all participants agreed a learning resource manual for nurses new to thoracic surgery would be highly beneficial to the unit.

It was suggested this manual contain information regarding anatomy and physiology of the lungs, thoracic conditions and surgeries, and assessment of the

patient and chest tube system. In addition, the importance of physiotherapy for thoracic surgery clients was mentioned in several consultations. This was an important finding via the consultations, as it was not discovered via the literature review.

Overview of the Learning Resource Manual

Self-directed Learning

Via the literature review process it was identified that learning resource manuals are an effective way of providing education to nurses. Learning resource manuals allow nurses to read and analyze the material at their own pace and convenience (Abbasi et al., 2013). To assist with self-directed learning, self-study questions and case studies were incorporated throughout the manual; in this way, the learner can be sure they understand the material.

Theoretical Basis

Knowles' Adult Learning Theory.

Self-directed learning in nursing is often based on the principles of Adult Learning Theory, as adults are considered autonomous and capable of independent study (Mitchell & Courtney, 2005; Dunning, 1995). Thus, Knowles' Adult Learning Theory was used to guide the creation of the learning resource manual. According to Adult Learning Theory, adults need to know why they are learning, they are motivated to learn by the need to solve problems, their previous experience must be respected and built upon, the learning approaches should match background and diversity, and they should be actively involved in the learning process (Cooke et al., 2014; Bryan, Kreuter, & Brownson, 2009).

To ensure those reading the manual knew its purpose, an introduction to the manual was created explaining the purpose and intended audience. In developing the manual, it was intentionally divided into chapters; in this way, a very novice learner could read and learn from the entire manual or a seasoned nurse could choose to explore the chapters they were unfamiliar with. The division of chapters was chosen to ensure respect for the learner with the intent of adding to their previous knowledge while appreciating a diverse audience. To engage the learner, motivate them, and keep them involved in the learning process, "test your knowledge" sections and case studies were created. A motivation to use the manual is expected to come from the nurse's interest in becoming a more knowledgeable and component thoracic surgery health care professional.

Benner's Novice to Expert Model.

Benner's Novice to Expert Model was also used to guide the development of the learning resource manual. This model outlines five levels of competence among nurses with each stage building on the previous: novice, advanced beginner, competent, proficient, and expert (Fero et al., 2008; Morrow, 2009). The learning resource manual was created to assist nurses who are novice in caring for thoracic surgery clients move toward an advanced beginner stage; thus, they would require less cuing, have a more advanced knowledge, and be more skillful in their practice (Benner, 1982; NSW Health, 2011).

Learning Resource Manual Content

The learning resource manual was based on the findings from the integrated literature review and consultation process and was guided by Knowles' Adult

Learning Theory and Benner's Novice to Expert Model. The manual was divided into seven chapters:

- Anatomy and Physiology of Human Lungs;
- Caring for Thoracic Surgery Clients;
- Chest Tube Systems;
- Assessing Clients Following Thoracic Surgery;
- Pain Management and Dressing Changes;
- Supportive Roles; and
- Additional Resources and Case Studies.

To begin, basic concepts of lung anatomy and physiology were reviewed. This first chapter was intended to refresh the nurse's memory of familiar concepts and thus build on their previous knowledge. The following chapters proceed to explain the type of client conditions cared for on Six East, how these clients should properly be assessed, what chest tube systems are used, and how they can be properly assessed and cared for. The last two chapters explain the importance of the interprofessional team in caring for clients following thoracic surgery, provide additional resources for those who wish to acquire more information, and present case studies in which the learner can test their comprehensive knowledge.

Implementation and Evaluation Plan

Implementation

At the end of this practicum project, the final product (a completed learning resource manual) will be presented to key stakeholders on Six East. Once approved by the unit manager and surgical clinical educator, implementation of this learning resource manual will occur. This will involve making the manual available on Six

East and introducing it to new graduate nurses during their orientation. Also, with the permission of the unit manager, the learning resource manual will be discussed in staff meetings and Six East education days to make unit nurses aware of the resource and its usefulness for new nurses, seasoned nurses who are new to thoracic surgery, nursing students completing clinical rotations on the unit, or anyone who simply wishes to know more about the care of thoracic surgery clients.

Evaluation

Once the learning resource manual is implemented, a formative evaluation of its effectiveness and need for improvement will be completed (McKenzie, Neiger, & Thackeray, 2013). Evaluation will be based on the principles of Kirkpatrick's Evaluation Model; this will evaluate changes in learning, behavior, and results (Rouse, 2011). This framework consists of four hierarchical levels to evaluate outcomes: "learner satisfaction or reaction to the program; measures of learning attributed to the program; changes in learner behavior in the context for which they are being trained; and the program's final results in its larger context" (Frye & Hemmer, 2012, p. 293).

Learner satisfaction and learning attributed to the learning resource manual will be evaluated by providing new graduate nurses with an anonymous survey approximately six months after their unit orientation. This survey will assess whether those new to the unit felt the learning resource manual provided them with beneficial knowledge and enhanced their competence in caring for thoracic surgery clients from their perspective. To evaluate learner behavior and the effectiveness of the learning resource manual in the larger context, the unit manager and senior thoracic surgery nurses will be interviewed. This will determine, from their perspective, if care of

clients following thoracic surgery by new graduate nurses has improved, overall, on the unit.

Advanced Practice Nursing Competencies

According to the Canadian Nurses Association (CNA), "competencies are the specific knowledge, skills, judgment and personal attributes required for a registered nurse to practise safely and ethically in a designated role and setting" (CNA, 2008, p. 21). Use of ANP competencies has been highly significant throughout this practicum project. Each of the four competencies identified by the Canadian Nurses Association (CNA) (2008) has been important in this process: clinical competence, research, leadership, and consultation and collaboration.

Clinical Competence

My personal experience as a thoracic surgery nurse greatly assisted with my ability to complete this practicum project. With this solid foundation in clinical practice and use of updated research I was able to create a learning resource manual to enhance the clinical competence of novice thoracic surgery nurses (Tracy, 2014). With my expertise in this clinical setting, I was able to anticipate potential client situations and problems and add solutions to such problems in the manual as well as create case studies with potential real life scenarios.

Research

The importance of research and evidence-based practice in developing the learning resource manual cannot be overemphasized. It was vital to ensure all information provided in the learning resource manual was based on current and accurate information (Gray, 2014). During the literature review process a large amount of current literature was consumed and critiqued. Information presented in

the learning resource manual was based on this research; thus, ensuring the information was based on reliable and updated information was fundamental.

Leadership

According to the CNA (2008), Advanced Practice Nurses (APN) are "agents of change, consistently seeking effective new ways to practise, to improve the delivery of care, to shape their organization, to benefit the public and to influence health policy" (p. 24). The ANP competency of leadership was demonstrated by taking the initiative to complete such a practicum project that will be beneficial to novice thoracic surgery nurses. This learning resource manual is a means of mentoring novice nurses, promoting professional growth, and initiating change on Six East (CNA, 2008). My hope is this practicum project is innovative and will empower others by enhancing their clinical practice (Tracy & Hanson, 2014).

Consultation and Collaboration

Consultation and collaboration competencies have been important during the entire practicum process. During each aspect of the practicum I have consulted with my professor, Dr. Joy Maddigan, and have relied on her scholarly guidance and suggestions. This competency was also invaluable when completing the consultation process with stakeholders and experts in the field of thoracic surgery. These collaborative relationships have assisted with producing a refined and useful final product (learning resource manual).

Conclusion

The main goals of this practicum project were met; that is, an integrated literature review was completed, individuals experienced in the care of thoracic surgery clients were consulted, and ANP competencies were demonstrated. The

overall goal of creating a learning resource manual for nurses new to thoracic surgery was also accomplished. Via the completion of these goals, I personally feel more competent in caring for thoracic surgery clients and have a much clearer understanding of the patient and family experience. Also, being more aware of the experience of new graduate nurses, I am better able to mentor and assist students and new graduate nurses as they prepare to care for thoracic surgery clients. Throughout the process of this practicum project my ANP competencies, especially in leadership and consultation, have been strengthened. These enhanced ANP competencies will be invaluable to me for the remainder of my nursing career.

RNs working on thoracic surgery units must be skilled in patient assessment and chest tube system care. In this final report, I have explained the background and rationale for this practicum project as well as the practicum goals. An overview of the practicum methods has been discussed and a summary of results from the literature review and consultation process has been included. The theoretical basis for the learning resource manual creation has been outlined as well as a brief summary of the learning resource manual content. Next steps have been identified including implementation and evaluation of the learning resource manual after completion of the practicum project. Lastly, APN competencies utilized throughout the practicum process have been discussed. The complete literature review, consultation report, and learning resource manual can be found in appendices “A”, “B”, and “C” of this paper respectively.

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Appendix A

Integrative Literature Review: Thoracic Surgery and its Implications for Nursing Care

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Abstract

Many patients with lung and esophageal cancer have surgery as a means of treatment. As a result of this surgery, the individual is admitted to the hospital and, in the post-operative period, has a chest tube system to manage chest drainage. This can be a very challenging time for patients and their families. Registered Nurses (RNs) are required to provide care to these patients and manage and assess their chest tube systems. Many new graduate nurses struggle with communication, critical thinking, and new skills. For nurses new to thoracic surgery, caring for chest tube systems can initially be a daunting task. The purpose of this paper is to better understand the difficulties associated with caring for thoracic surgery patients and chest tube systems for nurses new to thoracic surgery. To fulfill this purpose, an integrated literature review was completed exploring the experience of a lung or esophageal cancer diagnosis, the learning needs of new graduate nurses, issues surrounding chest tube care, and the usefulness of learning resource manuals in nursing education. Benner's Novice to Expert Theory and Knowles' Adult Learning Theory are also explored in relation to creating a learning resource manual for nurses new to thoracic surgery.

Key words: thoracic surgery; chest tubes; integrated literature review; learning resource manual.

Integrative Literature Review: Thoracic Surgery and its Implications for Nursing Care

Cancer, in its various forms, is a leading cause of morbidity and mortality in Canada and throughout the world (World Health Organization (WHO), 2015). Not only are individuals with cancer faced with a life-altering diagnosis, many of them, such as those with non-small cell lung cancer and esophageal cancer, need surgery as a treatment option and are admitted to hospital for this reason (Canadian Cancer Society, 2015). These cancer surgeries, along with various other conditions, require patients to have a chest tube inserted to remove fluid or air from the pleural space (Cerfolio & Bryant, 2010). Nurses working in acute care settings where these patients are admitted need a thorough understanding of thoracic conditions and proper assessment skills to provide safe and competent care (Lehwaldt & Timmins, 2005; Canadian Nurses Association (CNA), 2008). In this paper I will provide an integrative literature review examining the difficulties experienced by these patients, the learning needs of new graduate nurses and those new to thoracic surgery, complexities associated with chest tube care, and indications for effective professional development. Learning theories associated with developing competencies for caring for such clients will also be discussed. Literature summary tables will be provided for research studies relevant to the topic of this paper.

Integrative Literature Review

Background and Topic Relevance

Lung and esophageal cancers rank among the most common causes of cancer death worldwide with 1.59 million and 400 000 deaths in 2012 respectively (WHO, 2015). In Canada, lung cancer is the most commonly diagnosed type of cancer with approximately 72 Canadians being given this diagnosis daily (Canadian Cancer

Society, 2015). In Newfoundland and Labrador, lung cancer is the leading cause of cancer death for both men and women (Canadian Cancer Society, 2015). Surgery is a treatment option used for many patients with non-small cell lung cancer in which a portion of the lung (wedge resection), a lobe of the lung (lobectomy), or the entire lung (pneumonectomy) is removed depending on where the cancer exists (Canadian Cancer Society, 2015). Also, over 2000 Canadians each year are diagnosed with esophageal cancer (Canadian Cancer Society, 2015). According to the Canadian Institute for Health Information (CIHI) (2011), surgical interventions for esophageal cancer are among the most demanding measures performed by surgeons. Eighty-three percent of acute care hospitals in Canada do not perform esophagectomies required to treat esophageal cancer (CIHI, 2011). All of the aforementioned lung surgeries, as well as esophagectomies, are performed by various thoracic surgeons on 6 East at St. Clare's Mercy Hospital in St. John's, Newfoundland. Care of these patients in the post-operative period requires the Registered Nurses (RNs) on this unit, and other similar units, to both understand thoracic conditions and be competent in care of these patients and resulting chest tube systems.

Search Terms and Databases

The drains inserted in thoracic surgery patients are known as a chest tube or chest drain. Thus, mesh terms "chest tube" and "chest drain" were derived and added to a PubMed search. Then, "nursing", "nursing care" and "nursing interventions" were also added to this search. Various patient care and safety issues were also added to the search to obtain research on post-operative ambulation, pain management, wound care, and chest tube assessment. Several articles regarding pain management, assessment, and ambulation were retrieved however, little research was found on

wound care and infection with respect to thoracic surgery and chest tubes. The experience of new graduate nurses was also searched and several articles regarding this topic were included in this literature review.

Relevant articles were accessed and reviewed, with the most recent and pertinent research to the topic analyzed for this integrated literature review. Research studies of a quantitative nature were rated using the Public Health Agency of Canada (PHAC) quality-rating tool. Qualitative studies were evaluated for methodology, scientific merit, clarity, and rigor. Literature summary tables of many of these research studies were created for the purpose of this literature review. The search terms above were also used to conduct a search in CINAHL and the findings were similar.

Experiencing a Cancer Diagnosis

For many patients, receiving a cancer diagnosis and its associated life-threatening consequences is an emotional event potentially causing much worry and anxiety (Lehto, 2013; Hodgson, 2006). Sometimes, cancers (such as that of the esophagus) can be debilitating and impact the individual's lifestyle as well as their psychological and physical well-being (Hodgson, 2006). With a looming cancer diagnosis, many individuals feel ineffective in daily activities requiring their attention (Lehto, 2013). Often, those suffering from cancer have difficulty maintaining their normal life; that is, they are unable to work and continue with social relationships as they once did (McCarthy & Dowling, 2009).

In addition to a devastating diagnosis, patients with lung and esophageal cancers often have to endure surgical treatment. After having a portion or an entire lung removed, patients will have a resulting chest tube drain in the post-operative

period. After a partial or total esophagectomy, patients will have multiple wounds and drains in both their abdominal and thoracic cavities (Hodgson, 2006). Chest tubes are left in place for varying amounts of time and are generally removed when drainage has minimized and the surgeon is comfortable with the patient's chest x-ray. Depending on the physiologic problem, the patient may only need the chest tube for a couple days; however, some patients require them for several weeks.

Pain experienced by patients after a thoracotomy is considered "the most severe type of post-operative pain" as the incision cuts through the large muscles of the chest (Kol, Erdogan, & Karsh, 2012, p. 85). Evidence suggests patients undergoing surgical procedures for lung cancer treatment have a high prevalence of post-traumatic stress disorder (PTSD) symptoms, especially if they were anxious in the pre-operative period or had high levels of pain in the post-operatively (Jeantieu et al., 2014). Even up to six years following lung cancer surgery, patients experience distressing symptoms such as pain, fatigue, dyspnea, anxiety, and depression (Lowery et al., 2014). Many patients experience functional limitations due to these symptoms and, if two or more concurrent symptoms are experienced, poorer quality of life may result (Lowery et al., 2014; Kenny et al., 2008).

Being diagnosed with cancer and enduring a hospital admission is daunting for many patients. The need for surgery, the possibility of death, and simply having a chest tube are all stressors for many patients before and during their hospital stay (Parvan, Zamanzadeh, Lakdizaji, & Shabestari, 2012). Many patients requiring these specialized surgeries must travel from rural areas for care; this may also be a source of stress for the patient and their families (CIHI, 2011). From the patient perspective, nurses are often seen as very busy with little time to talk and answer questions

(McCarthy & Dowling, 2009; Hodgson, 2006). It is, however, important for nursing staff to exude positivity and provide explanations, teaching, and encouragement to such patients in the pre and post-operative period (McCarthy & Dowling, 2009; Hodgson, 2006). Nurses must be skilled and provide competent care, but must also have a grasp on the complexity of being diagnosed with such diseases, having surgery and treatment, and the aftermath. Taking the time to discuss beliefs with the patient and their family is a tremendously important aspect of holistic care (Wright & Bell, 2009). Often, the ability to "focus on the future in the face of a chronic or life-threatening illness enables families to experience the healing phenomenon of hope" (Wright & Bell, 2009, p. 211). Nurses must understand the psychological aspect of a cancer diagnosis and treatment and care for the patient with this in mind.

The Experience of New Nurses

"Nursing students as well as newly qualified nurses who have only just recently started working as a qualified nurse seem particularly vulnerable to developing health problems and making mistakes, precisely because they are inexperienced and therefore do not have fully developed skills yet" (Ketelaar, Nieuwenhuijsen, Frings-Dresen, & Sluiter, 2015, p. 1). The experience of new graduate nurses has been widely documented in the literature and can be a very challenging time for many professionals. In many health jurisdictions, new graduate nurses are expected to function in their role after only a short orientation. They must provide care for a full patient load, some of which are critically ill individuals; this requires thorough assessment skills, organization, and clinical competence (Honan Pellico, Brewer, & Tasone Kovner, 2009; Wangensteen, Johansson, & Nordstrom, 2008). With novice nurses (with less than five years of experience) accounting for

more than 23 percent of nurses in acute care facilities, it is essential they be adequately prepared for their new, demanding roles and feel supported by the organization of which they are now a part (Morrow, 2008).

Although new nurses are eager and excited about their new roles, many are fearful and uncomfortable during their first year of practice (Dyess & Sherman, 2009; McCaalla-Graham & De Gagne, 2015; Casey, Fink, & Propst, 2004). Communication is a major barrier for many new nurses. These communication issues range from new graduates experiencing horizontal violence and the resulting difficulty communicating with their coworkers, feeling uncomfortable communicating with the inter-professional team, and being afraid to contact physicians regarding their patients (Dyess & Sherman, 2009; Casey et al., 2004; Pfaff, Baxter, Jack & Ploeg, 2014). When new graduate nurses have issues with communication, it can impact patient care. If a new graduate is unconfident, hesitant to ask questions, or fearful to call the physician about a sick patient, this creates a potential risk to patient safety.

Some new graduates feel the expectations placed on them are very high and, while they are still gaining competence, they are expected to time-manage and care for the same patient acuity and load as a senior nurse (Honan Pellico et al., 2009; Wangensteen et al., 2008). New graduates often feel overwhelmed in their new role and this is further exacerbated when understaffing is an issue, nurse to patient ratios are high, and breaks are missed (Honan Pellico et al., 2009; Casey et al., 2004).

In addition to the aforementioned issues, some new nurses lack confidence in their clinical skills and have deficits in their critical thinking and nursing knowledge (Fero et al., 2008; Casey et al., 2004). Some new graduate nurses have difficulty initiating appropriate nursing interventions, recognizing there is a problem,

understanding the problem urgency, and then, in turn, they do not report essential clinical data (Fero et al., 2008). Such critical thinking issues improve greatly with years of experience however, for the new graduate nurse this can be quite challenging (Fero et al., 2008). When patient situations become complex, it is often difficult for these new graduates to make high-level decisions essential for positive patient outcomes (Dyess & Sherman, 2009).

Participants in McCalla-Graham and De Gagne's (2015) study felt nursing school inadequately prepared them to practice independently in acute care as they were kept from "worst-case scenarios" during their clinical rotations and were thus not equipped to deal with such situations as a RN (p. 124). A study by Casey et al. (2004) indicated new graduates are, in fact, uncomfortable with certain interventions including code blue situations and caring for clients with chest tubes. Often in complex situations new graduates are unsure how to respond and feel unable to ask for help (Dyess & Sherman, 2009). This, once again, may put patients at risk when the nurse is unsure how to act and unable to do so quickly.

New graduates are not the only nurses who have learning needs when dealing with new situations. Nurses, even those who have been practicing for a number of years, need further education when transferring to a new unit or new hospital. When nurses experience job change they often require an upgrading of their clinical skills and some degree of new knowledge (Butt et al., 2002). These nurses need education regarding disease conditions with which they are unfamiliar and technical procedures they have not encountered in their practice to date (Butt et al., 2002). Many nurses experiencing job change may require further independent study regarding the unit policies, protocols, and nursing interventions. Such learning needs would be very

relevant to an experienced nurse transferring to a thoracic surgery ward if they had never cared for thoracic surgery patients or chest tube systems.

Caring for Chest Tubes

Chest tubes (or chest drains) are commonly inserted intra-operatively during various cardiothoracic surgeries to drain fluid and air from the thorax (Sullivan, 2008). Although physicians insert these drains, nurses play an intricate role in their care. Nurses are often responsible to assist with drain insertion and removal and are required to assess the chest tube system and monitor for subcutaneous emphysema, drainage, air leaks, fluctuation, and bubbling (Sullivan, 2008; Briggs, 2010; Cerfolio & Bryant, 2010).

According to Eastern Health (2012) policy, the RN is responsible for assisting with tube insertion, ongoing assessment, and patient monitoring and care. This includes setting up drainage systems to appropriate levels of suction and, every four hours, assessing and documenting the client's chest sounds, vital signs, level of consciousness, anxiety level, pain, subcutaneous emphysema, respiratory distress, oxygen saturation, dressing integrity, colour, consistency, and fluctuation of drainage, system placement and connections, level of suction, and checking the system for an air leak (Eastern Health, 2012). If a patient experiences any distress or issues, assessment and monitoring would become even more frequent. At St. Clare's Mercy Hospital, post-operatively following a lobectomy, the patient is monitored in a Special Care Unit on 6 East where their vital signs, intake and output, and respiratory status are assessed and documented every hour and continuous oxygen saturation monitoring is maintained.

Adequate assessment skills in such areas are essential as patients with an air leak may experience an enlarging pneumothorax; in turn, this may result in hypoxia or air leaking uncontrollably from the lung (subcutaneous emphysema) causing patient distress (Cerfolio et al., 2005). Subcutaneous emphysema, if severe, can quickly obstruct the patient's airway; thus, keen nursing assessment skills are needed to recognize when an issue is arising (Briggs, 2010). Nurses must also be knowledgeable about wound care around the drain insertion site, when to clamp the drain, and how to monitor and change the system suction (Woodrow, 2013). To avoid infection at the chest tube insertion site, dressing changes must be performed using proper sterile technique (Kane, York, & Minton, 2013). It is difficult to find accurate statistics regarding the prevalence of surgical and chest tube site infections following thoracic surgery. However, chest tube sites are, in fact, a potential infection source and it is imperative for nurses to properly assess for signs of infection, ensure the area is kept dry, and change dressings using the proper technique (Sullivan, 2008; Woodrow, 2013). If a patient was to acquire an infection at their surgical or chest tube site it would delay their recovery in the post-operative period, possibly requiring antibiotics and introducing the worry of possible sepsis (a life-threatening complication).

Pain and ambulation are also very important considerations when caring for post-operative clients and those with chest tubes. Pain due to a thoracotomy can be very severe as the incision is through the large muscle of the chest (Kol, Erdogan, & Karsh, 2012). Following a thoracotomy, patients often experience pain when ambulating, coughing or breathing, and with shifting of their chest tube (Kol et al., 2012). This pain is highest in the first 48 hours after surgery, may feel like throbbing

or stabbing, and can be relieved with pain medication and position stabilization (Kol et al., 2012). While the tube is in situ or being removed from the patient's chest, additional pain medication or application of cold dressings is often necessary (Demire & Khorshid, 2010). As well, if a chest tube were inserted at the patient's bedside in an emergency situation, pain management would be required (Given, 2010). Nurses must be able to assess the patient's level of pain, understand what procedures are likely to cause pain, and be knowledgeable about pharmacological and non-pharmacological interventions available to assist in pain control (Given, 2010; Friesner, Curry, & Moddeman, 2006).

Appropriate pain control and ambulation are related in the post-operative period; patients must have adequate pain relief to ambulate, deep breathe, and avoid complications associated with immobility (Milgrom et al., 2004). Nurses must be knowledgeable about the importance of post-operative ambulation for patients following thoracic surgery as early ambulation can improve patient outcomes and decrease their length of hospital stay (Nesbitt et al., 2012). Without being aware of the importance of pain control and ambulation for this population, patients may not experience optimal outcomes.

It is imperative for RNs to educate patients and their families about the importance of pain control and ambulation. Without adequate pain relief (allowing patients to breathe deeply and move freely) and early, frequent ambulation, patients are at risk for atelectasis or a blood clot, the latter of which can be fatal (Nett, 2010). In addition to this, patients need education regarding the chest tube system itself; they must understand the importance of not tipping over the chest tube system (making it difficult to measure drainage), the importance of not disconnecting system suction,

and the importance of leaving the system below the level of their chest (ensuring drainage does not flow back into the lung). As discussed earlier, having a cancer diagnosis and the resulting surgery can be a difficult time for patients and their families. Thus, it is essential RNs provide care in a non-hurried manner; allow communication lines to be open between them, the patient, and their family in which vocalizing questions and concerns is encouraged; and create a trusting relationship in which hope and positivity is fostered.

As discussed earlier, some new graduate nurses do, in fact, feel uncomfortable caring for chest tube systems. However, in addition to this, many nurses at varying levels of experience feel uncomfortable caring for chest drains or are uncertain of specific aspects of care. Many nurses do not have adequate knowledge regarding the underpinning concepts of conditions requiring chest tubes, their placement, or their management (Lehwaldt & Timmins, 2007; Magner, Houghton, Craig, & Cowman, 2013). Studies indicate a large percentage of nurses do not understand proper positioning for chest drain insertion, how to manage air leaks, what bubbling means in the system, or that patients may require additional pain medication for chest tube insertion (Lehwaldt & Timmins, 2007; Lehwaldt & Timmins, 2005; Magner et al., 2013).

Nurses who have the least contact with chest tube systems may require the most education regarding their care (Magner et al., 2013). In general, the learning needs of newer graduate nurses often requires a more direct focus on client care and those working in acute care settings often require additional education regarding dealing with emergency situations and the pathophysiology of disease processes (Dyson, Hedgecock, Tomkins, & Cooke, 2009). Nurses who care for clients with

chest tube systems are no exception to this; that is, they need proper and ongoing instruction on how to properly care for thoracic surgery clients (Magner et al., 2013).

Self-directed Learning

New graduates and nurses new to a particular unit need support and education to ensure their transition is a smooth one and they are comfortable and confident in their new role (Rush, Adamack, Gordon, Janke, & Ghement, 2015). Often, novice nurses are eager to participate in professional development opportunities that allow them to both gain knowledge and prepare for unfamiliar situations they may face in practice (Pool, Poell, Berings, & ten Cate, 2015; Dyson et al., 2009). Eagerness to learn can be driven by the need to perform new tasks their daily work entails or when the need for a new skill arises (Pool et al., 2015).

"Nurses must be confident about their knowledge, competence, and technical skills in order to effectively function …" (Abbasi, Hazrati, Mohamadi, & Rajaeefard, 2013, p. 484). Self-direct learning manuals are an effective means of education for nurses; allowing them to read and learn at their own pace at a time convenient for them (Abbasi et al., 2013). Such learning modules provide education for nurses who have diverse work schedules and when face-to-face teaching is unavailable (Riley-Doucet, 2008; Abbasi et al., 2013). The self-directed learner must be sure they have, in fact, gained knowledge. In the case of the learning resource manual for nurses new to thoracic surgery being proposed in this practicum project, the learner will have access to self-study questions (and the answers) at the end of the manual to test their knowledge. Self-directed learning in the nursing environment is largely based on the concepts of adult learning theory; this will be discussed later in this paper (Dunning, 1995).

Theoretical Basis

Benner's Novice to Expert Model

In developing a self-directed learning manual for nurses new to thoracic surgery, Benner's Novice to Expert Model will be used as a theoretical basis. Benner identifies five levels of competence among nurses: novice, advanced beginner, competent, proficient, and expert (Fero et al., 2008; Morrow, 2009). According to this theoretical framework, each stage builds from the previous and becoming an expert is always accompanied by experience (Morrow, 2009).

At the novice level, the individual lacks confidence in their practice, requires cuing, and does not have experience with situations they are faced with (Benner, 1982). Then, at the advanced beginner level, the nurse gains some experience and becomes more efficient and skillful in their practice and requires less cuing as their knowledge is advancing (NSW Health, 2011). Next, a nurse would progress to the competent stage, which according to Benner (1982), requires two to three years of experience to attain. Here the nurse is beginning to feel confident in their actions, is more timely and efficient, and they are able to act with long-range goals in mind (Benner, 1982; NSW Health, 2011). In the competence stage the nurse is able to distinguish which aspects of a situation are most important for proper care (Fero et al., 2008). In stage four the nurse is considered proficient in providing care. Here, the nurse sees the situation as a whole and is able to reflect on their previous experience to modify their plan of care based on the circumstance (Fero et al., 2008; NSW Health, 2011). Lastly, at the expert level, nurses are intuitive and able to fully understand the situation and act appropriately (Benner, 1982; NSW Health, 2011).

"Once in the practice setting, many graduate nurses feel unready for practice but not incompetent; novices work in the present without a full grasp of clinical implications, do not appreciate the nuances and competing risks in clinical situations, and have inherent trust in coworkers" (Morrow, 2009, p. 281). As the proposed thoracic surgery learning resource manual will be mainly directed toward new graduate nurses, the definition of a novice nurse according to Benner's theory will be used to better understand their learning needs. Nurses who are new to thoracic surgery but have years of experience in other areas may also utilize this manual; although they may be advanced or expert nurses, they can still benefit from a learning resource manual regarding a subject with which they are unfamiliar. The manual will be a resource to assist novice nurses and those new to thoracic surgery in their understanding of thoracic conditions and how to assess and properly care for clients with a chest tube. In this manner, the manual will help nurses gain confidence in their knowledge and skill level with chest tubes and assist them in their progress from the novice to the advanced beginner stage.

Adult Learning Theory

The principles of Knowles' Adult Learning Theory will be used in the creation of the learning resource manual. Adults learn differently than children and are "responsible for their own decisions and acquire knowledge and skills more effectively when working with instructors in varied educational opportunities rather than just attending lectures" (Ludlow, Gaudine, & Jacobs, 2007, p. 47). This theory is built on the premise that adults are autonomous and self-directed learners (Mitchell & Courtney, 2005). Several principles of adult learning are: adults need to know why they are learning; they are motivated to learn by the need to solve problems; their

previous experience must be respected and built upon; learning approaches should match background and diversity; and adults need to be actively involved in the learning process (Cooke et al., 2014; Bryan, Kreuter, & Brownson, 2009). When providing instructional materials to adults, it is important to plan thoughtfully and integrate these principles (Bryan et al., 2009).

Upon beginning work on a thoracic surgery unit, any nurse would quickly identify why it is important for them to have a thorough understanding of thoracic conditions and the care of chest tube systems. Motivation to utilize a learning resource manual would come from this realization and the need to resolve this lack of knowledge that limits their competence on the unit. To match the learning material to their background and diversity, the manual will present information with the assumption that those reading it (novice nurses and nurses new to thoracic surgery) have a concrete general nursing knowledge. This will both respect their previous knowledge and background and built upon their existing understanding of the topic. Lastly, the learner will be involved in the process by reading the manual and completing case studies and short activities presented within the resource.

Summary of Themes and Concepts

A number of key themes and concepts were revealed via the completion of this integrated literature review. Firstly, the process of being diagnosed with cancer and the subsequent treatment and recovery can be a very difficult time for the patient both physically and psychologically. Nurses must realize these patients and their families need to be cared for holistically with understanding, compassion, and patience.

A dominant aspect of this literature review is the concepts surrounding the learning needs of novice nurses. New graduate nurses often experience barriers to providing care when working in the acute care setting. Often, new graduates do not feel confident in their clinical skills and assessments and, as a result, are reluctant and unsure about when to notify the physician or provide an intervention. This can compromise patient safety and thus it is essential new graduate nurses are properly orientated to their new unit and position and are properly educated regarding clinical skills unique to that environment.

Another theme is nurses, in general, lack adequate knowledge about certain aspects of chest tube care. Thus, even if a nurse has many years of clinical experience, they may still need additional education regarding thoracic surgery and chest tube care if transferring to this type of acute care unit. Care of thoracic surgery patients and those with chest tubes can be complex. As well as caring for the chest tube system, the patient's pain must be managed, wound care provided, anxiety assessed, and assistance with ambulation and care provided. Nurses must have a keen understanding of the complex needs of these patients and provide holistic care to ensure optimal patient outcomes. While performing all the skill-based requirements for the patient, the nurse must ensure the patient and family are comfortable and understand what is happening; that is, the relational aspect of care must not be neglected.

Lastly, the need for education and the usefulness of learning resource manuals was revealed. Nurses are motivated to learn about procedures and techniques directly affecting their practice. Learning resource manuals allow nurses to study independently on their own time. A learning resource manual surrounding thoracic

surgery and chest tube care would allow novice nurses and those new to the unit to gain knowledge about thoracic conditions and improve their confidence in assessing clients with chest tube systems.

Conclusion

This literature review has several important implications for this practicum project as a learning resource manual for nurses new to thoracic surgery is developed. Firstly, the importance of education regarding thoracic surgery and chest tube systems for new graduate nurses and experienced nurses transferring to a thoracic surgery unit has been reinforced. Several studies indicated what aspects, specifically, nurses struggle with or lack knowledge regarding chest tube assessment and care; such knowledge deficits would certainly need to be addressed in the learning resource manual. The literature also supported that learning resources manuals are, in fact, an efficient means of educating nurses, allowing them to learn on their own time at their own pace. Lastly, this literature review revealed how difficult the process of having a cancer diagnosis and subsequent treatments and surgery can be for the patient and their family. Providing nursing care with this in mind will be important topic when developing this learning resource manual; that is, the skills and techniques of chest tube care should not be done without consideration of the patient's feelings and concerns.

Whether due to surgery or another condition, care of patients with chest tube systems in the acute care setting requires the RN to have a specific knowledge and skill set to ensure positive patient outcomes. In this paper, I have provided an integrative literature review regarding the complexities of caring for thoracic surgery clients and the learning needs of novice nurses and those new to thoracic surgery

units. Benner's Novice to Expert Model and Knowles' Adult Learning Theory were both discussed in terms of their applicability to creating a learning resource manual for those new to thoracic surgery. Literature summary tables of several research studies surrounding the topic of this paper have been included in the appendices.

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Appendix A1

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: Impact of symptom burden in post-surgical non-small cell lung cancer survivors. -Lowery et al. (2014). -Study Objective: To examine the burden of symptoms in long-term lung cancer survivors, to identify when quality of life is affected.	-Inclusion criteria: having a diagnosis of non-small cell lung cancer (NSCLC), having a surgery for NSCLC with curative intent, 1-6 year post operation, and no evidence of current disease. -Setting: Memorial Sloan-Kettering Cancer Center in New York. -Study data collected from September 2005 to July 2007. -183 consenting participants (65% response rate).	-Quantitative study design using validated questionnaires. -Ethical approval obtained from appropriate Institutional Review Board. Informed consent obtained. -Health-related quality of life scale (HRQOL)(36-item) used to assess physical and mental health. Self-Reported Karnofsky Performance Scale (SR-KPS) used to measure performance ability. -Symptoms burden measured via The Brief Pain Inventory, The Brief Fatigue Inventory, The Baseline Dyspnea Index, and The Hospital Anxiety and Depression Scale. -Statistical analysis performed with various tests.	-57.9% reported pain, 13.7% fatigue, 57.9% dyspnea, 21.9% anxiety, and 8.2% depression. -20.2% had no symptoms, 30.6% had one, 27.9% had two, and 21.3% had three or more. -Those who were unmarried, had lower education, unemployed, lower income, and had multiple comorbidities had higher symptom burden. -Those experiencing two or more symptoms were more likely to experience impaired functioning and poorer quality of life.	<u>Strengths</u> -First study to examine the “tipping point” between symptom burden and resulting quality of life. -Examines long-term impact of lung cancer and surgery on the patient. -Good response rate (65%) and no bias noted. <u>Limitations</u> -Some potential participants declined the study, as they felt too unwell. This may have altered findings. -Unknown how patient comorbidities may have impacted results. May need a repeat study with a control group to examine this.	-Study is highly relevant to those who care for patients with lung cancer. Even though the patient is cancer free, they may still suffer from life-altering symptoms. -In accordance with the PHAC quality- rating tool, this study is of high overall quality and has a moderate study design.

Appendix A2

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: Pre- and postoperative self-reported cognitive effectiveness and worry in patients with suspected lung malignancy. -Lehto (2013). -Study Objective: To study the perceived cognitive effectiveness and worry among patients with a diagnosis of suspected lung cancer before and after surgery. Worry was also analyzed among those with/without lung cancer after surgery.	-Sample of 23 patients who had lung surgery and waited to determine tissue diagnosis. -Setting: Cancer Center and Veterans Administration Medical Center (Midwestern United States). -Data collected following diagnosis and 3-4 weeks following surgery. -Those with previous cancer diagnosis and psychiatric illness were excluded from study. -70% had a diagnosis of lung cancer after surgery.	-Part of a larger study. Quantitative study with repeated-measures longitudinal design. -Ethical approval obtained from human subject protection committees of involved institutions. -Attentional Function Index (AFI) used to measure perceived effectiveness in cognitive function. Penn State Worry Questionnaire (PSWQ) used to measure patient worry (cancer-specific questions were added to this scale). -Descriptive statistics used to analyze data.	-Lower effectiveness in cognitive function (in essential daily activities) both before and after surgery overall (no difference between groups, but those with cancer reported lower scores). -Overall, moderate worry was detected on the PSWQ. -The group without cancer reported higher worry on the PSWQ. Both groups had less worry following surgery. -35% preoperatively and 26% postoperatively reported high levels of general worry.	<u>Strengths</u> -Highly relevant to clinical practice. -Appropriate scales and measures used. <u>Limitations</u> -Results limited as attention, memory, and executive functions were not assessed as part of cognitive function. -Although many did not have cancer, they were faced with varying other diagnoses that may have caused worry. This was not assessed. -Small convenience sample and lack of racial diversity in sample make generalizing difficult. -Groups of unequal size, limiting comparisons.	-Study is relevant to those caring for patient with potential lung cancer (both in the pre and postoperativ e period). -In accordance with the PHAC quality-rating tool, this study is of weak overall quality and has a moderate study design.

Appendix A3

Study	Sample/ Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: What newly licensed registered nurses have to say about their first experiences. -Honan Pellico, Brewer, & Tasone Kovner (2009). -Study Objective: To explore the experience of newly licensed registered nurses (NLRN) and gain a better understanding of their work life.	-Setting: 34 states in the USA and the District of Columbia. -Sampling strategy to be nationally representative. -All participants had passed the National Council Licensing Exam (NCLEX) for the first time in the past 6-18 months prior to the survey.	-Parent study was a cross-sectional research design using a mailed survey. As part of parent study, participants accepted the opportunity to write additional comments: "If you would like to make any other comments about the survey, please feel free to write below or on the back of this booklet". Of the 3266 nurses (56% response rate) who completed the survey, 612 wrote additional comments. -Appropriate study approval obtained and an audit trail created and reviewed by outside authors. -Krippendorff's technique of analysis performed. Text was reviewed, coded, and passages categorized and analyzed.	-Theme 1: Colliding Expectations: Personal beliefs about what nursing would be like and the lived experience very different. Many felt they were inadequately trained by their nursing school and were deficient in their clinical skills. -Theme 2: The Need for Speed: Nurses felt they were forced off orientation too early and were expected to immediately time-manage as a skilled RN. Theme 3: You Want Too Much: High expectations (too much responsibility) and poor scheduling. Theme 4: How Dare You?: NLRNs experienced mistreatment from coworkers, physicians, and management. Theme 5: Change is on the Horizon: Many felt nursing was still a rewarding career.	<u>Strengths</u> -Open-ended question allowed participants to express their experience. <u>Limitations</u> -Issues of NLRNs who did not respond to survey may have changed results. -May be difficult to generalize findings to different countries.	-Study of high quality and relevance to practice as it indicates the issues NLRNs face. -Research question answered via appropriate methods and rigor. -Study successfully placed into context and need for study evident as nursing retention is an issue.

Appendix A4

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: Critical thinking ability of new graduate and experienced nurses. -Fero, Witsberger, Wesmiller, Zullo & Hoffman (2009). -Study Objective: To assess critical thinking ability of new and experienced graduate nurses and identify their learning needs.	-A sample of 2144 diploma, associate, and baccalaureate prepared nurses employed by the same university health care system. All were newly hired (first two weeks of employment). -Setting: Hospitals in southwestern Pennsylvania, USA. -Study data collected from January 2004 to September 2006. -All participants de-identified.	-Quantitative study design using a post hoc retrospective analysis. -Ethical approval obtained from a university institutional review board. -Performance Based Development System (PBDS) used. Participants shown 10 videos of patient scenarios and then stated, in writing, the actions they would take and the rationale. Responses then rated compared to model answers in 6 categories: problem recognition, reports essential clinical data, initiates independent nursing interventions, differentiation of urgency, anticipates relevant medical orders, and provides relevant rationale to support decisions. -Scale of good validity and reliability. P values of <0.05.	-Data analyzed using SPSS software. -Nurses with the least experience were least likely to meet expectations while those with the most experience were more likely. -25% were not able to identify the clinical problem and prioritize patient care according to PBDS. -Among experienced nurses, those who were prepared at a baccalaureate level performed better than those who were diploma prepared.	<u>Strengths</u> -Reliability and validity of instruments used in the study. -Concise inclusion criteria. <u>Limitations</u> -Sample taken at one point in time. -External validity is a limitation of the study. Results may be difficult to generalize to other hospitals and locations. -Data was incomplete in 19.1% of cases. This additional information may have altered results. -Results based on simulation. Actions on actual patients may vary.	-Study is highly relevant for those who orientate new graduate nurses and those choosing their level of preparation. -In accordance with the PHAC quality-rating tool, this study is of medium overall quality and has a moderate study design. -Study shows the importance of experience in critical thinking and the need for thorough orientation for new nurses.

Appendix A5

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: The graduate nurse experience. -Casey, Fink, Krugman, & Propst (2004). -Study Objective: To identify stresses and challenges graduate nurses face in their first year of practice.	-Convenience sample of 270 graduate nurses working in acute care facilities in the Denver metropolitan area. -Survey distributed to 784 new graduate nurses and 270 voluntarily participated (response rate of 34%). -Data collected from a variety of clinical areas. -Graduates had varying amounts of orientation and had all practiced less than one year. -Data collected from June 1999 to July 2001.	-A mixed-methods study. Descriptive, comparative design with a survey questionnaire. Approval from an institutional review board obtained. -The Casey-Fink Graduate Nurse Experience Survey was used. Survey has 5 sections: demographics, skills/procedure performance, comfort/confidence, job satisfaction, and open-ended questions about role transition. -Data collected at baseline, 3 months, 6 months, and 1 year of beginning work as a graduate nurse. -Survey has Cronbach's alpha of 0.78 and had been piloted for content validity by an expert panel.	-New graduates were uncomfortable with many interventions. Over half were uncomfortable with "code blues" at baseline and almost 30% uncomfortable with chest tubes. -Many graduate nurses felt uncomfortable communicating with residents and attending physicians. -6 themes identified via open-ended questions; most commonly reported theme being "lack of confidence in skill performance, deficits in critical thinking and clinical knowledge" (p. 307). -Relationships with peers, work environment, difficulty setting priorities, and communication were also identified themes.	<u>Strengths</u> -Provides insight into the lived experience of graduate nurses. <u>Limitations</u> -A decreased response rate over the study course could affect result validity. -Survey was under revision throughout the study duration. Created difficulty in interpreting data.	- In accordance with the PHAC quality-rating tool, this study is of medium overall quality but has a strong study design. -Results of this study should be considered by managers, preceptors, and clinical educators of new graduate nurses -This study indicates the need for further education for new graduate nurses.

Appendix A6

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: The lived experience of new graduate nurses working in an acute care setting. McCalla-Graham & De Gagne (2015). -Study Objective: To examine the lived experience of new graduates working in acute care settings during their first 12 months of employment.	-Setting: Multiple acute care hospitals in southwest Florida. -Inclusion criteria: nurses working in acute care settings for one year or less. Participants were excluded if they worked as a licensed practical nurse or vocational nurse. -First participants selected via purposeful sampling and remainder via snowball effect.	-A descriptive phenomenological study using Colaizzi's method of data analysis. -Ethical approval obtained from the university institutional review board. Informed consent obtained from participants. -10 participants were interviewed for 45-60 minutes using 11 open-ended questions. -All interviews recorded digitally and transcribed verbatim. Information was coded and themes identified and compared with themes from other participant interviews.	-Three themes identified related to the experience of working in acute care as a new graduate: knowledge, skills, and environment. -Knowledge: Participants felt nursing school did not adequately prepare them to be effective as a new graduate in acute care. They felt they were kept from "worst-case scenarios" during clinical rotations and were not prepared to deal with this as a new nurse. -Skills: The need for improved practical skills to care for acutely ill clients was indicated. Time management was an issue for new nurses. Environment: Participants indicated feeling uncomfortable in their new roles, being inadequately staffed, and feeling overwhelmed with work assignments.	<u>Strengths</u> -Phenomenology approach gives an insider perspective of the experience. -Member checking completed ensuring validity of findings. <u>Limitations</u> -May be difficult to generalize findings to areas outside of Florida. -Small sample size, thus difficult to know if data saturation was reached.	-Study is highly relevant to clinical practice as it shows struggles experienced by new nurses. -Researchers noted a gap in the research. Study aim sought to fill this void. Appropriate methods utilized to do so. -This study shows the needs of new graduates from their own perspective. The results can be used by nursing schools and management to ensure the needs of new nurses are met and that they are comfortable in their new roles.

Appendix A7

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: The learning needs of nurses experiencing job change. -Butt, Baumann, O'Brien-Pallas, Deber, Blythe, & DiCenso (2002). -Study Objective: To determine the learning needs of nurses transitioning to other units, other hospitals, or a different role on the same unit.	-Survey sent to all nursing personnel (3408) from two large teaching hospitals in Ontario, Canada. Results based on 828 returned surveys of those who experienced job change. -97.7% of those surveyed were female. 85% were RNs and 15% registered practical nurses. -Survey responses were divided into 3 groups: nurses who changed roles on the same unit, nurses who changed hospitals, and nurses who moved to a different unit.	-Quantitative study design with Likert-style questionnaire. -Ethical approval from McMaster University Ethics Review Committee. -Nursing Job-Change survey developed for this study. Items based on a 7-point Likert-scale. Content validity via feedback from experts and pretested for validity and reliability. -p-values of <0.05 considered significant. -Survey explored items such as work environment, quality of care, organizational and professional commitment, learning needs, and orientation.	-Data analyzed using SPSS software. -Nurses experiencing job change indicated they needed upgrading of their clinical skills and required a moderate amount of new knowledge. -70% of nurses working on a new unit felt they need new knowledge about disease conditions and 75.9% required new knowledge about technical procedures. Less learning was required for those with a new role on the same unit. -Most nurses saw a need for further information regarding patient policies and protocols and nursing interventions.	<u>Strengths</u> -Reliability and validity of instruments used in the study. <u>Limitations</u> -Lack of a control group. Unable to determine if nurses who stay on the same unit also feel they require increased knowledge in some areas. -External validity is a limitation of the study. Results may be difficult to generalize to nurses in small non-teaching hospitals. -Authors felt some statistically significant results may be due to large sample size.	-Study is highly relevant for unit managers and those who arrange orientation for nurses new to a role, unit, or hospital. -In accordance with the PHAC quality-rating tool, this study is of medium overall quality and has a moderate study design.

Appendix A8

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: The first year of practice: New graduate nurses' transition and learning needs. -Dyess & Sherman (2009). -Study Objective: To understand the experience and learning needs of new graduate nurses in their first year of practice.	-Setting: Novice Nurse Leadership Institute (NNLI) in South Florida. -81 participants with a mean age of 32 years. All had an associate's degree or baccalaureate degree in nursing. All had less than one year experience. -80% of participants worked in a variety of acute care specialty areas.	-A qualitative research study using hermeneutic analysis. -Focus groups conducted pre- and post- NNLI program. -Focus groups facilitators experienced and did not have connection to NNLI. -Ethical approval obtained from review board of Florida Atlantic University. -Semi-structured interview questions. -Sessions audiotaped and transcribed, coded, and themes resulted.	-Emerging themes included: -Confidence and Fear: New nurses felt confident and excited, yet fearful and scared about unknown client situations. -Communication: New nurses felt communication with the interdisciplinary team was difficult – presenting a patient safety issue when they were afraid to contact physicians. -Horizontal Violence: Feeling unsupported by nurse coworkers. -Professional Isolation: Feeling unsure of how to respond in a patient situation and not knowing where to turn. -Complexity: Caring for complex patients requiring high-level decision-making skills. -Contradicting Information: Receiving varying answers regarding clinical practice questions.	<u>Strengths</u> -Phenomenology approach gives an insider perspective of the experience. -Relevance of study noted. <u>Limitations</u> -May be difficult to generalize findings to areas outside of Florida. -No mention of member checking. -Unknown if participants felt influenced by other participant answers.	-Study shows the learning needs of new nurses from their own perspectives. -Results of this study can be used by those who orientate new nurses. Results can also be used by unit managers and the inter-professional team. -Member checking would have reinforced accuracy of themes derived.

Appendix A9

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: Nurses' knowledge of chest drain management in an Irish Children's Hospital. -Magner, Houghton, Craig, & Cowman (2013). -Study Objective: To explore contact with and knowledge regarding chest drain management among nurses and their preferred methods of keeping updated.	-230 nurses working in clinical areas who are exposed to chest drains. -Setting: Acute pediatric hospital in Ireland. -Study data collected over a two week period. -96.7% were female and 90% registered children's nurses. Half encountered chest drains daily and half once every 2 weeks.	-Cross-sectional quantitative study with a survey consisting of closed questions. -Survey return rate of 58% (121 nurses). -Nurses' Knowledge of Chest Drain Management questionnaire altered and used. Demographics gathered, knowledge of chest drains assessed, and how nurses get information about chest drains analyzed. -Experts reviewed scale for content validity and test-retest carried out for stability. Cronbach's alpha of 0.81. -p-value <0.05 significant. -Ethical approval obtained from the Hospital Ethics Committee.	-Nurses who have less contact with chest tubes require more regular education regarding care. -Survey indicated nurses were deficient in knowledge regarding the anatomy and physiology of the respiratory tract. -Mean score on knowledge test 78%. -95% answered correctly regarding intrapleural pressure and 83% for reasons for chest drain insertion. -Only 55% understood the significance of bubbling in the chest drain and 49% were uncertain about positioning of the tubing. -More than half indicated in-hospital education keeps their knowledge updated.	<u>Strengths</u> -Valid and reliable scale. -Acceptable survey response rate. <u>Limitations</u> -Knowledge and knowledge perception assessed. Level of actual skill remains unknown. -May be difficult to generalize results to areas outside of Ireland.	-Study is highly relevant to those who plan education for RNs. -Nurses need in-hospital education regarding specifics of chest drain care. -In accordance with the PHAC quality- rating tool, this study is of medium overall quality and has a moderate study design.

Appendix A10

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: Nurses' knowledge of chest drain care: an exploratory descriptive survey. -Lehwaldt & Timmins (2005). -Study Objective: To examine the level of knowledge nurses' have regarding chest drains and their management.	-250 nurses survey. All nurses worked on units of two large teaching hospitals. -Setting: Teaching hospitals in Dublin, Ireland. -84% of participants were female and over 92% were registered nurses with a single qualification. Nurses worked in various units such as surgical wards, intensive care, and recovery room. -67% of participants indicated caring for clients with chest tubes regularly.	-Quantitative study design. -Ethical approval obtained from local research ethics committee and permission granted from hospital directors. -Survey consisted of a 39-item questionnaire consisting of demographics, true-false questions, and questions relating to chest tube management (yes/no style answers). -A box was placed on the unit for survey return. Response rate of 88% (thus, a total of 189 participants). -Experts reviewed questionnaire for content validity. Test-retest carried out via a pilot sample.	-Over half of the sample was unsure about the concept of intrathoracic pressures. -Only half of participants knew "pneumothorax" to be the most common condition requiring a chest tube. -44% of the sample correctly answered the correct position for chest tube insertion. -27% of the sample inaccurately stated patients would not need additional medication for pain during chest tube insertion. -58.2% of nurses knew chest tubes should not be milked. -About half of the sample knew chest tube bubbling could indicate an air leak.	<u>Strengths</u> -Instrument validity. -Need for further study is discussed. <u>Limitations</u> -Limitations were not discussed in the study. -Methods of data analysis not well described. -Unknown whether questionnaire was supervised or if participants could discuss or look up answers. -Difficult to generalize results.	-Study indicates the need for further teaching regarding underpinning concepts of chest tubes. -Study highly relevant for those who manage units where clients with chest tubes are admitted. -In accordance with the PHAC quality- rating tool, this study is of weak-medium overall quality and has a moderate study design.

Appendix A11

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: The need for nurses to have in service education to provide the best care for clients with chest drains. -Lehwaldt & Timmins (2007). -Study Objective: To assess the knowledge level of nurses regarding caring for patients with chest drains and to determine how nurses keep informed about developments in this skill.	-Sample of 250 nurses working in acute care respiratory and cardiothoracic surgery units in two large teaching hospitals in Ireland. -Response rate of 88% (189 completed surveys). -88.4% of respondents were female and 92.1% were registered nurses with a single qualification. -No mention of when data was collected.	-A quantitative study using a self-report survey. Ethical approval obtained from local research ethics committee and hospital approval obtained. -39 item questionnaire created based on current literature. Questionnaire consisted of 3 sections: demographics, true/false questions, and questions regarding how nurses keep up-to-date with practice. -Content validity established via expert panel review and pilot testing. Reliability determined via test/retest. Cronbach's alpha of 0.87. -A box provided on units for survey return.	-Nurses exhibited good knowledge regarding suction levels, bottle changes, clamping, and pain relief (>60% correctly answered). -Nurses answered 40-60% correctly on questions regarding body position for tube insertion, milking chest drains, and air leaks and breathing techniques. -A poor level of knowledge was indicated (<40% correct) regarding anatomical and underpinning concepts of chest tube management, placement, and conditions requiring drains. -More than half of nurses surveyed had never attended educational activities pertaining to chest tube management.	<u>Strengths</u> -Provides insight into strengths and weaknesses of chest drain care provided by nurses. <u>Limitations</u> -Limitations were not discussed in this study. -May be difficult to generalize these findings to other hospitals. -Varying academic qualifications of those surveyed.	- In accordance with the PHAC quality-rating tool, this study is of medium overall quality but has a moderate study design. -Results of this study should be considered by managers and clinical educators of respiratory and cardiothoracic surgery units. -This study indicates the need for further education regarding chest drains among registered nurses.

Appendix A12

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: Nurse's Perception of Stressors Associated with Coronary Artery Bypass. -Parvan, Zamanzadeh, Lakdizaji, & Mousavi Shabestari (2012). -Study Objective: To determine the perception of nurses regarding patient stressors associated with coronary artery bypass graft surgery (CABG).	-68 nurses participated; all who had cared for patients aged 40-75 years who had undergone CABG surgery in the past 3-5 days. -Setting: Cardiac surgery units of Shahid Madani Health Care Center in Tabriz, Iran. -Study data collected from July to August 2011. -Preliminary study conducted with 10 participants.	-Quantitative study design with descriptive characteristics and Likert-scale questions. -Ethical approval obtained from the Research Council of Nursing and Midwifery and informed consent obtained. -Revised Cardiac Surgery Stressor Scale (RCSSS) with 37 questions was used. -The RCSSS assessed two parts: first, personal and social information; second, interpersonal, intrapersonal, and extra-personal factors. -Cronbach's alpha of 0.93 reported and p-values less than 0.05 were considered significant.	-Data analyzed using SPSS software. -The most commonly identified stressors by the nurses were: the need of cardiac surgery, death due to illness or surgery, having a chest tube, and payment of hospital and medical bills. -Having visitors during certain times, injections, receiving medication, and increased activity were also perceived stressors but less commonly cited.	<u>Strengths</u> -Reliability and validity of instruments used in the study. -Concise inclusion criteria. <u>Limitations</u> -Sample of only cardiac surgery patients and nurses. -External validity is a limitation of the study. Results may be difficult to generalize to other surgeries or in other locations. -No evidence of bias or confounding. -Small sample size.	-Study is highly relevant to clinical practice. -Results should be considered by nurses who specialize in cardiac care or care for patients with chest tubes. -In accordance with the PHAC quality-rating tool, this study is of medium overall quality and has a moderate study design.

Appendix A13

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: Nature and intensity of the pain following thoracotomy. -Kol, Erdogan, & Karsh (2012). -Study Objective: To describe the pain experienced by individuals in the first 48- hour post-operative period following a thoracotomy.	-70 study participants who were hospitalized following a thoracotomy, lobectomy, or segmentectomy. -Setting: Intensive care unit of the Thoracic Surgery Department – Akdeniz University Hopsital. -Study data collected from November 2007 to November 2008. -All patients had an uncomplicated extubation, voluntarily participated, and had an average age of 50.	-Quantitative study design with SPSS data analysis. -Ethical approval obtained from Akdeniz University Medical School. -Two scales used: Verbal category scale and Behavioural pain scale. Reliability and validity of both adequate. -Verbal category scale measures perceived severity of pain by the patient by choosing the most appropriate phrase to describe their pain. -Behavioural pain scale consists of a rater determining the patient's facial expression, position of the upper limbs, and compliance with ventilation. -p-values of less than 0.05 considered significant.	-Over 65% of patients described their incisional pain as "throbbing" and "stabbing". -85.7% reported an increase in pain when moving/walking. 74.3, 68.6, and 54.3% of patients reported increased pain with breathing, coughing, and chest tube movement respectively. -Nearly all patients reported relief with position stabilization and medication. -Highest pain reported in the second hour post-operatively and pain decreased over the first 48 hours.	<u>Strengths</u> -Reliability and validity of instruments used in the study. -Types of pain and methods of relief both explored. <u>Limitations</u> -Limitations were not discussed in the study. -Types of analgesia used not well discussed. Unknown whether patients had epidurals or "as needed" pain medications. -Credibility of rater for the Behavioural pain scale not discussed. This may cause bias.	-Study is highly relevant to those who care for thoracic surgery patients. -Intensity and methods of pain relief should be considered by those who care for such clients. -In accordance with the PHAC quality- rating tool, this study is of medium overall quality and has a moderate study design.

Appendix A14

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: Strategies for continuing professional development among younger, middle-aged, and older nurses: A biographical approach. -Pool, Poell, Berings, & ten Cate (2015). -Study Objective: To explore the professional development strategies for nurses of varying ages (relating to their career stage and private life).	-Data collected from February to August 2013. -21 nurses participated (17 female). -Purposive sampling used (striving for variation). -Nurses worked at various hospitals and in various specialties in the Netherlands. -Participants divided into 3 age categories: younger (20-34), middle-aged (35-49), and older (50-65).	-Qualitative study with a biographical approach. -Participants interviewed for approximately 90 minutes using semi-structured questioning. -Academy of Human Resource Development standards on ethics abided by. No need for ethical approval for this type of study in Dutch law. Informed consent from participants. -Interviews audiotaped, transcribed, coded, analyzed, and themes identified.	-Nurses felt compelled to continuing professional development based on what their daily work entails. They wished for help when new equipment introduced or a new skill required. Learning was triggered by the need to perform new tasks. -Middle-aged and older nurses felt they learned from their personal lives (such as raising children and sickness among family) and this impacted their practice. -Younger nurses felt professional development was important for them to gain knowledge and prepare for unfamiliar situations. -Nurses engage in professional develop to keep their work interesting. -Balancing work life and home life with professional development was important.	<u>Strengths</u> -Interviews allowed participants to express themselves freely. <u>Limitations</u> -Nurses who were not directly involved in patient care were excluded from the study. -Nurses were purposefully chosen for the study. Perspective of those not chosen unknown.	-Study is highly relevant to understand the professional development goals of different aged nurses. -Study placed into context and need for study identified. -The findings of this study would be of interest to those who provide learning opportunities for nurses who provide direct patient care. Varying learning opportunities may be needed for nurses at different stages in their career.

Appendix A15

Study	Sample/Groups	Design and Methodology	Key Results and Findings	Strengths/ Limitations	Conclusion and Rating
Study title: Learning needs assessment for registered nurses in two large acute care hospitals in Urban New Zealand. -Dyson, Hedgecock, Tomkins, & Cooke (2009). -Study Objective: To identify the learning needs of registered nurses (RNs) from the perspective of RNs and their managers.	-Two groups of participants: Clinically based RNs working in acute care and senior RNs in management or educator positions. -Setting: Two large urban hospitals in New Zealand. -Study data collected from November 2007 to November 2008.	-Descriptive quantitative study design with questionnaire. -Return rate of 35% (563) from RNs and 63% (101) nurse managers/educators. -Questionnaire developed from a literature review and from an earlier survey. A pilot study was used. -Questionnaire divided into two parts: 71 items regarding client care, health care team, and professional issues and demographic information such as work experience. All items based on a Likert-style scale from strongly agree to strongly disagree. -Ethical approval obtained from New Zealand Ministry of Health and Disability Ethics Committee.	-Learning needs of newer RNs focused more on direct client care. More senior RNs wanted more focus on team development and professional issues. -RNs working in acute care identified “interpreting information from diagnostic tests, coordinating an emergency situation, managing people with challenging behaviours, applying pharmacology in practice, and pathophysiology of disease process” as the top five learning needs. -Management/educators identified “using evidence to support their practice” and “discussing evidence for practice with colleagues” as learning needs for the RNs.	<u>Strengths</u> -Perception of multiple stakeholders assessed. -Acceptable survey response rate. <u>Limitations</u> -Although response rate acceptable, the opinion of remaining nurses would have been valuable to the study. -May be difficult to generalize results to areas outside of New Zealand. -Scale limited by subjectivity.	-Study is highly relevant to those who plan education for RNs. -Direct care practices should be included in educational for new RNs. -Need for study evident and possible further study identified. -In accordance with the PHAC quality- rating tool, this study is of medium overall quality and has a moderate study design.

Appendix B

Consultation Report: Thoracic Surgery and its Implications for Nursing Care

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Consultation Report: Thoracic Surgery and its Implications for Nursing Care

The advanced practice competency of consultation is an important aspect of nursing practice; this skill is essential for the development of a learning resource manual for nurses new to thoracic surgery as proposed for the practicum project for Nursing 6660 (Canadian Nurses Association (CNA), 2008; Vosit-Steller & Morse, 2014). Consulting and collaborating with colleagues and the inter-professional healthcare team allows for a varied perspective on any subject matter and can result in a more comprehensive view of an issue or need. For the purpose of this practicum project, the benefit of consulting experts in the field of thoracic surgery could not be underestimated. Thus, a thoracic surgeon, unit manager, surgical clinical educator, and a senior nurse were all consulted to better understand, from their point of view, the need for the proposed learning resource manual. In this paper, I will introduce the overall purpose of the practicum project, provide a rationale for the consultation process, explain the participant backgrounds and the consultation methods, describe how the data was managed and analyzed, describe what was learned via the consultations, and, lastly, how the information gleaned from the consults will be utilized in the practicum project.

Practicum Project Background

Six East is the designated general and thoracic surgery unit at St. Clare's Mercy Hospital (SCMH) in St. John's, Newfoundland. Many of the patients on this unit are admitted due to various thoracic conditions and arrive post-operatively following thoracic surgery (often after being diagnosed with lung or esophageal cancer). Registered Nurses (RNs) working on this unit are required to care for

patients following major surgery and assess chest tube systems that are used to treat these thoracic conditions.

A review of the literature shows that being diagnosed with cancer is difficult for the patient and their family; a hospital admission, surgery, and resulting chest tube system can further exacerbate this worry (Lehto, 2013; Hodgson, 2006; Jeantieu et al., 2014; Parvan, Zamanzadeh, Lakdizaji, & Shabestari, 2012). Thoracic surgery can be very painful for the patient and, occasionally, patients with chest tubes become critically ill and require intense care and monitoring; proper nursing care and assessment skills are essential to ensure optimal outcomes for these clients (Kol, Erdogan, & Karsh, 2012; Cerfolio et al., 2005; Briggs, 2010). New graduate nurses are often unconfident in their new positions and have difficulty communicating with the inter-professional team and performing unfamiliar tasks (Ketelaar, Nieuwenhuijsen, Frings-Dresen, & Sluiter, 2015; Dyess & Sherman, 2009; McCaalla-Graham & De Gagne, 2015; Casey, Fink, & Propst, 2004; Fero et al., 2008). Many nurses, at varying levels of experience, do not have adequate knowledge regarding the underpinning concepts of conditions requiring chest tubes, their placement, or their management (Lehwaldt & Timmins, 2007; Magner, Houghton, Craig, & Cowman, 2013). Thus, both new nurses and those transferring to a thoracic surgery unit for the first time may need education regarding thoracic conditions, chest tubes, and their management and, in turn, be able to provide education and support to patients and their families.

For the reasons highlighted in the literature review process, a learning resource manual for nurses new to thoracic surgery was chosen as the topic for this practicum project. Various aspects of Benner's Novice to Expert Theory and

Knowles' Adult Learning theory will be used in the manual creation. The manual will focus on various thoracic conditions, chest tube systems, how to assess and care for the systems, and the importance of providing care for these patients with compassion and understanding.

The manual will be made available to the manager of Six East and the surgical clinical educator at SCMH. The clinical educator will be able to make new graduate nurses aware of this manual and offer it to them as a resource to enhance their knowledge and skill level in thoracic surgery. In addition, nurses who preceptor students and are cosigned with independent nursing students can direct the students to this resource and have them read it as part of their orientation to the unit. Although this manual will have a nursing focus, it will also be available to clinical clerks (third year medical students) who are completing rotations on Six East; clinical clerks often have questions about the various aspects of chest tube care and could benefit from such a manual. This resource will be available to the thoracic surgeons at SCMH and they can direct medical students to this manual as deemed appropriate. The manual will be available in print format and also be saved as a Word document on the desktop of the three computers on the unit.

Consultation Purpose

The rationale behind consulting individuals associated with the thoracic surgery unit at SCMH is to better understand, from their perspective, whether or not novice nurses are confident and efficient when caring for chest tubes and thoracic surgery clients after finishing the bachelor of nursing (BN) program and being orientated to the unit. If these individuals believe novice nurses are not adequately prepared for this skill, I would like to determine if a learning resource manual for

nurses new to thoracic surgery would be beneficial for the unit. If deemed valuable, I would seek to understand, from their perspective, what type of information this manual should contain and what issues surrounding chest tube care should be addressed.

Participants

For the purpose of this practicum project, four individuals were consulted: a thoracic surgeon, unit manager, clinical educator, and a RN experienced in thoracic surgery. Recruitment simply involved explaining the purpose of the practicum project and asking each individual if they were willing to participate (all four individuals readily agreed to the interview).

The selected thoracic surgeon has been caring for patients on 6 east for nearly two years. It was necessary to consult a thoracic surgeon to gain a physician's point of view on the care of thoracic surgery patients and the importance of (and what they consider) proper nursing care and assessment. The unit manager of general/thoracic surgery (6 East) at SCMH was also selected and, prior to this role, she was an experienced nurse in the intensive care unit. She is partly responsible for hiring and supporting new graduate nurses to this unit and also receives incident reports of various occurrences on the unit. Her perspective was valued as she has an understanding of chest tube systems and the care they require as well as what issues are associated with this type of care. The surgical clinical educator for SCMH also participated; she has a role in orientating new graduate nurses to the surgical program. Her perspective was important as she is aware of how new graduates are orientated to the floor and frequently answers questions regarding chest tubes and thoracic surgery for nurses on Six East. Lastly, it was essential to consult a senior nurse on the unit;

thus, a nurse who has worked in thoracic surgery for eight years was selected. During those years, the selected nurse has been a preceptor to students, participated in orientating new graduate nurses, participated in question development with the CNA, and recently received the CEO Award of Excellence for Service for his work on the thoracic surgery unit. In consulting this senior nurse, I wanted to learn his perspective on the learning needs of nurses new to the unit and if he felt further resources were needed to orientate new nurses to the thoracic surgery unit.

Methods, Data Management, and Analysis

All four interviews were completed during June 2015 in a quiet, classroom setting on the unit. Data were collected via in person, semi-structured interviews; I used a list of structured questions but allowed for additional comments as necessary when the interviewee had a great deal to say on the topic (Young, 2004). I personally took notes and transcribed the interviews by typing the content into a Word document on my computer. Each interview lasted between 30 to 45 minutes. During the interview, responses were repeated back to the individual when clarity was needed, ensuring the response was not being misunderstood. A list of the questions used to guide these interviews can be found in Appendix "B1". As well, there were several questions only asked to specific interviewees; a list of these particular questions can be found in Appendix "B2". These questions were developed based on the findings from the integrated literature review conducted prior to the consultation planning process.

Answers to interview questions were analyzed for content and themes and each response was compared for similarities and differences. Data were stored electronically on a password-protected laptop.

Ethical Considerations

The Health Research Ethics Authority (HREA) Screening Tool was used to determine if this project should be submitted to a Research Ethics Board for approval. This screening tool, and the checklist as appropriate to this project, can be found in Appendix "B3" of this paper. After completing this screening tool, it was determined this project does not need to involve the HREA, as it is not a research project (please see Appendix "B4"). Permission to interview participants for the purpose of this practicum project was discussed with the unit manager and the Professional Practice Department of Eastern Health; because no patient information was involved, there was no need for agency permission to be granted. All four participants agreed to take part in the interview and this was considered verbal consent. No identifying information was attached to the data collected. Prior to beginning each interview, I reviewed the purpose of the interview and each interviewee was made aware that particular patient information was not to be discussed. Also, participants were made aware the information gathered from the interview would only be used for the purpose of this practicum project and their identity would be protected. They were also told if they felt they could not answer a particular question there was no obligation to do so.

Consultation Results

Participants described the reactions of new nurses when learning to care for thoracic surgery clients and resulting chest tube systems as having feelings of terror, anxiety, and apprehension. All rated the confidence level of new graduates when caring for these patients as less than four (on a scale of one to ten, with ten being very confident). Several interviewees attributed this absence of confidence and anxiety to the lack of exposure novice nurses generally have with chest tube systems.

Participants were in agreement that having previous experience on Six East as a nursing student was a major asset to the nurses' confidence and competence as a new graduate on the unit. One participant stated these nurses, due to more exposure with chest tube systems, were generally more confident and competent early in their new positions. Two participants were unsure of the education students have regarding chest tube systems at the undergraduate level; however, two participants felt the knowledge gained at this level was very general and more education is required for those who choose to work on this unit. Participants indicated seven to eight new graduates are hired each year on Six East and it often takes at least a year for these new graduates to be entirely comfortable in their new roles. With this many new graduates, it is essential they become competent as quickly as possible; the proposed learning resource manual would assist with this endeavor.

The senior nurse interviewee discussed the importance of new graduates caring for complex thoracic surgery clients while on orientation, as their cosigned nurse is able to teach them and improve their comfort level during this time. This orientation period would be an ideal opportunity to refer new graduates to the learning resource manual; before they begin caring for these complex patients they could refer to this resource to ensure they are fully equipped to holistically care for and assess these patients. With the knowledge base gained from this resource manual, new graduates will be able to acquire a more rewarding experience caring for thoracic surgery clients during their orientation period; with a strong underlying knowledge they will have more confidence from their early clinical experience.

The specific assessment skills nurses need to safely care for thoracic surgery patients were discussed as well as what exactly should be assessed. The responses to

this question were very similar and detailed. The importance of basic nursing skills such as taking vital signs, a proper respiratory assessment (including chest auscultation), and the ability to recognize when a patient is unwell (patient inspection) were all talked about. The thoracic surgeon specifically spoke of the importance of patient inspection, assessing whether the patient appears distressed, and assessing for tracheal tugging or accessory muscle use. Specific to the chest tube system, participants discussed the importance of being able to troubleshoot when something is wrong with the system and checking the set-up in a "patient to system" approach. The importance of dressing changes (and ensuring these are done according to policy) and palpating to check for subcutaneous emphysema were deemed highly important by the senior nurse interviewed. Interviewees also acknowledged the importance of assessing the type and how much drainage a chest tube system is collecting, assessing for air leak, and checking for fluctuation in the system.

All participants agreed on the importance of nurses being able to detect when something is wrong with a thoracic surgery client or their chest tube system as nurses are the primary caregivers and health care providers that spend the most time with these patients. Several interviewees mentioned the need for nurses to understand the policy about when clients need to be accompanied off the unit and, aside from policy, when a patient is sick enough that the nurse should accompany them anyway. This policy will be discussed in the manual and, additionally, the importance of assessing for indications that a nurse should be present due to the patient's physical condition will also be incorporated. Several possible complications were noted for patients with chest tube systems: abnormal bleeding, infection at the site, subcutaneous emphysema, obstruction of the airway, atelectasis, or a pneumothorax (or tension

pneumothorax). These complications, for various reasons, were acknowledged to be fatal if not properly diagnosed and treated.

The participants did not note many common errors or incidents with respect to chest tube systems in recent years. The clinical educator noted often getting calls regarding how to take fluid samples for microbiological testing from the chest tube systems. Another participant noted not all nurses do the chest tube dressing according to policy and often do not understand when to clamp the tubing or why.

All participants agreed on the high importance of the relational aspect of care between the nurse and thoracic surgery clients and the importance of caring for these patients with confidence and compassion. One participant spoke about the importance of explaining things to the patient and their families and discussing their condition; they noted this puts the patient at ease and creates a trusting relationship. Another participant noted when a nurse is anxious and appears unsure of what to do, this evokes feelings of nervousness in the patient, which can increase their heart rate and exacerbate the situation. One interviewee commented on the fact that patients now have a great deal of access to information on the Internet and felt it was better to receive accurate information from the nursing staff than false and alarming information from online. When speaking of the relational aspect of care, one participant commented that many patients need a great deal of support from the time of their diagnosis and for the rest of their lives. This same participant noted that, in Newfoundland particularly, there is a small and very spread out population with many elderly patients who are on fixed incomes. When travelling to St. John's for complex thoracic surgeries these patients often require financial support, transportation, and places for their families to stay. These patients need proper supports in place and

need to be assessed by hospital staff so appropriate referrals can be put into place (such as social work or the mental health liaison). As these referrals are not routine, those new to Six East may not know what resources exist or how to access them; this has implications for teaching points in the learning resource manual. One interviewee noted cancer diagnoses to be difficult for patients and their families, both physiologically and mentally, as they are faced with potential mortality and fear of the unknown. This interviewee noted the importance of letting the patient cry, acknowledging their difficult situation, and not forgetting the patient is more than their diagnosis.

Participants were asked about resources available for nurses who are new to thoracic surgery and how they are currently gaining expertise. It was learned here that there is a teaching guide about the unit; however, the manual has very little information regarding thoracic surgery and chest tube systems. One interviewee commented new nurses are proctored by the more senior nurses and rely on the mentoring of these nurses. Another participant stated the importance of our thoracic surgeons and how accommodating they are with answering questions and teaching. As well, education days were mentioned where topics surrounding thoracic surgery are sometimes discussed and the availability of the clinical educator to answer skill-based questions was recognized. During orientation, the clinical educator discusses policies surrounding chest tubes and shows a short video on the pneumostat chest tube and how to check for bubbling.

All participants strongly agreed a learning resource manual for nurses new to thoracic surgery would be an asset for the unit. One interviewee noted there is no other hospital in Newfoundland where these thoracic surgeries are performed and the

skill set required is particular to 6 East; thus exposure to these surgeries and chest tubes are limited as we care for a specific subtype of patients making such a manual highly useful. When asked what should be included in such a manual the answers among participants were consistent. Participants felt thoracic surgeries and conditions should be explained in terms novice nurses could easily understand, as well as the anatomy and physiology of the lungs. Chest tube care and management were suggested to be a major part of the learning resource manual, including the system set-up, components, and how to troubleshoot. Assessment skills associated with chest tube care and why each aspect of assessment is important were also mentioned. One participant suggested the manual also discuss the need and role of physiotherapy for thoracic patients and how nursing can support this role. This idea was an excellent addition, as it was not discovered via the literature review process. The physiotherapist plays an integral role in the care of thoracic surgery patients by performing chest physiotherapy. The physiotherapist role and how nursing staff can support it via early post-operative ambulation would be important learning points for those new to Six East and would be an asset to the learning resource manual. Also, this same participant thought the manual should include what to expect post-procedures and what should be looked for and assessed post-operatively (risk of abnormal bleeding, improper fluid balance, risk of atrial fibrillation, and deep vein thrombosis). Another participant thought the different type of chest tube systems should be included as well as the supplies needed (and nursing role) in chest tube insertion and removal.

Implications and Conclusion

The results and information generated via these consultations have many implications for the development of the learning resource manual proposed for this practicum project. Via the consultation process with experts in thoracic surgery, I strived to determine whether this practicum project had merit. It was important these individuals felt such a learning resource manual for nurses new to thoracic surgery was a worthwhile and highly needed resource; and, in fact, they agreed on the importance and value of this project.

Once again, as the interviewed individuals were all experienced in the field of thoracic surgery, I sought to find out what, they felt, new nurses struggle with and what skills they need to care for thoracic surgery clients and chest tube systems and how new nurses are currently gaining expertise in the field. It was also very important to learn their opinion on what a thoracic surgery learning resource manual should include and what types of complications these patients can experience and the severity. These goals were accomplished via the consultation process and a great deal of useful information gathered to assist in the manual creation. After completing the consultation process and integrated literature review, it can be said with confidence that a learning resource manual for nurses new to thoracic surgery is a project of value to the unit.

The consultations reinforced much of what was learned via the integrative literature review; however, the interview process highlighted several important aspects of care that were not as evident from the literature review alone. The importance of providing care for thoracic surgery clients with patience and empathy, although mentioned in the literature review, was brought to the forefront in the interview process by all interviewees. The need for comprehensive assessments that

incorporate patient inspection and thorough respiratory assessment was also made very evident during the consultation process. The weight of responsibility on nursing staff and the trust patients, families, and the attending physicians must have in nursing care was emphasized in the interviews. The importance of mentorship and how new nurses rely on senior staff for guidance was a significant discovery. Lastly, the value of physiotherapy for thoracic surgery clients and the supportive role of nursing were highlighted. These new discoveries will all be important aspects of care to include in the learning resource manual and made the consultations a highly worthwhile endeavor.

In this report I have explained who was interviewed for the purpose of my practicum project and why it was important to consult these individuals. An overview of the practicum project, a rationale for the consultation process, and data collection and management was discussed. Most importantly, the results of the consultation process have been discussed which reinforce the importance of this learning resource manual for the thoracic surgery unit at SCMH. The implications these results have on the creation of the learning resource manual have also been discussed. Questions asked during the interview process and reasoning why HREA approval was not needed can be found in the appendices of this paper.

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Appendix B1: General Interview Questions

-What are the reactions of new nurses when first learning to care for thoracic patients and chest tube systems? How would you rate their confidence level on a scale of one to ten (one being very low confidence and ten being very confident)? Please explain.

-What contributes to novice nurses being comfortable with chest tube systems upon graduation? Does the bachelor of nursing program alone adequately prepare them for this skill? Does having experience on the thoracic surgery floor prior to graduation impact their comfort level? Why or why not?

- What specific assessment skills does a nurse need to safely care for an individual with a chest tube system? What exactly should be assessed?

-Is it important that nurses are able to detect when something is wrong with a chest tube system or thoracic surgery patient? What can go wrong? What complications can they face? Please explain.

-What impact does a nurse's confidence level have on the care provided to thoracic surgery clients? Is the patient's anxiety level impacted by the nurse's apparent confidence level?

-Have you noticed any common errors or incidents with respect to chest tube system care? Please explain.

-How important is the relational aspect of care when caring for thoracic surgery clients? What type (or how much support) do these clients and families require?

-Are adequate resources available for nurses who are new to thoracic surgery to increase their knowledge and self-efficacy prior to starting on the unit? How are they currently gaining expertise? Please explain.

-Would nurses new to thoracic surgery benefit from a learning resource manual pertaining to the field? Why or why not?

-What are some aspects of caring for thoracic surgery clients that would be important to include in such a manual?

Appendix B2: Additional Interview Questions

Additional Interview Questions for Unit Manager

-Do you receive many incident reports surrounding chest tube care? To what do these reports generally pertain?

-Approximately how many newly graduated nurses are hired on 6 East each year?

-How are nurses new to 6 East generally educated about chest tube systems? Are there any educational materials currently in place?

Additional Interview Questions for Thoracic Surgeon

-How much importance do you place on proper nursing care and assessment of chest tube systems?

-Have their been instances where a nurse has noticed something critical with a thoracic surgery client and notified you? Are outcomes more positive when such things are discovered early?

Additional Interview Questions for Clinical Educator

-Do you receive many calls regarding various aspects of chest tube care? What type of questions do you hear?

-Are nurses new to thoracic surgery given any education regarding chest tube systems before starting work on the floor? If so, what does this entail?

Additional Interview Questions for Experienced RN

-In your experience with orientating those new to thoracic surgery, what are their most common questions and concerns with respect to chest tube systems?

-How long does it take a nurse to be entirely comfortable with this type of care?

Appendix B3: HREA Screening Tool

	Question	Yes	No
1.	Is the project funded by, or being submitted to, a research funding agency for a research grant or award that requires research ethics review		**X**
2.	Are there any local policies which require this project to undergo review by a Research Ethics Board?		**X**
	IF YES to either of the above, the project should be submitted to a Research Ethics Board. **IF NO** to both questions, continue to complete the checklist.		□**X**
3.	Is the primary purpose of the project to contribute to the growing body of knowledge regarding health and/or health systems that are generally accessible through academic literature?	□	□**X**
4.	Is the project designed to answer a specific research question or to test an explicit hypothesis?	□	□**X**
5.	Does the project involve a comparison of multiple sites, control sites, and/or control groups?	□	□**X**
6.	Is the project design and methodology adequate to support generalizations that go beyond the particular population the sample is being drawn from?	□	□**X**
7.	Does the project impose any additional burdens on participants beyond what would be expected through a typically expected course of care or role expectations?	□	□**X**
LINE A: SUBTOTAL Questions 3 through 7 = (Count the # of Yes responses)		**0**	
8.	Are many of the participants in the project also likely to be among those who might potentially benefit from the result of the project as it proceeds?	**X**□	
9.	Is the project intended to define a best practice within your organization or practice?	**X**□	
10.	Would the project still be done at your site, even if there were no opportunity to publish the results or if the results might not be applicable anywhere else?	**X**□	
11.	Does the statement of purpose of the project refer explicitly to the features of a particular program, organization, or region, rather than using more general terminology such as rural vs. urban populations?	**X**□	
12.	Is the current project part of a continuous process of gathering or monitoring data within an organization?		**X**
LINE B: SUBTOTAL Questions 8 through 12 = (Count the # of Yes responses)		**4**	

Appendix B4: Interpretation of HREA Screening Tool

Using the HREA interpretation information below, the sum of line A was less than the sum of line B (0 < 4), indicating this is not a research project. This suggests there is no need for REB approval.

Interpretation:

- If the sum of Line A is greater than Line B, the most probable purpose is **research**. The project should be submitted to an REB.
- If the sum of Line B is greater than Line A, the most probable purpose is **quality/evaluation**. Proceed with locally relevant process for ethics review (may not necessarily involve an REB).
- If the sums are equal, seek a second opinion to further explore whether the project should be classified as Research or as Quality and Evaluation.

These guidelines are used at Memorial University of Newfoundland and were adapted from ALBERTA RESEARCH ETHICS COMMUNITY CONSENSUS INITIATIVE (ARECCI). Further information can be found at: http://www.hrea.ca/Ethics-Review-Required.aspx.

Appendix C

Caring for Clients Following Thoracic Surgery

A learning resource manual for nurses new to thoracic surgery.

Developed by ©Laura Malone, BNRN

Introduction

Who is this learning resource manual for?

Six East is the general/thoracic surgery unit at St. Clare's Mercy Hospital, a facility of Eastern Health. This manual is intended for use as a resource for nurses or nursing students who are new to caring for clients following thoracic surgery. It is also a useful resource for nurses who are unfamiliar or uncomfortable with assessing and caring for chest tube systems or those who have not done so in quite some time. Although this manual is intended for nurses, it may also be used by other members of the health care team who are interested in learning more about the care of thoracic surgery clients. This manual may also be used as a reference for nurses or nursing students on other units who are interested in learning more about thoracic surgery or have to care for a patient with a chest tube on another unit.

Reminder:

When caring for clients following thoracic surgery, you must follow the policies and guidelines of your employing agency!

Why is this manual important?

Taking on the roles and responsibilities of being a nursing student or new graduate nurse can be a challenging time! Many nursing students, new graduate nurses, or those transferring to thoracic surgery from other units feel overwhelmed in their new positions. Caring for thoracic surgery clients with chest tube systems is a very unique skill; you may not have cared for such clients during nursing school or to this point in your career. This manual provides basic information about the anatomy and physiology of the respiratory system and then introduces you to:

- various thoracic conditions and surgeries,
- what a chest tube system is and how it works, and
- how to care for and assess thoracic surgery clients.

How can this manual be used?

If you consider yourself a novice learner when it comes to thoracic surgery and chest tube systems, you may want to read this manual, at your own pace, from start to finish and complete the "test your knowledge" quiz at the end of each unit (answers can be found in Appendix "A"). If you have cared for thoracic surgery clients in the past, or currently care for thoracic surgery clients, you may use this manual as a reference on certain aspects of thoracic surgery care. If you are a Registered Nurse (RN) that preceptors students or orientates new graduate nurses, this manual can be used as a learning resource to be reviewed with your student.

Table of Contents

Chapter One:

Anatomy and Physiology of Human Lungs

Contents:

Learning Objectives:

Upon completion of Chapter One, you will be able to:

-identify the basic anatomy of the lung;

-define important structures within the lung;

-describe the breathing (inhalation/exhalation) process.

Section 1.1: Lung Anatomy

The lungs are part of the lower respiratory tract and function in two ways: air distribution and gas exchange (Thibodeau & Patton, 2007).
The lungs are protected by the ribcage and each individual has two: a left lung and a right lung. Each lung is further divided into sections called lobes (American Thoracic Society, 2015). As pictured below, the right lung has three lobes while the left has two (London Cancer Centre, 2015).

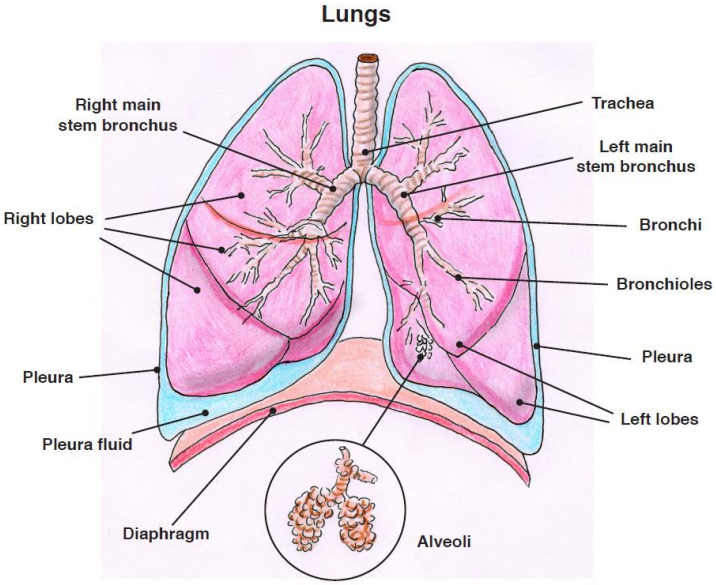

Figure 1: Lung Anatomy. From http://www.londoncancercentre.co.uk/cancer-types/lung/

Important Structures:

Trachea – commonly called the "windpipe" and allows air to enter the lungs from the outside (Black & Hawks, 2009).

Diaphragm – muscle that separates the lungs from the abdominal cavity; this structure plays an important role in the breathing process.

Pleurae – serous membranes that covers the lung in two layers; the potential space between these layers is known as the *pleural space* (Black & Hawks, 2009).

Bronchi – the bottom of the trachea divides into the left and right bronchi, which eventually branches into numerous alveoli (Thibodeau & Patton, 2007).

Alveoli – structures that assist with the exchange of carbon dioxide and oxygen (Thibodeau & Patton, 2007).

Did you know?

The right lung is bigger than the left. This is because the left lung shares space with the heart.

Section 1.2: Lung Physiology

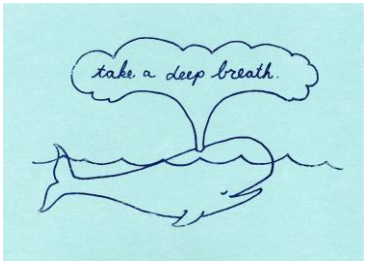

Figure 2: From http://www.cliparthut.com/

How do we breathe?

The average adult takes 12-18 breaths each minute. This involves the repetitive process of *inhalation* and *exhalation*.

Inhalation

When a person inhales (breathes in), the diaphragm contracts (pulls downward). The air pressure inside the thoracic cavity is then lowered in comparison to the air outside (due to an increase in space); thus, oxygen-rich air flows in through the nose and mouth, travels through the trachea and then the lungs, and the lungs expand (National Heart, Lung, and Blood Institute (NHLBI), 2012).

Exhalation

When a person exhales (breathes out), the diaphragm relaxes and moves upward. As the diaphragm relaxes, the thoracic cavity space decreases, increasing the air pressure inside the chest compared to the air outside. Carbon dioxide filled air is then forced out of the lung, through the trachea, and exits the body via the mouth and nose (NHLBI, 2012).

Figure 3: From http://www.discoversinging.co.uk

Section 1.3: Test Your Knowledge

1) Label the parts of the lung on the diagram below:

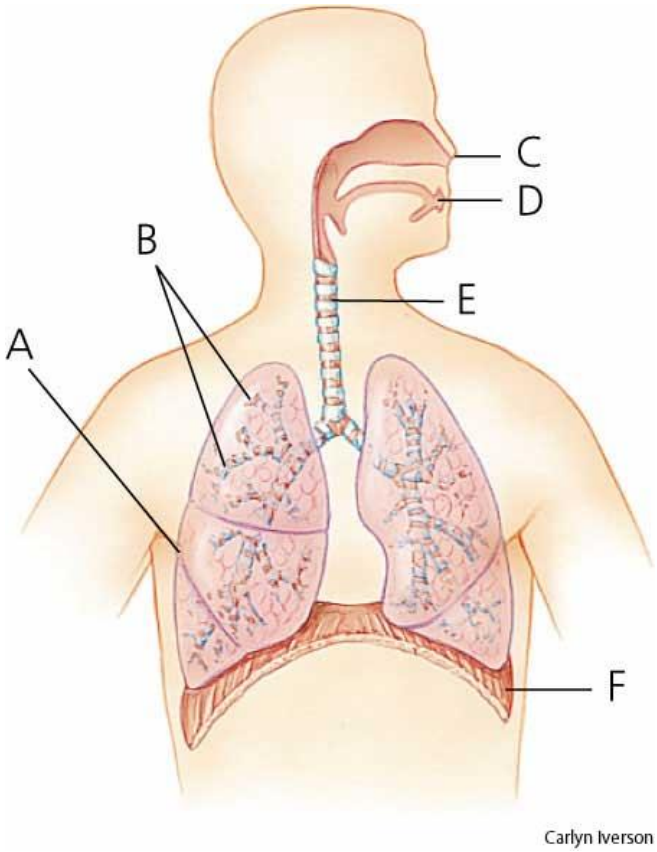

Figure 4: From http://www.yourdictionary.com/respiratory-system

2) True or False?

a. The right lung has two lobes. _____
b. The trachea is commonly known as the windpipe. _____
c. The bronchi are located at the top of the trachea. _____
d. When a person inhales, the diaphragm moves upward. _____
e. It is normal for a person to take 16 breaths in one minute. _____
f. During exhalation, carbon dioxide is forced out of the lung. _____

Chapter Two:

Caring for Thoracic Surgery Clients

Contents:

Learning Objectives:

Upon completion of Chapter Two, you will have a better understanding of:

-the impact a cancer diagnosis has on the patient and family;

-thoracic surgeries performed at St. Clare's Mercy Hospital;

-conditions of the lung that often require treatment with a chest tube.

Section 2.1: Impact of a Cancer Diagnosis

Cancers are a global issue and impact the health and well-being of many Canadians and their families.

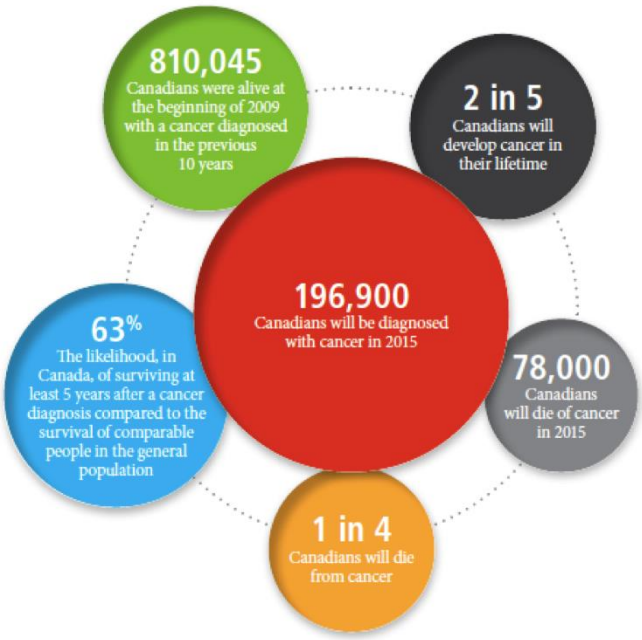

Figure 5: Canadian Statistics. From www.cancer.ca

Facts and Figures

Many patients who are diagnosed with lung and esophageal cancers are cared for on Six East. Approximately 25% of clients on Six East are admitted due to thoracic conditions.

-Lung cancer is among the five most commonly diagnosed cancers for both men and women; it is the most common cause of cancer death in Newfoundland and Labrador and worldwide (WHO, 2015; Canadian Cancer Society, 2015).

-Esophageal cancer is the sixth leading cause of cancer death worldwide (WHO, 2015).

-An estimated 72 Canadians are diagnosed with lung cancer daily (Canadian Cancer Society, 2015).

-Over 2000 Canadians are diagnosed with esophageal cancer each year (Canadian Cancer Society, 2015).

The Cancer Diagnosis

Cancer – we have all heard the word and dislike its implications for various reasons. As health care providers, it is not only important to understand the disease, but to understand its impact on the patient and their family.

*Receiving a cancer diagnosis can be an emotional, life-altering event; many patients experience worry and anxiety (Lehto, 2013; Hodgson, 2006). After diagnosis, a person's psychological and physical well-being can be impacted and they often feel ineffective in their daily lives (McCarthy & Dowling, 2009).

*Those requiring surgery as lung cancer treatment often experience a great deal of pain post-operatively and some experience symptoms of post-traumatic stress disorder following their ordeal (Kol, Erdogan, & Karsh, 2012; Jeantieu et al., 2014).

*Being diagnosed with cancer, being admitted to hospital, having surgery, coping with the possibility of death, and travelling from rural areas are all potential stressors (Parvan, Zamanzadeh, Lakdizaji, & Shaberstari, 2012; Canadian Institute for Health Information (CIHI), 2011).

Relational Aspects of Care

Provide care in an unhurried manner
– Patients often feel nurses are busy and rushed. Even when you are busy, it is important that patients feel you have time to care for their needs.

Listen and answer questions
-Encourage conversation with clients and family members. They may have questions and concerns about their diagnosis and care. Actively listen to what they have to say; make sure your patients and family members feel heard.

Be compassionate
-Provide skilled care with an understanding of what the patient is feeling. Exude *positivity*, provide *explanations*, be *encouraging*, and provide ***HOPE***.

Always provide safe, compassionate, competent, ethical care!

"Nurses engage in compassionate care through their speech and body language and through their efforts to understand and care about others' health-care needs" – Canadian Nurses Association, 2008, p. 8

Section 2.2: Thoracic Surgeries

Six East is the General/Thoracic Surgery unit at St. Clare's Mercy Hospital. On this unit, patients are cared for after various surgeries involving their lungs or esophagus. This section will give a short overview of several of these surgeries, all of which require chest tube insertion and care in the intra-operative and post-operative periods respectively.

Thoracotomy

-Often, thoracic surgeries require a thoracotomy incision. This type of incision cuts through the large muscles of the chest and gives the surgeon access to the chest cavity (Kol, Erdogan, & Karsh, 2012). Many surgeries for lung and esophageal cancer require a thoracotomy.

**It is important for all patients with a thoracotomy incision to be referred to physiotherapy! This will be discussed further in Chapter Five.*

Video-Assisted Thoracoscopic Surgery (VATS)

VATS is considered minimally invasive and is used to correct or explore various complications in the thoracic cavity. Small incisions are created (as opposed to a large thoracotomy incision) and a camera is used to visualize the field. Postoperatively, these patients may experience less pain, a shorter hospital stay, and fewer complications compared to open surgery using a thoracotomy (Brodsky & Cohen, 2000).

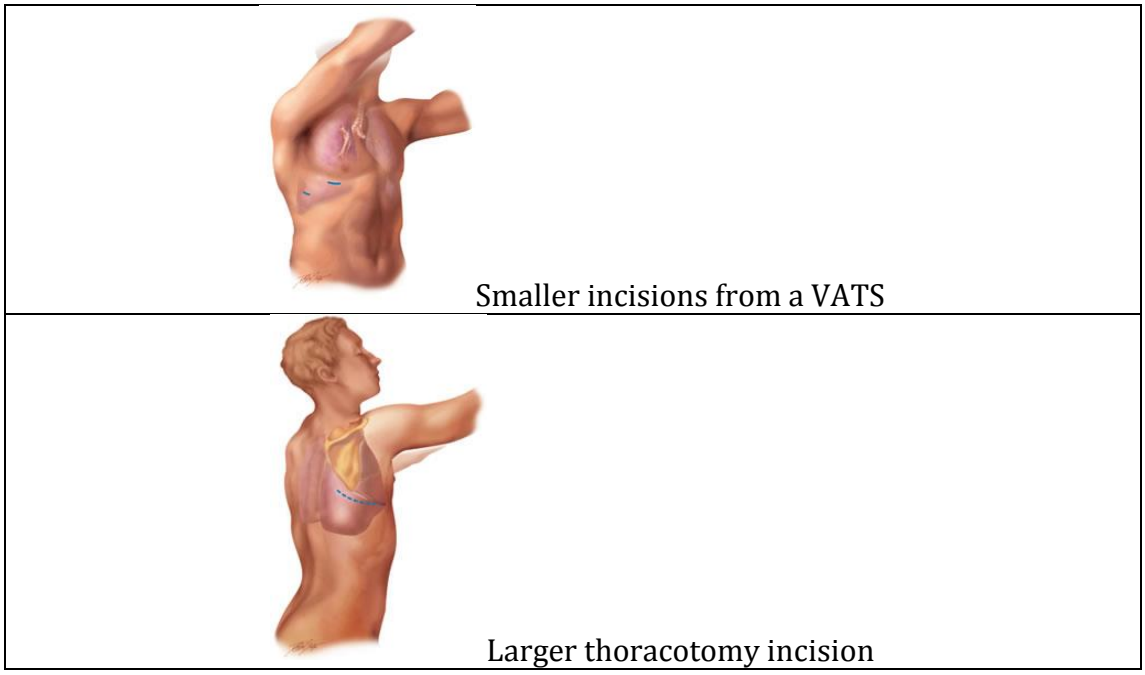

Figure 6: VATS versus Thoracotomy. From http://www.covidien.com/vatssurgery/pages.aspx?page=Benefits

Wedge Resection, Lobectomy, Pneumonectomy

These three surgeries are often performed to remove a tumour or treat non-small cell lung cancer. Post-operatively, these patients usually have an epidural for pain management and always have chest tubes (the care of these tubes will be discussed in Chapter Three).

A ***wedge resection*** (often done via VATS) removes the diseased section of one lobe of the lung. When a larger portion of the lung is removed without removing the entire lobe, this is often referred to as a *segment resection*. Postoperatively, these patients are cared for on Six East.

A ***lobectomy*** (often requiring a thoracotomy) removes an entire lobe of one lung. Post-operatively, these patients are cared for in the Special Care Unit (SCU) on Six East where they receive continuous oxygen saturation monitoring. A "lobectomy care map" is a guide used to care for these patients. This care map and a checklist guide used to assist with the intensive monitoring of these patients can be found in Appendices "B" and "C" of this manual. The surgery is titled depending on what lobe of lung is removed (for example, a left lower lobectomy is the removal of the lower lobe of the left lung).

When required, an entire lung (right or left) can be removed via a ***pneumonectomy*** (requiring a thoracotomy). Post-operatively, these patients are usually cared for in the Intensive Care Unit (ICU) initially and, when deemed ready by the surgeon, are transferred to the SCU on Six East.

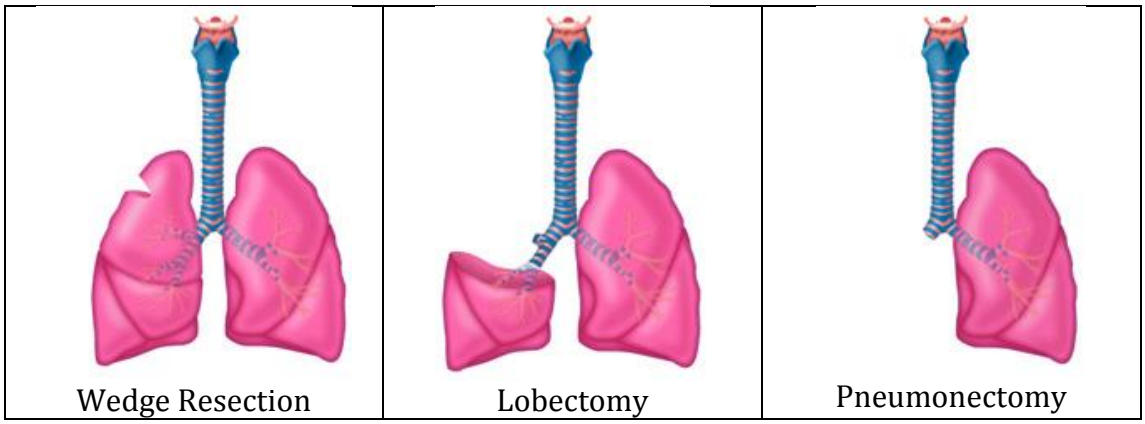

Figure 7: Lung Surgeries. From http://www.cts.usc.edu/lpg-typesoflungsurgery.html

Did You Know?

Pneumonectomy patients should be positioned on their operative side (the side without a lung). This prevents fluid from surrounding the remaining lung and allows it to function properly.

Esophagectomy

An esophagectomy is often done to treat cancers of the esophagus (the tube that food passes through to get to the stomach). Depending on how much of the esophagus is removed, the surgeon may perform a *partial esophagectomy* (removing a portion of the esophagus) or a *total esophagectomy* (removing the entire structure). Such surgical interventions for esophageal cancer are considered among the most demanding measures performed by surgeons and 83 percent of Canadian acute care hospitals do not perform them (CIHI, 2011). The surgery may require open incisions in the neck, chest, or abdomen depending on where the cancer exists (American Cancer Society, 2015).

Post-operatively, these patients often go to ICU before being transferred to the SCU on Six East. These patients are frequently fed via a jejunostomy tube (J-tube) to provide nutrition in the early post-operative period and to ensure the patient is able to receive proper nutrition in the event of swallowing difficulties (Srinathan et al., 2013). These patients will generally have an epidural for pain management and a chest tube. After an esophagectomy, a patient remains NPO until swallowing tests are performed and it is deemed suitable by their surgeon for them to eat.

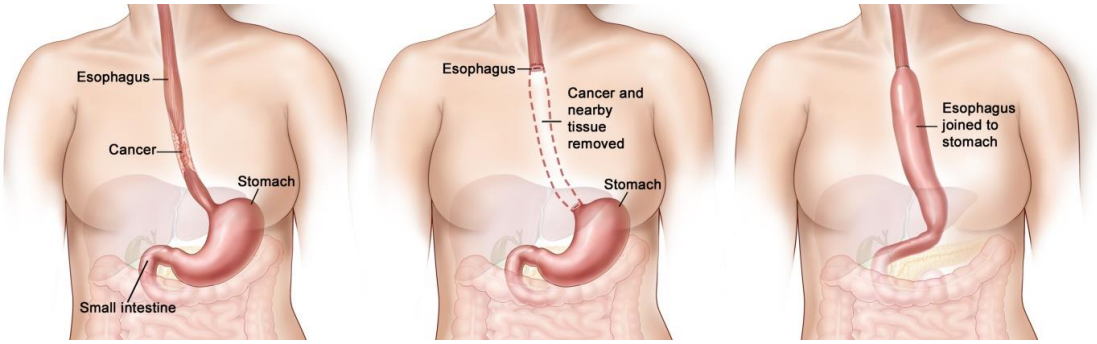

Figure 8: Esophagectomy. From http://www.randeepwadhawan.com/eesophagectomy-cancer-of-the-oesophagus/

Section 2.3: Thoracic Conditions Requiring Chest Tubes

In addition to lung and esophageal cancers, other patients are admitted to Six East for various thoracic conditions and often require treatment with a chest tube. A few of the most common conditions will be discussed here; however, this list is not comprehensive.

Pneumothorax – Commonly referred to as a "collapsed lung", a pneumothorax occurs when air builds up in the pleural space (between the lung and chest wall); this puts pressure on the lung and causes it to collapse. This can happen spontaneously or because of a trauma (Jarvis, 2008). Pneumothorax symptoms may include chest pain or shortness of breath (Longmore et al., 2010). A chest tube is commonly inserted to remove the air, which releases the pressure on the lung and allows it to expand normally once again.

Pleural Effusion – In comparison to a pneumothorax, a pleural effusion occurs when excess fluid collects in the pleural space. This may be classified as a hemothorax, empyema, chylothorax, or haemopneumothorax depending on the type of fluid. This fluid often settles into dependent areas of the thorax (Jarvis, 2008). Symptoms can include chest pain, shortness of breath, or a fever. In some cases, a chest tube can be inserted to assist with removal of the drainage.

Hemothorax – A collection of blood in the pleural space.

Empyema – A build up of purulent drainage (pus) in the pleural cavity.

Chylothorax – Chyle is a mixture of lymph fluid with fat that has a milky appearance. When this fluid collects in the pleural space it is known as a chylothorax. A chyle leak is an infrequent occurrence, but can be caused from lymphatic injury from trauma or chest, abdominal, or neck surgery (Smoke & DeLegge, 2008).

Haemopneumothorax – This occurs when there is a buildup of both blood and air in the pleural space.

Interesting Fact:

Young, tall, and thin males are the most likely individuals to have a spontaneous pneumothorax (Longmore, 2010).

Section 2.4: Test Your Knowledge

#1. Fill-in the missing boxes in the table below:

Term	Definition
a.	**A collection of blood in the pleural space**
b. Empyema	
c.	**A milky substance consisting of lymph and fat**
d. Haemopneumothorax	
e.	**The surgical removal of a portion of the esophagus**
f. Pneumonectomy	
g.	**The surgical removal of one lung lobe**

#2. True or False?

a. Surgical removal of the right middle lobe is known as a wedge resection. _____

b. After a right pneumonectomy, the patient should lie on their left side. _____

c. A pneumothorax is often referred to as a collapsed lung. _____

d. Lung cancer is the most common cause of cancer death in the world. _____

e. Being diagnosed with cancer can be a very stressful time for the patient. _____

f. Obese females are most likely to suffer from a pneumothorax. _____

g. Chest pain is a potential symptom of a pneumothorax. _____

h. Removal of the entire esophagus is known as a partial esophagectomy. _____

Chapter Three:

Chest Tube Systems

Contents:

Learning Objectives:

Upon completion of Chapter Three, you will have a better understanding of:

-what a chest tube is;

-the different components of the atrium express dry seal chest tube;

-the pneumostat chest drain valve and its use.

Section 3.1: What is a Chest Tube?

Many nurses who are new to thoracic surgery do not feel comfortable caring for patients with chest tubes. After reading this chapter, you will be more familiar with what a chest tube is and its various components.

Chest tubes are often inserted intra-operatively; however, in emergency situations, the physician may decide to insert it at the bedside.

When unwanted air or fluid builds up in the pleural cavity, a chest tube can be inserted to remove it. A chest tube is a flexible, one-way, hollow drain and, once inserted between the ribs, drains the excess fluid or air and allows the lung to expand normally once again (Sullivan, 2008). Using suction, a negative pressure is created in the chest cavity, which allows for the needed drainage of air and fluid.

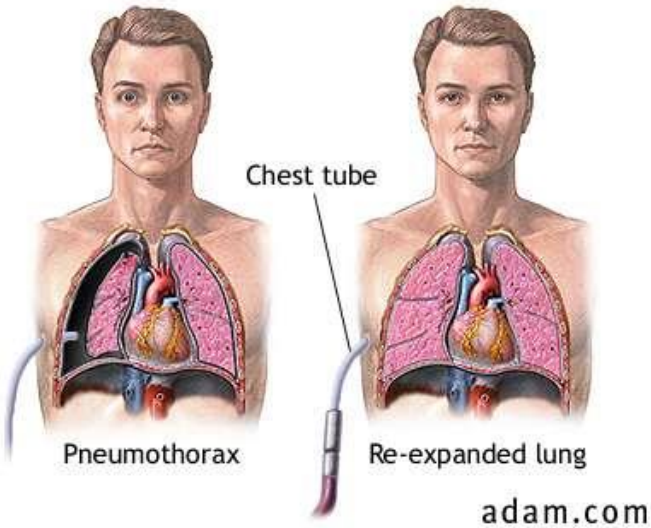

Figure 9: Chest tube. From http://www.aci.health.nsw.gov.au

It is difficult to estimate how long a patient will need their chest tube. The drain is left in place as long as the fluid or air remains in the pleural space. Post-operatively, the chest tube is left in place (generally for several days) and drainage is monitored. In all cases, the patient has chest x-rays as ordered by their physician. The physician views these x-rays, looking for improvement, and will remove the chest tube when they are comfortable with the image and the patient's status.

Did You Know?

The concept of draining pleural fluid was first practiced in the time of Hippocrates using incision, cautery, and metal rods (Cerfolio & Bryant, 2010).

Section 3.2: Express Dry Seal (Chest Tube)

There are many variations of chest tube systems and brand names. Six East uses the Atrium Express Dry Suction Dry Seal Drain pictured below.

Figure 10: Chest tube. From http://www.atriummed.com/en/chest_drainage/express.asp

This chest tube is considered a "dry seal" as it does not require water to operate as some chest tubes do; thus, this system is not as sensitive to position if it is tipped (Maquet, 2015).

Sampling Pleural Fluid

At times, the physician may request a sample of the pleural fluid be taken from the chest tube. There is a needleless luer port on the patient tube connector to assist with this task. Simply cleanse the luer port with an alcohol swab, connect a syringe to the luer port, and withdraw the sample. Then, send the fluid for testing as per hospital policy and as ordered by the physician.

Parts of the Chest Tube System (As labeled on the diagram on page 106)

A – This is the **dry suction regulator** and can change the suction level from -10 cm H_2O suction to -40 cm H_2O. Suction level can be changed using a dial next to the control on the right side of the system. This allows for the rate of drainage of air or fluid to be altered (Maquet, 2015).

B – This is the **vacuum indicator**. When a check mark is present in the circle, vacuum is present. When there is no check mark, the system is functioning at gravity (Atrium Medical, 2011).

C – The feature on the bottom right of the system functions as the **air leak monitor.** When the system is set up initially, 30 mls of pre-packaged water is placed into a port on the back of the system. Once inside the system, the water is blue in colour, allowing for visibility. The air leak monitor is divided into five chambers (with one on the right, and five on the left (when facing the system)). When the water bubbles within these chambers it indicates an air leak; in turn, no bubbling indicates there is no air leak. The degree of the air leak is evident by how far the bubbling can be seen from right to left (bubbling may just be in the first chamber, or in all chambers). An air leak may be persistent or intermittent.

D – This is the **fluid collection chamber**; this system can hold over two litres of fluid before it needs to be changed. This allows the health care provider to measure the amount of drainage accumulating over any particular period of time.

E – This is the **suction monitor bellows** indicator. When this orange bar is all the way left (completely flat) it indicates that the tube is not connected to wall suction. On the other hand, when the orange bar is all the way right, it indicates the suction is functioning properly.

Not labeled on this diagram but important to note is the tubing extending from the left side of the system. This is the tubing that connects the chest tube system to the drain inserted into the patient's chest. As well, on the top right of the chest tube system there is a small, white port. Tubing connects from this port to wall suction to create the vacuum.
Note: Wall suction should be set at -80 mmHg or higher (Maquet, 2015). It is also important to ensure the wall suction regulator is turned on!

Figure 11: Wall suction regulator. From http://www.callpsifirst.com/gauges.htm

Section 3.3: Pneumostat

At times, patients will be connected to a pneumostat chest drain valve. This allows the patient to be ambulatory as it does not require wall suction. Patients can sometimes be discharged to home with a pneumostat when it is required for a long period of time.

*The pneumostat chest drain is used **only to remove air** from the chest cavity; it is **never** used as a fluid collection device (Atrium, 2015)!*

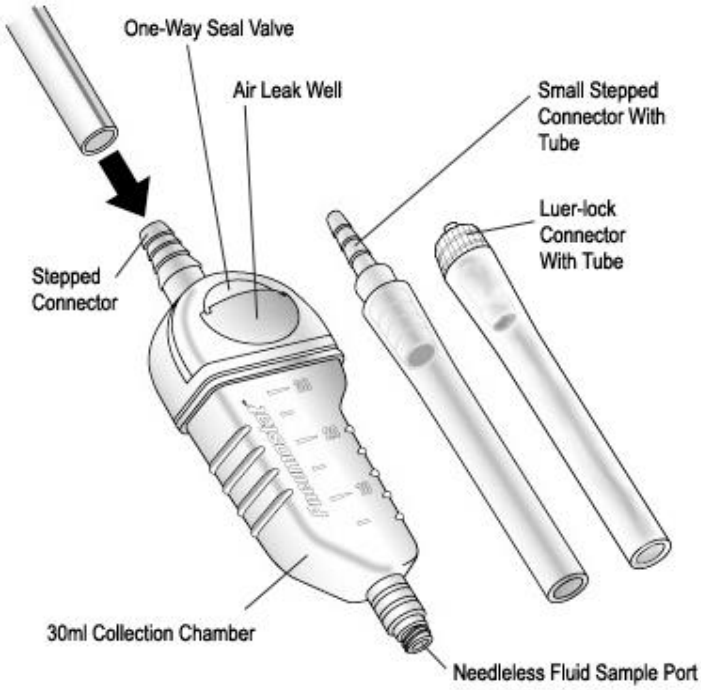

Figure 12: Pneumostat. From https://www4.mdanderson.org/pe/index.cfm?pageName=opendoc&docid=51

To test for an air leak with the pneumostat, add one ml of water to the air leak well pictured above. If there is no bubbling, there is no air leak; if there is bubbling, an air leak exists. Water should be removed when assessment is complete.

The pneumostat can hold 30 ml of fluid. To remove fluid from the system or to take a fluid sample, connect a syringe to the needleless sample port at the bottom of the system and withdraw the fluid. This fluid can be sent as a sample or discarded as per hospital policy.

This system has a one-way valve; this allows air to exit the pleural space and does not allow air to re-enter on inspiration.

Section 3.4: Test Your Knowledge

#1. Draw arrow toward and label the **dry suction control, air leak monitor, fluid collection chamber, needleless luer port, and tubing that connects to the patient** on the diagram below:

Figure 13: Chest tube. From http://www.atriummed.com/en/chest_drainage/express.asp

#2. True or False?

a. The pneumostat is used to drain large amounts of fluid. _____

b. It is difficult to estimate how long a chest tube will stay in place. _____

c. A needle is required to take a fluid sample from a chest tube. _____

d. Wall suction should be set -80 mmHg or higher for the atrium express. _____

e. 3 ml of water is needed to test for an air leak in a pneumostat. _____

f. Both the pneumostat and atrium express have a one-way valve. _____

Chapter Four:

Assessing Clients Following Thoracic Surgery

Contents:

Learning Objectives:

Upon completion of Chapter Four, you will have a better understanding of:

-how to properly assess a thoracic surgery patient;

-how to assess a chest tube system;

-how to trouble-shoot when issues arise with a chest tube system.

Section 4.1: Patient Assessment

It is critical for the RN to thoroughly assess thoracic surgery clients at the beginning and throughout the shift. This includes vital signs, a head to toe physical assessment, and a proper respiratory assessment. Always explain to the patient and family what you are doing and why!

According to Eastern Health Policy (2012), *the patient's breath sounds (respiratory rate and pattern), vital signs (including oxygen saturation), level of consciousness, anxiety level, and pain, must be assessed every four hours for patients with a chest tube.*

Figure 14: Retrieved from http://www.pastudentessentials.com/vital-signs/

Note: If a patient has a chest tube, they must be accompanied by a RN at all times for off-unit activities!

Inspection - It is important to inspect the patient and assess their rate and depth of respirations. The RN must look for changes in respiratory status and ensure the patient is not experiencing any distress. The RN should ask the patient (or observe) if they have a cough (and whether or not it's productive) and if they are experiencing any shortness of breath or pain during respirations (Jarvis, 2008). **Observe:** Is the patient using their accessory muscles for breathing? This may be an indication of respiratory distress!

Auscultation – Breath sounds must be auscultated on the anterior and posterior chest. Does the patient have good air entry into each lung lobe? Do you hear any adventitious sounds? Decreased, absent, or adventitious breath sounds may indicate a number of complications and the physician should be notified.

Note: When caring for thoracic surgery patients it is important to consider fluid balance. Excess fluid can put extra strain on the lungs and cause respiratory distress. In such cases, the physician may order furosemide (a diuretic) to decrease the fluid and restore fluid balance.

Did You Know?

When a patient coughs up blood, this is known as ***hemoptysis.***

Section 4.2: Chest Tube Assessment

When caring for thoracic surgery patients, physical assessment is essential; however, it is also important to thoroughly assess the chest tube system and insertion site. Once again, remember to put the patient and family at ease by explaining your actions!

According to Eastern Health Policy (2012), *the nurse should assess the chest tube system every four hours. This involves palpating for subcutaneous emphysema, assessing the chest tube dressing, assessing the drainage (colour, amount, and consistency), checking for airtight connections, assessing for air leaks, and ensuring correct suction levels.*
**For the complete Eastern Health policy regarding chest tubes, please see Appendix "D" in this manual.*

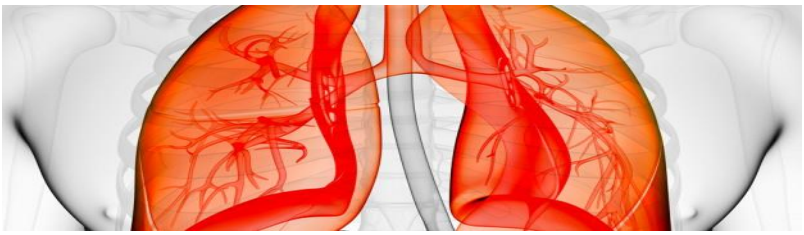

Figure 15: Retrieved from http://www.americannursetoday.com

Important Notes:

***A pleural chest tube should NEVER be "milked" or "stripped". This involves compressing and releasing the tubing from patient to system to express drainage; these maneuvers can manipulate system pressure and does little to help keep the tube patent (Bauman & Handley, 2011).**

***Two toothless chest tube clamps should be kept at the patient's beside at all times and brought with the patient if they leave the unit. The chest tube should only be clamped: to check for air leaks, change the drainage system, if the chest tube accidentally becomes disconnected from the system, or if ordered by a physician (Coffey-Hickey & Downey, 2012).**

***Tubing should be checked for kinks and dependent loops that may hinder suction and drainage. Ensure the patient is not lying on the tubing.**

Did You Know?

The chest tube system should always be in an upright position and rest at a lower level than the insertion site.

Subcutaneous Emphysema

Subcutaneous emphysema occurs when air enters the subcutaneous space of the chest wall and then disperses into the soft tissue of the shoulders, arms, upper chest, neck, or face (Cerfolio, Bryant, & Maniscalco, 2008). As indicated in Eastern Health policy (2012), nurses should assess for subcutaneous emphysema by palpating the soft tissue in these areas (starting near the chest tube site). Subcutaneous emphysema can be distressing for patients and their families as, at times, the eyelids may swell and the patient may not be able to see. If subcutaneous emphysema is severe in the neck it can obstruct the airway and cause patient distress. If a patient has increasing amounts of subcutaneous emphysema the physician should be notified.

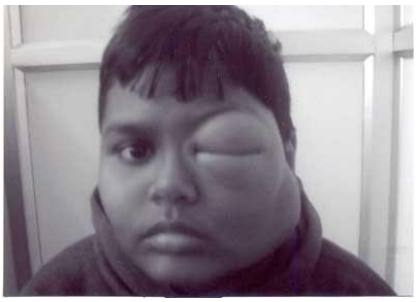

Figure 16: Subcutaneous emphysema. From http://www.indianpediatrics.net/jan2008/jan-58-60.htm

Air Leak

In Chapter Three the air leak monitor on the chest tube system was discussed. To assess for an air leak, tell the patient/family what you are about to do and ask the patient to cough. Bubbling in the chambers of this air leak monitor indicates an air leak is present and how severe the air leak is. If an air leak develops, it is important to look for the cause by starting from the patient and working your way down to the system. First, ensure the chest tube dressing is intact and occlusive and ensure all your connections are secure. Then, begin clamping the tubing (with two clamps), starting closest to the patient and working your way down to the system (it is okay to use toothless clamps for this reason for a very short period of time (less than one minute)). If the bubbling stops when tubing is clamped close to the chest wall, the air leak is inside the chest or at the insertion site. If the bubbling continues, keep moving the clamps further down the tubing until the system is reached; then, if the bubbling continues, there may be a problem with the chest tube system and a system change may be indicated (Perry & Potter, 2006). Sometimes bubbling in the system may persist; ensure the physician is aware and continue to monitor for changes.

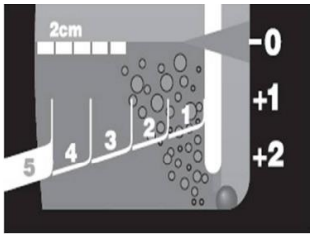

Figure 17: Bubbling. From http://regionstraumapro.com/post/52946244341

Tidaling or Fluctuation

In the first several days after a chest tube is inserted, tidaling is expected upon expiration. This is assessed by watching the system while the patient breathes deeply or coughs; tidaling is present if the fluid in the tubing moves back and forth or there is movement of the tiny ball to the right of the air leak monitor (refer to Figure 10 in Chapter Three). After two to three days, tidaling should begin to decrease and eventually stop; this indicates that the lung has expanded once again (Potter & Perry, 2006).

Drainage

It is important to assess both the amount and type of drainage in the chest tube system and document these findings on the patient's intake and output record. On Six East, at the end of every shift the RN uses a pen and puts a mark at the top of the current drainage and writes the date and time; in this manner, it is known how much drainage the patient is excreting per shift. The physician should be notified if the drainage (particularly bloody drainage) exceeds 100 ml/hour (Potter & Perry, 2006). If drainage increases very quickly the physician should also be notified at that time.

Ten questions to think about when assessing a chest tube system:

-Are there toothless clamps at the bedside?
-Is the suction set to the correct level on the dry suction regulator?
-Is the suction monitor bellow in the correct position (expanded for suction, deflated for atmospheric pressure (gravity))?
-Is the system upright and positioned below the level of the insertion site?
-Are there any unwanted kinks or dependent loops in the tubing?
-Is the patient's dressing dry, intact, and occlusive?
-Does the patient have any subcutaneous emphysema? If so, where?
-Is there tidaling present with the patient deep breathes or coughs?
-Is there an air leak? If so, why?
-Is the chest tube draining? If so, how much and what type of fluid?

**The chest tube assessment discussed in Section 4.2 pertains to the atrium express dry seal system. To assess a pneumostat, it is important to assess the dressing, subcutaneous emphysema, drainage, and air leak (as discussed in Section 3.2).*

Important Note:

Chest tube suction must not be disconnected unless this is okay with the physician. Often the physician will write, "May vent to ambulate". Once this order is written, the suction may be disconnected for the patient to ambulate in the hallway or go to the washroom. It is important to then remember to reconnect the suction!

Section 4.3: Potential Patient Complications

There are several additional complications thoracic surgery patients sometimes face. A few of these complications will be discussed in this section.

Atrial Fibrillation

Atrial fibrillation is a heart arrhythmia characterized by a fast and irregular heart rhythm (Longmore et al., 2010). This can occur in 12-44% of patients in the post-operative period after having lung or esophageal surgery (Fernando et al., 2011). Thus, it is important to manually palpate the pulse of thoracic surgery patients to assess for irregular heart rate or tachycardia. If the RN suspects atrial fibrillation, the physician should be made aware. A patient with atrial fibrillation may require telemetry to monitor their heart activity or require various medications to control their heart rate and rhythm.

Tension Pneumothorax

A tension pneumothorax occurs "when air is trapped in the pleural space during inspiration and cannot escape during expiration" (Black & Hawks, 2009, p. 1660). This can happen, for example, if a chest tube falls out and a tight dressing is placed over the opening or if a chest tube system becomes accidentally disconnected and chest tube is clamped for too long. This can cause a positive pressure to build up in the pleural space and cause the lung to completely collapse. If not treated, this can be a fatal complication. If a tension pneumothorax is suspected or the patient experiences acute respiratory distress or chest pain, the physician should be contacted immediately.
**If the chest tube falls out, this complication may be avoided by placing a dressing on the site but only securing it on three sides.*

Deep Vein Thrombosis (DVT)

A deep vein thrombosis occurs when a blood clot forms in a deep vein (often in a leg). This sometimes happens in patients with cancer, hospitalized patients, or post-operative patients. Sometimes, these blood clots can pass to the lungs; this is known as a pulmonary embolism and is very dangerous. To prevent DVT, certain patients may be ordered TEDs and sequential compression devices. It is also important that all post-operative patients are ordered an anticoagulant (enoxaparin, for example). If a patient is not ordered an anticoagulant, it is appropriate to ask the physician if one would be beneficial.
**Remember, if the patient has an epidural in place, the RN must verify with the anesthesiologist that it is okay to give enoxaparin.*

Section 4.4: Test Your Knowledge

#1. Identify the correct term:

a. An irregular heartbeat often noticed in the post-operative period. _____

b. A complication caused by air leaking into the soft tissue. _____

c. A blood clot in a patient's lung. _____

d. Coughing up bloody sputum. _____

e. A potentially fatal complication when air becomes trapped in the pleural space and cannot escape. _____

#2. True or False

a. Enoxaparin is often given to prevent DVTs. _____

b. If a patient has a chest tube, one clamp must be kept at the bedside. _____

c. If a patient has a chest tube, they may leave the unit alone. _____

d. If a patient has a chest tube, their vitals signs must be checked at least every four hours. _____

e. A tension pneumothorax is not dangerous. _____

f. The chest tube system should be kept below the chest tube insertion site. _____

g. Tidaling (or fluctuation) in the chest tube can be normal. _____

Chapter Five:

Pain Management & Dressing Changes

Contents:

Learning Objectives:

Upon completion of Chapter Five, you will have a better understanding of:

-the importance of pain management for thoracic surgery clients;

-how to properly care for chest tube insertion site dressings.

Section 5.1: Pain Management

When caring for any patient it is important to ensure their pain is properly managed in the post-operative period. When patients undergo a thoracotomy, a long incision is made through large chest muscles; this is often considered to be the cause of the most severe type of post-operative pain (Kol, Erdogan, & Karsh, 2011). Patients with a chest tube who did not have surgery may still experience pain as a large bore tube has been inserted through their chest wall and is sutured in place. It is important to ask patients about the pain they are experiencing every four hours and treat them accordingly. It is useful to ask the patient to rate their pain on a scale of zero to ten, with zero being no pain and ten being the worst pain they have ever experienced.

Epidural

After a thoracotomy, patients often have an epidural catheter in place and are assessed daily by an anesthesiologist while this is in place. During this time, the patient is on "epidural protocol" and must be assessed by a RN hourly. A copy of the hourly assessment record can be found in Appendix "E" of this manual. Even with an epidural, the patient may still require additional pain medication. The anesthesiologist will order additional medications such as morphine, ketorolac, or acetaminophen on an as needed basis. After the epidural is removed and the protocol has ended, the surgery team must then order pain medication as needed for the patient.

NOTE: While a patient is on epidural protocol, all pain medication must be ordered or agreed with by the anesthesiologist!

Why is pain management important?

-Post-operatively, thoracic surgery patients need to be able to ambulate, breathe deeply, and cough. To sufficiently complete these tasks, the patient's pain needs to be controlled! Early and frequent ambulation helps prevent DVT and, without deep breathing and coughing, the patient's respiratory status is compromised, atelectasis may develop, and sputum cannot be excreted (Kol et al., 2011; Yin, Tse, & Wong, 2011).

-Some research shows that lack of pain control after a thoracotomy (in the post-operative period) can be associated with chronic pain issues after discharge from hospital (Gottschalk & Ochroch, 2008).

Every patient experiences pain differently.

Knowing and communicating with your patients is key in understanding their experience and properly managing their pain!

Section 5.2: Dressing Changes

Chest tubes are usually sutured into place upon insertion and are always covered with an occlusive dressing. Chest tube dressings are generally changed every 48 hours or when soiled.

Figure 18: Chest tube dressing. From http://downloads.lww.com/wolterskluwer_vitalstream_com/sample-content/9780781788786_Craven/samples/mod09/topic12a/text.html

The site should be cleansed and dried as per sterile technique and agency policy. Depending on the preference of the attending physician, a petroleum dressing (jelonet) is often wrapped around the tube at the insertion site (as per Eastern Health policy). Then, sterile drain sponges are placed around the tube and covered with sterile gauze (and often an abdominal pad, depending on the amount of drainage). The dressing is then firmly secured by placing hypafix (tape) over the dressing in an occlusive manner.

Important Note:

Remember, both the incisional site and chest tube insertion site are potential sites of infection!

Figure 19: Chest tube insertion site. From https://commons.wikimedia.org/wiki/File:VATS_03.jpg

Chapter Six:

Supportive Roles

Contents:

Learning Objectives:

Upon completion of Chapter Six, you will have a better understanding of:

-the role of the physiotherapist in thoracic surgery;

-the role of the RN in chest tube insertion and removal;

-roles and responsibilities of the interprofessional team.

Section 6.1: Physiotherapy

The physiotherapist has an extremely important role in the care of thoracic surgery clients, especially after a thoracotomy or lobectomy. The RN must collaborate with the physiotherapist to devise a holistic plan for patient care.

Figure 20: Physiotherapy. From http://leslieinvancan.blogspot.ca/2013/12/w-is-for-walking.html

Physiotherapists work to decrease pulmonary complications that can negatively impact the patient in the post-operative period; without this care, hospital stay and morbidity may be increased (Reeve, 2008).

The physiotherapist teaches. The physiotherapist educates patients about the importance of deep breathing, coughing, and ambulating after their surgery and practices these techniques with them.

The physiotherapist mobilizes. The physiotherapist encourages patients to ambulate early and frequently and assists them with doing so. The physiotherapist may ask for the help of the RN when mobilizing a patient or assisting them out of bed. It is the RNs responsibility, in collaboration with the physiotherapist, to ensure patients are ambulating.

The physiotherapist assesses. When needed, the physiotherapist will assess patient mobility and decide upon ambulatory aids.

The physiotherapist performs "chest physiotherapy". Chest physiotherapy assists with regaining adequate pulmonary function and muscle strength (Makhabah, Martino, & Ambrosino, 2013).

The importance of collaboration between members of the interprofessional team cannot be overemphasized! The RN must support the physiotherapist, encourage clients and families to participate in ambulation and care, and recognize when the physiotherapist should be consulted!

Section 6.2: Chest Tube Insertion/Removal

Chest tube insertion and removal are considered advanced skills. On Six East, the RN assists with the insertion or removal of the chest tube as needed.

RN Responsibilities

-The RN may be asked to gather supplies for insertion or removal.

-Position the patient so the site is accessible and the arm is out of the way.

-After insertion, the RN may need to connect the chest tube to the system and dress the site.

-Ensure the patient is medicated for pain.

Supplies

For chest tube insertion, the physician may require:
-chest tube insertion tray
-chest tube/chest tube clamps
-sterile gloves
-needles/syringes
-sutures
-local anaesthetic
-antiseptic solution
-chest tube drainage system
-dressings
-suction supplies

For chest tube removal, the physician may require:
-suture removal kit
-petroleum gauze
-dressings
-biohazard disposal bag

*Certain aspects of the supply list need to be verified with the physician (for example, what size sterile gloves or what size chest tube).

REMEMBER:

The patient and family will need both information and emotional support during these procedures. Patients are often frightened; they may need reassurance or a hand to hold!

Section 6.3: Interprofessional Team

There are many members of the health care team and their roles are all important. As each client is unique, various interprofessional team members may need to be consulted depending on the circumstances. It's important to know who to call and when!

Unfortunately, there are times when thoracic surgery clients experience respiratory distress. When this occurs, it is appropriate to page the ***respiratory therapist*** and request their assistance. They will help you assess the client's respiratory status and ensure their oxygen is properly titrated.

As esophagectomy clients require J-tube feeds, they will need to be seen by the ***dietician***. The dietician will ensure the patient's nutritional needs are being met; they will assess them and recommend the type of feed and the rate at which it should be administered.

If the patient's functional ability changes during their hospital stay, the ***occupational therapist*** may need to assess them. They may be consulted to determine if the patient needs additional equipment upon discharge.

For various reasons, the RN may wish to consult the ***social worker*** to visit the client. Many thoracic surgery clients and their families travel across the province and have no accommodations in St. John's. They may have questions about their financial situation or may need assistance via homecare after discharge; a social work consult would be appropriate in these situations.

If the client is experiencing emotional distress and the RN feels it would be beneficial, the ***mental health nurse*** may be consulted. They can discuss the client's situation with them and provide support as needed.

Many clients having surgery for malignancies are requiring enoxaparin injections upon discharge home. The ***social work assistant*** should be consulted for these patients to assist with obtaining financial coverage for this medication.

Remember, you are not alone! If you are unsure who to consult or how to do so, ASK! Any member of the interprofessional team will assist you!

In Case of Emergency

Sometimes, emergency situations happen. If your patient is experiencing a respiratory or cardiac arrest:

-Pick up the phone and dial "2000"

-Report the Code Blue

-Follow the Code Blue procedure until help arrives

Section 6.4: Test Your Knowledge

This section will cover Chapters Five and Six

#1. Identify the member of the health care team that should be consulted in each situation:

a. The physician requests a patient be started on J-tube feeds. _____

b. The patient is experiencing shortness of breath and sub-par oxygen saturation. _____

c. The patient is requiring enoxaparin injections after discharge. _____

d. A patient's family member is requesting home care upon discharge. _____

e. The patient needs additional equipment to ensure their home is safe. _____

f. The RN is unsure of how to mobilize the patient. _____

#2. A physician asks you to assist them with inserting a chest tube. Make a list of some supplies you might need to bring.

_____
_____
_____
_____

#3. True or False

a. A patient with an epidural needs to be checked on every two hours. _____

b. Dressings around a chest tube insertion site should be occlusive. _____

c. The physiotherapist is the only person responsible for patient mobilization. _____

d. If you witness a code blue, you should dial "2000". _____

e. Chest tube removal is an advanced skill. _____

f. If a patient has an epidural, they should not require any additional pain medication. _____

Chapter Seven:

Additional Resources & Case Studies

Contents:

Learning Objectives:

Chapter Seven exists to present different online resources available for thoracic surgery nurses. It also gives the opportunity to test your newly obtained knowledge by completing case studies regarding care of thoracic surgery clients.

Section 7.1: Additional Resources

Thoracic surgery and chest tube care is an interesting and complex field. By completing this learning resource manual you will have learned some information and assessment techniques to get you started in caring for thoracic surgery clients. However, the learning process does not end here! It is important to continue gaining new and updated knowledge in the field.

Here are the links to some additional references that may be useful to you or your patients:

The Lung Association
www.lung.ca

Canadian Cancer Society
www.cancer.ca

World Health Organization
http://www.who.int/mediacentre/factsheets/fs297/en/

Atrium
www.atriummed.com

University Health Network: Going Home with a Pneumostat
http://www.uhn.ca/PatientsFamilies/Health_Information/Health_Topics/Documents/Going_Home_with_a_Pneumostat_Chest_Drain_Valve.pdf

Remember: When caring for your clients, you must follow the best practices and guidelines set out for you in Eastern Health Policy. It is important to read and understand these policies and utilize them as your standard of practice.

Section 7.2: Case Studies

Case Study #1

Ms. Smith (62 years old) is currently post-operative day one following a left lower lobectomy (as a treatment for lung cancer). Her vital signs have been stable, but this morning her nurse has noticed her heart rate is elevated (130 beats/min) and irregular on palpation. Ms. Smith states she is feeling tired this morning and does not feel like participating with the physiotherapist. Her epidural is running at 4 ml/hour but she is rating her pain as 8/10 and grimaces when she moves in her bed.

#1. How should the RN respond to Ms. Smith's elevated and irregular heart rate?

a) No response – it's probably nothing.
b) Monitor it throughout the day – 130 beats/min isn't too high
c) Notify the physician – Ms. Smith could have atrial fibrillation
d) Call a code blue

#2. How should the RN respond when Ms. Smith says she is too tired to participate with physio?

a) Do not comment. She has probably had a difficult night.
b) Explain the importance of physiotherapy and encourage her to participate.
c) Tell her if she doesn't participate you will notify her physician.
d) Quietly tell the physiotherapist Ms. Smith is an uncooperative patient.

#3. Is Ms. Smith's pain currently under control?

a) No. She may require a breakthrough pain medication
b) Yes. 8/10 is a good pain scale rating.
c) Yes. Her epidural alone should provide enough medication.
d) No. But her epidural is already at a high rate so no further medication is needed.

#4. A day later, Ms. Smith coughs up some bloody sputum. This is called:

a) empyema
b) DVT
c) pleural effusion
d) hemoptysis

#5. The attending physician decided Ms. Smith should receive enoxaparin (lovenox) injections for a month after discharge. What should the nurse do?

a) Tell Ms. Smith that the community health nurse will give the injections.
b) Teach Ms. Smith and her family how to give lovenox and watch them give the injection.
c) Consult the social work assistant to ensure the medication is covered.
d) Both B and C.

Case Study #2

Mark, a 19 year old tall, thin man, presents to the emergency room (ER) with chest pain and shortness of breath. A physician in the ER inserts a large bore chest tube and Mark was admitted to the thoracic surgery unit. The order states "Chest tube to -20 cm H2O suction".

#1. What is the most likely cause of Mark's symptoms?
a) myocardial infarction
b) muscle pain
c) spontaneous pneumothorax
d) influenza

#2. Upon arriving to the unit, the RN notices Mark's chest tube dressing has fallen off. She/he should:
a) Inspect the site and reapply a new dressing.
b) Leave the dressing off – he doesn't need it.
c) Find the old dressing and reapply it.
d) Tape the tube in place until there is more time to fix the dressing.

#3. Later that day, the RN notices the suction monitor bellow (orange bar) is flat. What should he/she do?
a) Nothing. This means the suction is working.
b) Assess the system as the suction is not working.
c) Immediately notify the physician.
d) Ask the patient why the orange bar is flat.

#4. A few days later, Mark's physician orders the chest tube to gravity. A porter arrives to take Mark off the unit for a chest x-ray. The RN should:
a) Allow him to leave the unit with a Personal Care Attendant and porter.
b) Allow Mark to leave with the porter, but ensure the porter has clamps.
c) Accompany Mark and bring clamps.
d) Tell the porter Mark can't leave and get a portable x-ray.

#5. The physician is planning to remove Mark's chest tube. What is the RN's role?
a) Offer Mark some pain medication.
b) Assist the physician with gathering supplies.
c) Help the physician position Mark appropriately.
d) All of the above.

#6. Upon discharge, Mark states he does not understand his medical condition. The nurse should:
a) Tell him not to worry about it. It probably won't happen again.
b) Call the physician to give an explanation
c) Get angry with Mark for not asking questions earlier.
d) Sit down with Mark and take a few moments to talk with Mark and his family.

Case Study #3

Mr. Warren is a 77 year old gentleman who lives alone. He has three sons who all live out of province. Mr. Warren was recently diagnosed with lung cancer and has undergone a wedge resection of his right lung. It is currently post-operative day two and all his vital signs have been stable. He has a chest tube at -20 cm H2O suction.

#1. Mr. Warren suddenly develops rapid, continuous bubbling in his air leak monitor. What should the nurse do?
a) Leave the tubing for one hour and see if it resolves.
b) Ensure his dressing is occlusive and check the system for an air leak.
c) Nothing. Sudden rapid bubbling is normal.
d) Immediately change the chest tube system.

#2. The nurse finds Mr. Warren to be tearful and asks if he is okay. Mr. Warren states he thinks he will need help as his house is large and he having difficulty caring for himself. What can the nurse do?
a) Tell him everything will be okay.
b) Allow Mr. Warren to talk about his feelings and offer him a social work consult to discuss home supports.
c) Request a social work consult without telling Mr. Warren.
d) Walk out of the room, as he may need some time alone.

#3. Upon assessment, the nurse notices Mr. Warren has a quarter-sized amount of subcutaneous emphysema posterior to his chest tube site. The nurse should:
a) Continue to monitor this throughout the shift and ensure it does not increase.
b) Notify the physician immediately.
c) Clamp the chest tube.
d) Nothing. Subcutaneous emphysema is not serious.

#4. Mr. Warren complains of a painful right calf. The nurse notices the area is warm and red. What should be her first response:
a) Cover the area with tepid cloths.
b) Cover the area with a bandage.
c) Hang the leg dependent over the bed.
d) Notify the physician as Mr. Warren may have a DVT.

#5. Mr. Warren spikes a temperature. Upon investigation the physician states there is pus build-up in his lung. This is known as a/an:
a) empyema
b) pneumothorax
c) chyle leak
d) hemothorax

Section 7.3: Case Study Answers

Case Study #1

1 – C (It is possible Ms. Smith has atrial fibrillation. The physician should be notified).
2 – B (Physiotheraphy is very important after a lobectomy. The nurse should encourage Ms. Smith to participate).
3 – A (It seems like Ms. Smith is in pain and may need a breakthrough pain medication).
4 – D (Bloody sputum is known as hemoptysis).
5 – D (The nurse should educate the client and family and consult the social work assistant to help with medication cost coverage).

Case Study #2

1 – C (Because of Mark's age, build, and symptoms, he is most likely having a spontaneous pneumothorax).
2 – A (In this case, the patient requires a new dressing).
3 – B (A flat suction monitor bellow indicates the suction isn't working and the system should be assessed).
4 – C (The nurse must go with the patient for any off unit activity and bring toothless clamps).
5 – D (The nurse should ensure his pain is controlled and assist the physician with the procedure).
6 – D (Mark and his family would benefit from communicating with the RN).

Case Study #3

1 – B (It seems like Mr. Warren has an air leak. The dressing should be checked and the system assessed).
2 – B (Mr. Warren may want to talk about his concerns with the nurse and discuss his home situation with a social worker).
3 – A (This small amount of subcutaneous emphysema will not harm the patient. However, it should be monitored to ensure it does not increase).
4 – D (Mr. Warren may have a DVT and the physician should be notified).
5 – A (Pus build-up in the lung is known as an empyema).

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Appendix A: "Test Your Knowledge" Answers

Section 1.3

Question 1

A – Right Lung (or Right Middle Lobe)
B – Bronchi (or bronchial tubes)
C – Nose
D – Mouth
E – Trachea
F – Diaphragm

Question 2

A – False. The right lung actually has three lobes.
B – True.
C – False. The bronchi are actually located at the bottom of the trachea.
D – False. When a person inhales, the diaphragm actually moves downward.
E – True.
F – True.

Section 2.4

Question 1

A – Hemothorax
B – A collection of pus (purulent fluid)
C – Chyle
D – A collection of blood and air in the pleural space
E – Partial esophagectomy
F – The surgical removal of an entire lung
G – Lobectomy

Question 2

A – False. It is called a right middle lobectomy.
B – False. The patient should lie on the operative side.
C – True.
D – True.
E – True.
F – False. Thin, males are most likely to have a pneumothorax.
G – True.
H – False. Removal of the entire esophagus is a to

Section 3.3

Question 1

Refer to Section 3.1 for answer.

Question 2
A – False. The pneumostat is used to remove air.
B – True.
C – False. The syringe connects directly to the port without a needle.
D – True.
E – False. Only 1 ml of water is needed.
F – True.

Section 4.4
Question 1
A – Atrial fibrillation
B – Subcutaneous emphysema
C – Pulmonary embolism
D – Hemoptysis
E – Tension pneumothorax

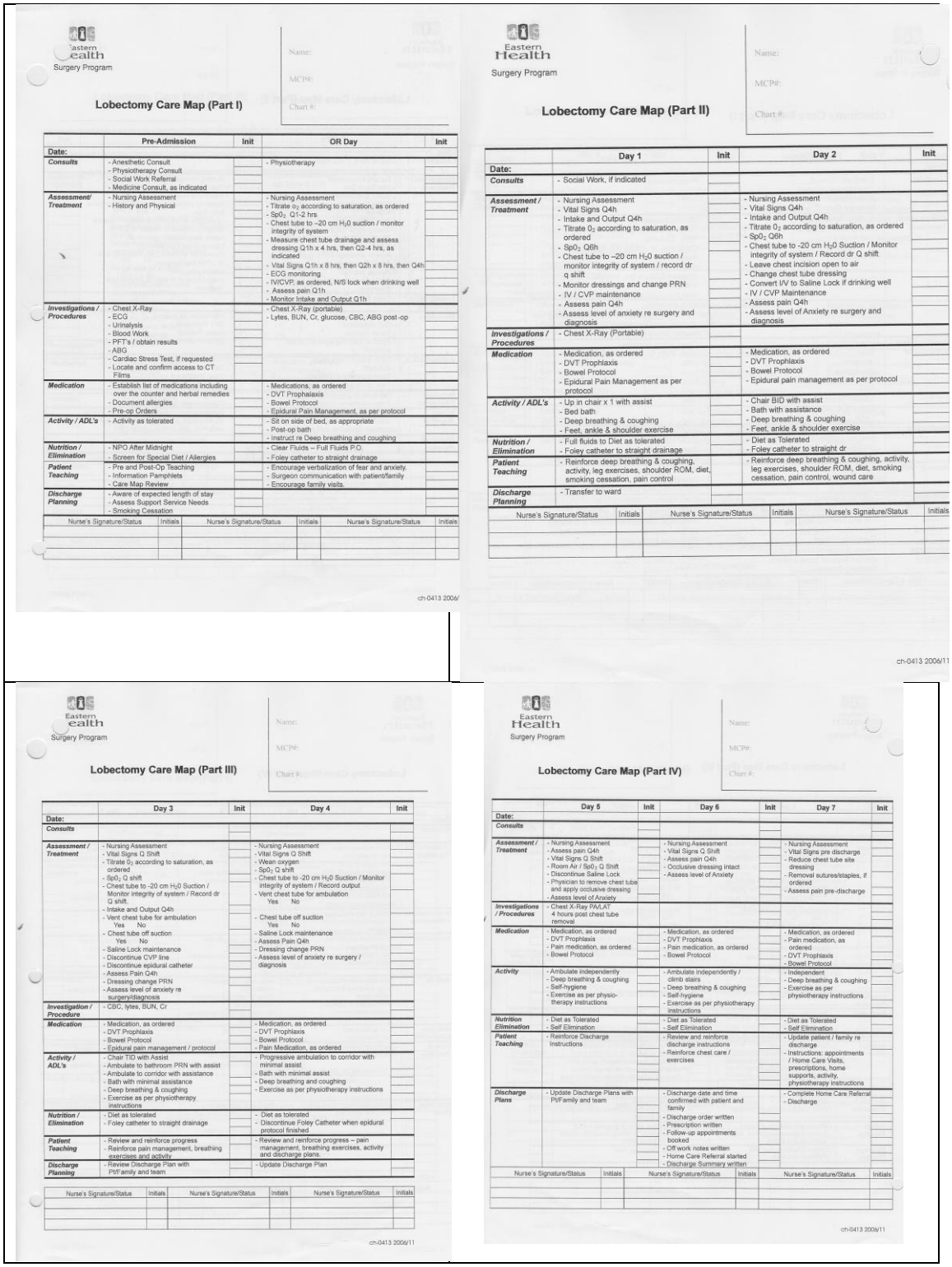
Question 2
A – True.
B – False. 2 clamps should be kept at the bedside.
C – False. To leave the unit, the patient should be accompanied by a RN.
D – True.
E – False. This can be fatal.
F – True.
G – True.

Section 6.4
Question 1
A – Dietician
B – Respiratory therapist
C – Social work assistant
D – Social Worker
E – Occupational Therapist
F – Physiotherapist

Question 2
Refer to Section 6.2 for answer.

Question 3
A – False. The patient must be checked every hour.
B – True
C – False. The RN should also assist with mobilization.
D – True
E – True
F – False. The patient may still require breakthrough pain medication.

Appendix B: Lobectomy Care Map



Eastern Health
Surgery Program

Name:
MCP#:
Chart #:

Lobectomy Care Map (Part I)

Date:	Pre-Admission	Init	OR Day	Init
Consults	- Anesthetic Consult - Physiotherapy Consult - Social Work Referral - Medicine Consult, as indicated		- Physiotherapy	
Assessment/ Treatment	- Nursing Assessment - History and Physical		- Nursing Assessment - Titrate O_2 according to saturation, as ordered - SpO_2 Q1-2 hrs - Chest tube to –20 cm H_20 suction / monitor integrity of system - Measure chest tube drainage and assess dressing Q1h x 4 hrs, then Q2-4 hrs, as indicated - Vital Signs Q1h x 8 hrs, then Q2h x 8 hrs, then Q4h - ECG monitoring - IV/CVP, as ordered, N/S lock when drinking well - Assess pain Q1h - Monitor Intake and Output Q1h	
Investigations / Procedures	- Chest X-Ray - ECG - Urinalysis - Blood Work - PFT's / obtain results - ABG - Cardiac Stress Test, if requested - Locate and confirm access to CT Films		- Chest X-Ray (portable) - Lytes, BUN, Cr, glucose, CBC, ABG post-op	
Medication	- Establish list of medications including over the counter and herbal remedies - Document allergies - Pre-op Orders		- Medications, as ordered - DVT Prophalaxis - Bowel Protocol - Epidural Pain Management, as per protocol	
Activity / ADL's	- Activity as tolerated		- Sit on side of bed, as appropriate - Post-op bath - Instruct re Deep breathing and coughing	
Nutrition / Elimination	- NPO After Midnight - Screen for Special Diet / Allergies		- Clear Fluids – Full Fluids P.O. - Foley catheter to straight drainage	
Patient Teaching	- Pre and Post-Op Teaching - Information Pamphlets - Care Map Review		- Encourage verbalization of fear and anxiety. - Surgeon communication with patient/family - Encourage family visits.	
Discharge Planning	- Aware of expected length of stay - Assess Support Service Needs - Smoking Cessation			

Nurse's Signature/Status	Initials	Nurse's Signature/Status	Initials	Nurse's Signature/Status	Initials

ch-0413 2006/

Eastern Health
Surgery Program

Name:
MCP#:
Chart #:

Lobectomy Care Map (Part II)

Date:	Day 1	Init	Day 2	Init
Consults	- Social Work, if indicated			
Assessment / Treatment	- Nursing Assessment - Vital Signs Q4h - Intake and Output Q4h - Titrate O_2 according to saturation, as ordered - SpO_2 Q6h - Chest tube to –20 cm H_20 suction / monitor integrity of system / record dr q shift - Monitor dressings and change PRN - IV / CVP maintenance - Assess pain Q4h - Assess level of anxiety re surgery and diagnosis		- Nursing Assessment - Vital Signs Q4h - Intake and Output Q4h - Titrate O_2 according to saturation, as ordered - SpO_2 Q6h - Chest tube to -20 cm H_20 Suction / Monitor integrity of system / Record dr Q shift - Leave chest incision open to air - Change chest tube dressing - Convert I/V to Saline Lock if drinking well - IV / CVP Maintenance - Assess pain Q4h - Assess level of Anxiety re surgery and diagnosis	
Investigations / Procedures	- Chest X-Ray (Portable)			
Medication	- Medication, as ordered - DVT Prophlaxis - Bowel Protocol - Epidural Pain Management as per protocol		- Medication, as ordered - DVT Prophlaxis - Bowel Protocol - Epidural pain management as per protocol	
Activity / ADL's	- Up in chair x 1 with assist - Bed bath - Deep breathing & coughing - Feet, ankle & shoulder exercise		- Chair BID with assist - Bath with assistance - Deep breathing & coughing - Feet, ankle & shoulder exercise	
Nutrition / Elimination	- Full fluids to Diet as tolerated - Foley catheter to straight drainage		- Diet as Tolerated - Foley catheter to straight dr	
Patient Teaching	- Reinforce deep breathing & coughing, activity, leg exercises, shoulder ROM, diet, smoking cessation, pain control		- Reinforce deep breathing & coughing, activity, leg exercises, shoulder ROM, diet, smoking cessation, pain control, wound care	
Discharge Planning	- Transfer to ward			

Nurse's Signature/Status	Initials	Nurse's Signature/Status	Initials	Nurse's Signature/Status	Initials

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Eastern Health
Surgery Program

Name:
MCP#:
Chart #:

Lobectomy Care Map (Part III)

Date:	Day 3	Init	Day 4	Init
Consults				
Assessment / Treatment	- Nursing Assessment - Vital Signs Q Shift - Titrate O_2 according to saturation, as ordered - SpO_2 Q shift - Chest tube to -20 cm H_20 Suction / Monitor integrity of system / Record dr Q shift. - Intake and Output Q4h - Vent chest tube for ambulation Yes No - Chest tube off suction Yes No - Saline Lock maintenance - Discontinue CVP line - Discontinue epidural catheter - Assess Pain Q4h - Dressing change PRN - Assess level of anxiety re surgery/diagnosis		- Nursing Assessment - Vital Signs Q Shift - Wean oxygen - SpO_2 Q shift - Chest tube to -20 cm H_20 Suction / Monitor integrity of system / Record output - Vent chest tube for ambulation Yes No - Chest tube off suction Yes No - Saline Lock maintenance - Assess Pain Q4h - Dressing change PRN - Assess level of anxiety re surgery / diagnosis	
Investigation / Procedure	- CBC, lytes, BUN, Cr			
Medication	- Medication, as ordered - DVT Prophlaxis - Bowel Protocol - Epidural pain management / protocol		- Medication, as ordered - DVT Prophlaxis - Bowel Protocol - Pain Medication, as ordered	
Activity / ADL's	- Chair TID with Assist - Ambulate to bathroom PRN with assist - Ambulate to corridor with assistance - Bath with minimal assistance - Deep breathing & coughing - Exercise as per physiotherapy instructions		- Progressive ambulation to corridor with minimal assist - Bath with minimal assist - Deep breathing and coughing - Exercise as per physiotherapy instructions	
Nutrition / Elimination	- Diet as tolerated - Foley catheter to straight drainage		- Diet as tolerated - Discontinue Foley Catheter when epidural protocol finished	
Patient Teaching	- Review and reinforce progress - Reinforce pain management, breathing exercises and activity		- Review and reinforce progress – pain management, breathing exercises, activity and discharge plans.	
Discharge Planning	- Review Discharge Plan with Pt/Family and team		- Update Discharge Plan	

Nurse's Signature/Status	Initials	Nurse's Signature/Status	Initials	Nurse's Signature/Status	Initials

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Surgery Program

Name:
MCP#:
Chart #:

Lobectomy Care Map (Part IV)

Date:	Day 5	Init	Day 6	Init	Day 7	Init
Consults						
Assessment / Treatment	- Nursing Assessment - Assess pain Q4h - Vital Signs Q Shift - Room Air / SpO_2 Q Shift - Discontinue Saline Lock - Physician to remove chest tube and apply occlusive dressing - Assess level of Anxiety		- Nursing Assessment - Vital Signs Q Shift - Assess pain Q4h - Occlusive dressing intact - Assess level of Anxiety		- Nursing Assessment - Vital Signs pre discharge - Reduce chest tube site dressing - Removal sutures/staples, if ordered - Assess pain pre-discharge	
Investigations / Procedures	- Chest X-Ray PA/LAT 4 hours post chest tube removal					
Medication	- Medication, as ordered - DVT Prophlaxis - Pain medication, as ordered - Bowel Protocol		- Medication, as ordered - DVT Prophlaxis - Pain medication, as ordered - Bowel Protocol		- Medication, as ordered - Pain medication, as ordered - DVT Prophlaxis - Bowel Protocol	
Activity	- Ambulate independently - Deep breathing & coughing - Self-hygiene - Exercise as per physio-therapy instructions		- Ambulate independently / climb stairs - Deep breathing & coughing - Self-hygiene - Exercise as per physiotherapy instructions		- Independent - Deep breathing & coughing - Exercise as per physiotherapy instructions	
Nutrition Elimination	- Diet as Tolerated - Self Elimination		- Diet as Tolerated - Self Elimination		- Diet as Tolerated - Self Elimination	
Patient Teaching	- Reinforce Discharge Instructions		- Review and reinforce discharge instructions - Reinforce chest care / exercises		- Update patient / family re discharge - Instructions: appointments / Home Care Visits, prescriptions, home supports, activity, physiotherapy instructions	
Discharge Plans	- Update Discharge Plans with Pt/Family and team		- Discharge date and time confirmed with patient and family - Discharge order written - Prescription written - Follow-up appointments booked - Off work notes written - Home Care Referral started - Discharge Summary written		- Complete Home Care Referral - Discharge	

Nurse's Signature/Status	Initials	Nurse's Signature/Status	Initials	Nurse's Signature/Status	Initials

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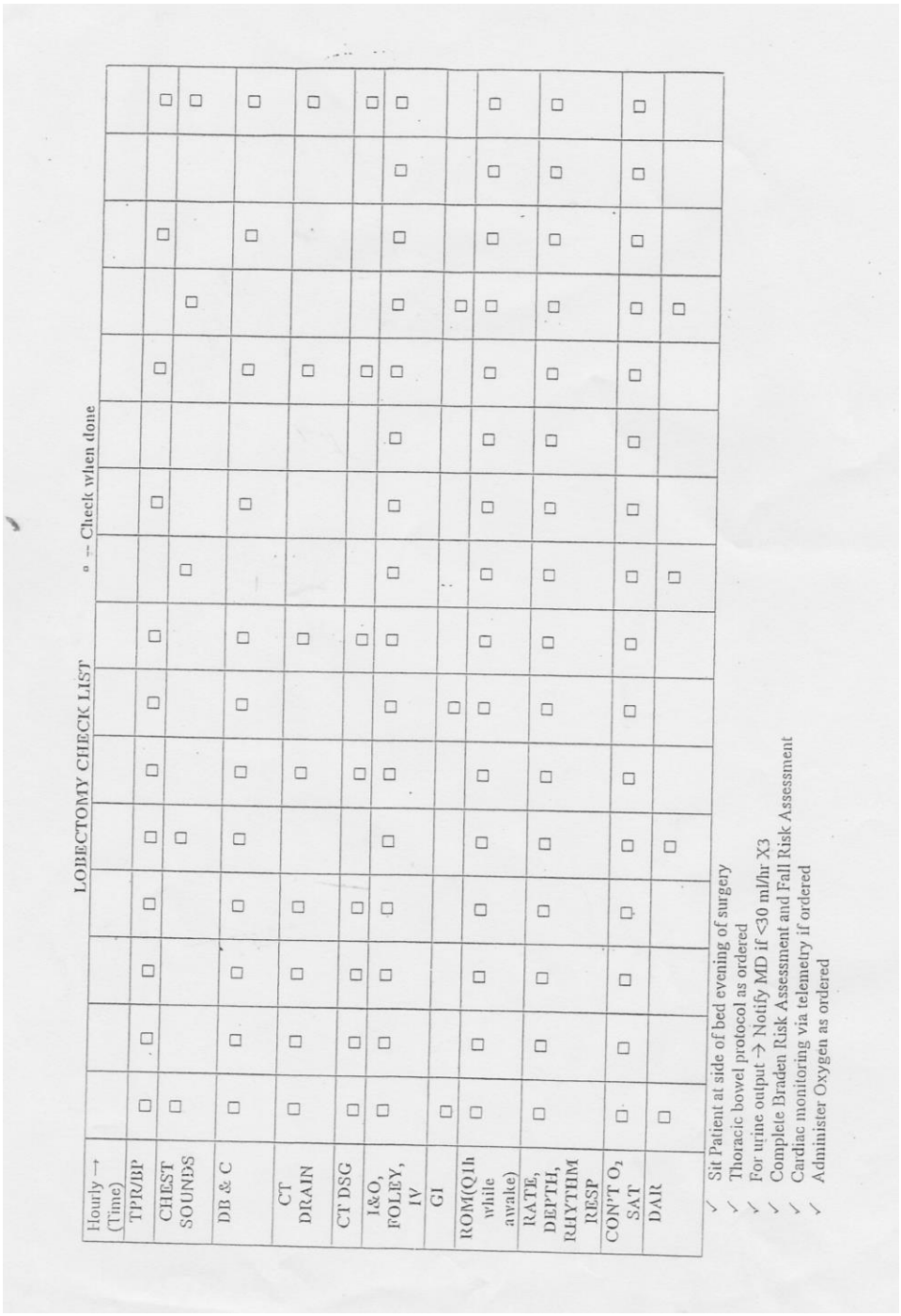
Appendix C: Lobectomy Checklist

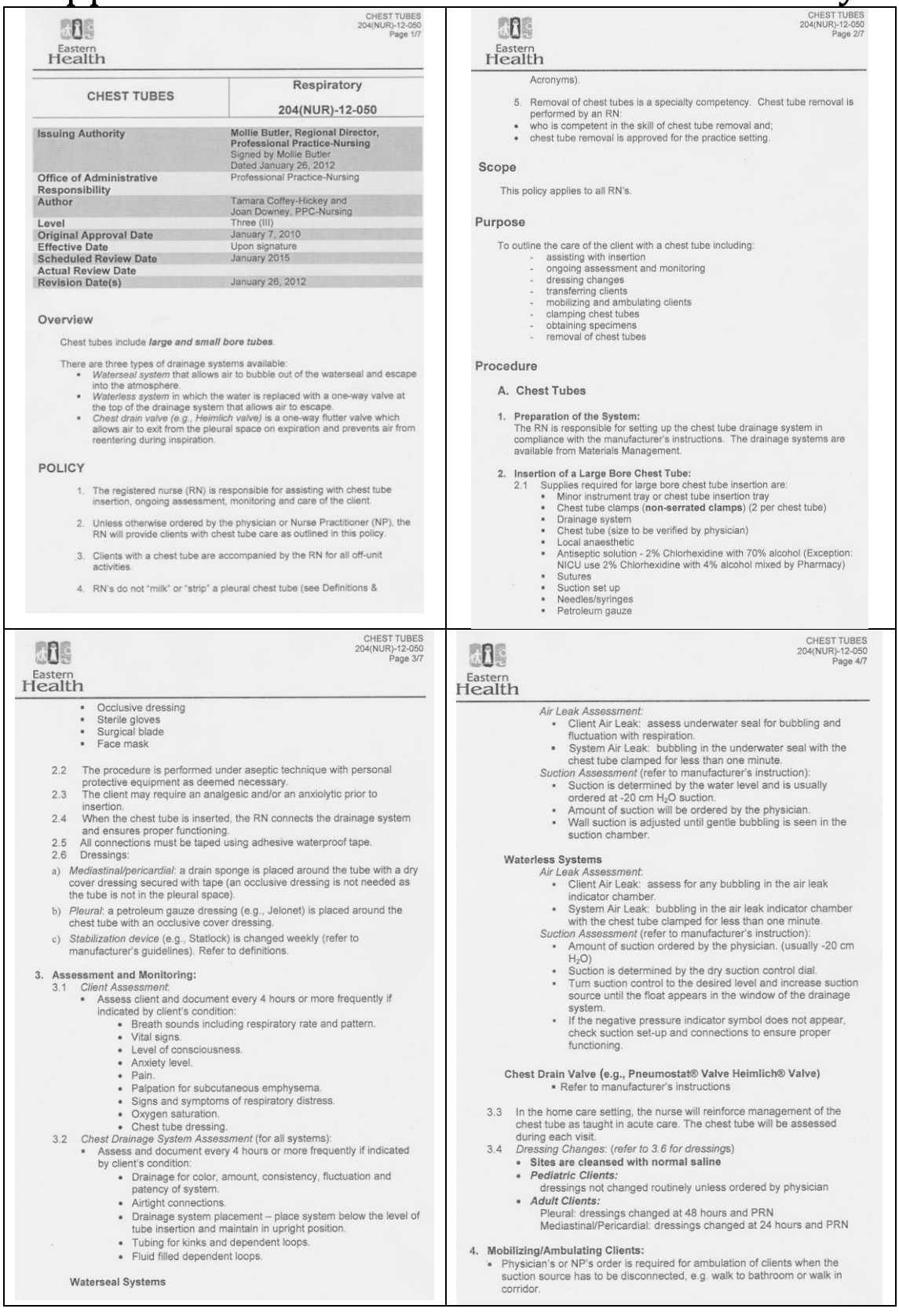


LOBECTOMY CHECK LIST □ -- Check when done

Hourly → (Time)																			
TPR/BP	□		□	□	□	□	□												□
CHEST SOUNDS	□			□				□				□							□
DB & C	□	□	□	□	□	□	□												□
CT DRAIN	□	□	□		□		□												□
CT DSG	□	□	□				□												□
I&O, FOLEY, IV	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
GI	□					□									□				
ROM(QIh while awake)	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
RATE, DEPTH, RHYTHM RESP	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
CONT O_2 SAT	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
DAR	□			□					□						□				

✓ Sit Patient at side of bed evening of surgery
✓ Thoracic bowel protocol as ordered
✓ For urine output → Notify MD if <30 ml/hr X3
✓ Complete Braden Risk Assessment and Fall Risk Assessment
✓ Cardiac monitoring via telemetry if ordered
✓ Administer Oxygen as ordered

Appendix D: Eastern Health Chest Tube Policy



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CHEST TUBES	Respiratory 204(NUR)-12-050
Issuing Authority	**Mollie Butler, Regional Director, Professional Practice-Nursing** Signed by Mollie Butler Dated January 26, 2012
Office of Administrative Responsibility	Professional Practice-Nursing
Author	Tamara Coffey-Hickey and Joan Downey, PPC-Nursing
Level	Three (III)
Original Approval Date	January 7, 2010
Effective Date	Upon signature
Scheduled Review Date	January 2015
Actual Review Date	
Revision Date(s)	January 26, 2012

Overview

Chest tubes include ***large and small bore tubes***.

There are three types of drainage systems available:
- *Waterseal system* that allows air to bubble out of the waterseal and escape into the atmosphere.
- *Waterless system* in which the water is replaced with a one-way valve at the top of the drainage system that allows air to escape.
- *Chest drain valve (e.g., Heimlich valve)* is a one-way flutter valve which allows air to exit from the pleural space on expiration and prevents air from reentering during inspiration.

POLICY

1. The registered nurse (RN) is responsible for assisting with chest tube insertion, ongoing assessment, monitoring and care of the client.
2. Unless otherwise ordered by the physician or Nurse Practitioner (NP), the RN will provide clients with chest tube care as outlined in this policy.
3. Clients with a chest tube are accompanied by the RN for all off-unit activities.
4. RN's do not "milk" or "strip" a pleural chest tube (see Definitions & Acronyms).
5. Removal of chest tubes is a specialty competency. Chest tube removal is performed by an RN:
   - who is competent in the skill of chest tube removal and;
   - chest tube removal is approved for the practice setting.

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Scope

This policy applies to all RN's.

Purpose

To outline the care of the client with a chest tube including:
- assisting with insertion
- ongoing assessment and monitoring
- dressing changes
- transferring clients
- mobilizing and ambulating clients
- clamping chest tubes
- obtaining specimens
- removal of chest tubes

Procedure

A. Chest Tubes

1. **Preparation of the System:**
   The RN is responsible for setting up the chest tube drainage system in compliance with the manufacturer's instructions. The drainage systems are available from Materials Management.

2. **Insertion of a Large Bore Chest Tube:**
   2.1 Supplies required for large bore chest tube insertion are:
   - Minor instrument tray or chest tube insertion tray
   - Chest tube clamps (**non-serrated clamps**) (2 per chest tube)
   - Drainage system
   - Chest tube (size to be verified by physician)
   - Local anaesthetic
   - Antiseptic solution - 2% Chlorhexidine with 70% alcohol (Exception: NICU use 2% Chlorhexidine with 4% alcohol mixed by Pharmacy)
   - Sutures
   - Suction set up
   - Needles/syringes
   - Petroleum gauze

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- Occlusive dressing
- Sterile gloves
- Surgical blade
- Face mask

2.2 The procedure is performed under aseptic technique with personal protective equipment as deemed necessary.
2.3 The client may require an analgesic and/or an anxiolytic prior to insertion.
2.4 When the chest tube is inserted, the RN connects the drainage system and ensures proper functioning.
2.5 All connections must be taped using adhesive waterproof tape.
2.6 Dressings:

a) *Mediastinal/pericardial*: a drain sponge is placed around the tube with a dry cover dressing secured with tape (an occlusive dressing is not needed as the tube is not in the pleural space).

b) *Pleural*: a petroleum gauze dressing (e.g., Jelonet) is placed around the chest tube with an occlusive cover dressing.

c) *Stabilization device* (e.g., Statlock) is changed weekly (refer to manufacturer's guidelines). Refer to definitions.

3. **Assessment and Monitoring:**
   3.1 *Client Assessment*:
   - Assess client and document every 4 hours or more frequently if indicated by client's condition:
     - Breath sounds including respiratory rate and pattern.
     - Vital signs.
     - Level of consciousness.
     - Anxiety level.
     - Pain.
     - Palpation for subcutaneous emphysema.
     - Signs and symptoms of respiratory distress.
     - Oxygen saturation.
     - Chest tube dressing.

   3.2 *Chest Drainage System Assessment* (for all systems):
   - Assess and document every 4 hours or more frequently if indicated by client's condition:
     - Drainage for color, amount, consistency, fluctuation and patency of system.
     - Airtight connections.
     - Drainage system placement – place system below the level of tube insertion and maintain in upright position.
     - Tubing for kinks and dependent loops.
     - Fluid filled dependent loops.

Waterseal Systems

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Air Leak Assessment:
- Client Air Leak: assess underwater seal for bubbling and fluctuation with respiration.
- System Air Leak: bubbling in the underwater seal with the chest tube clamped for less than one minute.

Suction Assessment (refer to manufacturer's instruction):
- Suction is determined by the water level and is usually ordered at -20 cm H_2O suction.
- Amount of suction will be ordered by the physician.
- Wall suction is adjusted until gentle bubbling is seen in the suction chamber.

Waterless Systems

Air Leak Assessment:
- Client Air Leak: assess for any bubbling in the air leak indicator chamber.
- System Air Leak: bubbling in the air leak indicator chamber with the chest tube clamped for less than one minute.

Suction Assessment (refer to manufacturer's instruction):
- Amount of suction ordered by the physician. (usually -20 cm H_2O)
- Suction is determined by the dry suction control dial.
- Turn suction control to the desired level and increase suction source until the float appears in the window of the drainage system.
- If the negative pressure indicator symbol does not appear, check suction set-up and connections to ensure proper functioning.

Chest Drain Valve (e.g., Pneumostat® Valve Heimlich® Valve)
- Refer to manufacturer's instructions

3.3 In the home care setting, the nurse will reinforce management of the chest tube as taught in acute care. The chest tube will be assessed during each visit.
3.4 *Dressing Changes*: (*refer to 3.6 for dressings*)
- **Sites are cleansed with normal saline**
- ***Pediatric Clients:***
  dressings not changed routinely unless ordered by physician
- ***Adult Clients:***
  Pleural: dressings changed at 48 hours and PRN
  Mediastinal/Pericardial: dressings changed at 24 hours and PRN

4. **Mobilizing/Ambulating Clients:**
   - Physician's or NP's order is required for ambulation of clients when the suction source has to be disconnected, e.g. walk to bathroom or walk in corridor.

Appendix D: Eastern Health Chest Tube Policy

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5. **Transferring Clients:**
   - Suction can be discontinued, without an order, to transfer a client from one room or unit to another. Suction must be reconnected when transfer is complete.
   - Chest tubes clamps accompany the client with a **large bore** chest tube in case of inadvertent disconnection of the tube from the drainage system.
   - Drainage system placement – place system below the level of tube insertion and maintain in upright position.

6. **Clamping Chest Tubes**:

   6.1 **Chest tubes can only be clamped under the following specific circumstances**:
   - assess for an air leak within the system (clamp less than 1 minute);
   - empty or change drainage system (new system is prepared);
   - inadvertent disconnection of the chest tube from the drainage system;
   - physician or NP order (e.g., prior to removal, to control a large pleural effusion). If respiratory distress occurs, the chest tube is unclamped and the physician notified.

   Placement of clamps:
   Large bore chest tube:
   - clamp close to the chest wall;
   - 2 **non-serrated** clamps per chest tube.

   Small bore chest tube:
   - Inadvertent disconnection:
     - close leur lock if attached to chest tube;
     - if no leur lock cover opening of tube.
   - Assess air leak, change drainage system or if ordered:
     - clamp the ***drainage system tubing*** just below the connection site to chest tube;
     - 2 **non-serrated** clamps per *drainage* tube.

7. **Obtaining Specimens**:
   - Refer to manufacturer's instructions

8. **Removal of Chest Tubes:**
   - Prior to removal, the RN assesses the client's need for analgesia.
   - Immediately following removal, an occlusive dressing (with petroleum gauze dressing for pleural tubes) is applied.
   - Assess site after 48 hours. A dressing is not required if no drainage and site approximating well.

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9. **Documentation:**
   Chest Tube Insertion:
   - name of practitioner who performed the procedure;
   - size of tube inserted;
   - site of insertion;
   - condition of skin around insertion site;
   - type of dressing applied;
   - client's tolerance including vital signs & respiratory assessment.

   Ongoing Assessment: include client assessment, system assessment findings, care provided, interventions and evaluation.

   Chest Tube Removal:
   - name of physician/nurse who performed the procedure;
   - assessment of site and dressing;
   - client's tolerance of procedure which includes vital signs and respiratory assessment.

Supporting Documents *(References, Industry Best Practice, Legislation, etc.)*

Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN). Neonatal Skin Care. Evidence-based clinical practice guideline.

Teleflex Medical (2009). Chest Drainage as a Therapeutic Intervention. www.teleflexmedical.com/ucd/chest_drainage_systems.php

Coughlin. A., & Parchinsky C. (2006), Go with the flow of chest tube therapy. *Nursing 2006* http://www.nursingcenter.com/pdf.asp?AID=633441

Mosby's Nursing Skills:
http://63.111.3.50/SkillsConnect/Default.aspx?Token=MNS0127999&SkillID=35

Linkages

- Personal Protective Equipment IPC-190
- Positive Patient Identification (PPI) PRC-130
- Hand Hygiene Policy IPC-150.
- Specialty and Non-Delegated Competencies: RN's 204 (NUR) -1-150
- Routine Practices Policy IPC-200
- Clinical Documentation PRC-020

Key Words

- Chest Tubes Insertion, Chest Tube, Heimlich® Valve, Pneumostat® Valve, Removal Chest Tube

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Definitions & Acronyms

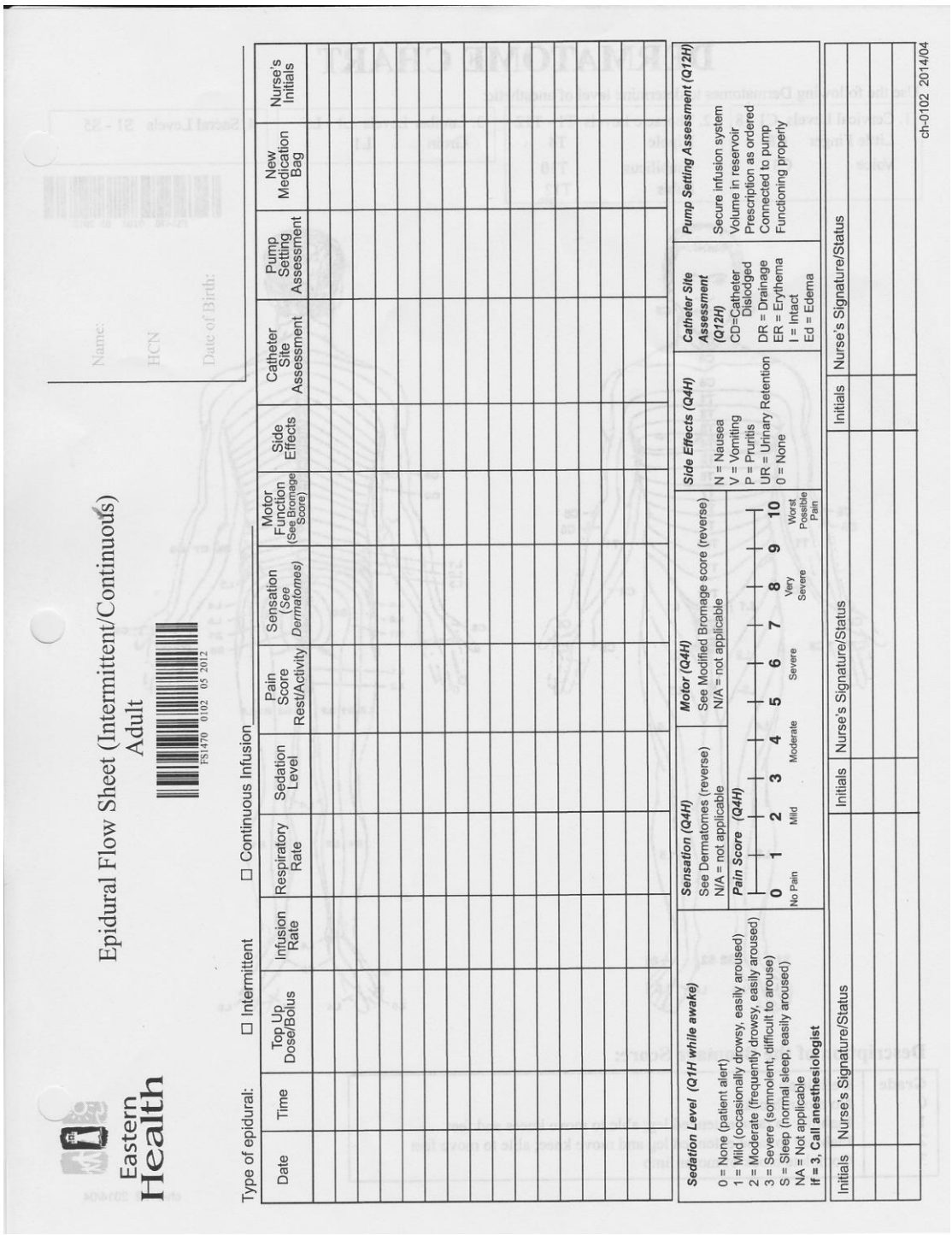
Chest Tube	Inserted in the pleural space or mediastinal and/or pericardial space. **Pleural chest tubes** are usually inserted in the 4th or 5th intercostal space to remove fluid and/or air from the pleural space and to re-establish normal intrapleural pressure. **Mediastinal and/or pericardial chest tubes** are inserted) to facilitate the removal of blood and prevent cardiac tamponade (e.g. cardiac surgery).
Stabilization device	Is an adhesive anchoring device used to secure chest tubes, drainage tubes and other, large, medical tubes (e.g., Statlock) www.statlock.com.
Stripping	"Compression along length of the tubing beginning at client and continuing until drainage area is reached." (*Perry & Potter, 2006, p. 865)*
Milking	"Compression and releasing the tube sequentially." (*Perry & Potter, 2006, p. 865)*

Policy History This policy replaces the following policies:

Legacy Board	Policy #	Policy Name	Date Revised
EH	204 (NUR)-12-050	Chest Tubes	(O)

Key: EH-Eastern Health

Appendix E: Hourly Epidural Record



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Epidural Flow Sheet (Intermittent/Continuous)
Adult

FS1470 0102 05 2012

Name:

HCN

Date of Birth:

Type of epidural: ☐ Intermittent ☐ Continuous Infusion

Date	Time	Top Up Dose/Bolus	Infusion Rate	Respiratory Rate	Sedation Level	Pain Score Rest/Activity	Sensation (See Dermatomes)	Motor Function (See Bromage Score)	Side Effects	Catheter Site Assessment	Pump Setting Assessment	New Medication Bag	Nurse's Initials

Sedation Level (Q1H while awake)
0 = None (patient alert)
1 = Mild (occasionally drowsy, easily aroused)
2 = Moderate (frequently drowsy, easily aroused)
3 = Severe (somnolent, difficult to arouse)
S = Sleep (normal sleep, easily aroused)
NA = Not applicable
If = 3, Call anesthesiologist

Sensation (Q4H)
See Dermatomes (reverse)
N/A = not applicable

Pain Score (Q4H)
0 No Pain 1 2 Mild 3 4 Moderate 5 6 Severe 7 8 9 Very Severe 10 Worst Possible Pain

Motor (Q4H)
See Modified Bromage score (reverse)
N/A = not applicable

Side Effects (Q4H)
N = Nausea
V = Vomiting
P = Pruritis
UR = Urinary Retention
0 = None

Catheter Site Assessment (Q12H)
CD=Catheter Dislodged
DR = Drainage
ER = Erythema
I = Intact
Ed = Edema

Pump Setting Assessment (Q12H)
Secure infusion system
Volume in reservoir
Prescription as ordered
Connected to pump
Functioning properly

Initials	Nurse's Signature/Status	Initials	Nurse's Signature/Status	Initials	Nurse's Signature/Status

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