

# Evidence-based management of patients with chest tube drainage system to reduce complications in cardiothoracic vascular surgery wards

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## ABSTRACT

**Aims:** This evidence-based project was to implement the best practice to provide safe and effective care to patients with chest tube drainage system in cardiothoracic wards.

**Methods:** Best practice recommendations on monitoring and maintenance of chest drains were retrieved from the Joanna Briggs Institute COnNECT – database. A checklist was developed based on these recommendations. Nurses in the two cardiovascular wards were taught how to use the checklist. Two post-implementation audits on the nurses' compliance to use the checklist were conducted. Data were analysed using the Joanna Briggs Institute Practical Application of Evidence System.

**Results:** Initial post-implementation audit results showed that the compliance rates of monitoring underwater seal, suction pressure and connector were 100%, checking of dressings 90%, and swinging and/or bubbling 70%. The checklist also detected 36 near-miss events. The second post-implementation audit results showed that the compliance rate of monitoring insertion site for air infiltration was 100%, checking of dressings 78%, and swinging and/or bubbling 91%. Fifty-seven near-miss events were detected.

**Conclusion:** The use of the checklist prevented adverse events during the evidence implementation period. It can thus be concluded that using a systematic guide to observe and monitor patients with chest tubes enhances the effectiveness and safety of nursing care in the hospital.

**Key words:** cardiothoracic, chest drain, chest tube, evidence-based nursing

*Int J Evid Based Healthc* 2015; 13:58–65.

## Background

Chest tubes – also known as chest drains – are usually seen in patients with conditions such as pneumothorax, haemothorax, pleural effusion and empyema.<sup>1</sup> These tubes are inserted into the pleural space to drain air, blood or pus so that negative pressure can be restored within the pleural space, enabling lung re-expansion and preventing lung collapse.<sup>2</sup> Patients who have undergone cardiothoracic surgery also require chest tubes to remove air and blood postoperatively.<sup>1</sup> The chest tube, with its

underwater seal, is a closed drainage system that allows only one-way movement of air and/or fluids from the pleural space to the drainage bottle, and is designed to prevent reverse flow from the drainage bottle back into the pleural cavity.<sup>3</sup>

Nurses taking care of patients with chest tubes are required to monitor closely the patients' conditions and their chest tube drainage systems. It is both important and necessary for nurses to understand chest tube management to prevent potential complications, which could increase patients' level of stress<sup>4</sup> or prolong patients' recovery and length of stay in the hospital.<sup>5</sup> Problems related to chest tube management include dislodgement and occlusion of the tube,<sup>3</sup> and these problems could progress to more serious complications if they are not detected by nurses. A coiled, looped or

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# Evidence For Cardiothoracic Surgery

**Shahzad G. Raja**



## **Evidence For Cardiothoracic Surgery:**

Cardiothoracic Surgery: An Evidence-Based Approach Daniel Willson,2021-11-16 The branch of medicine that is involved in the surgical treatment of organs inside the thorax is known as cardiothoracic surgery It is also known as thoracic surgery Cardiac surgery involves the heart and great vessels wherein thoracic surgery include surgery of lungs esophagus thymus etc In most countries cardiac surgery and thoracic surgery are two different surgical specialties but in some countries they are considered to be one surgical specialty known as cardiothoracic surgery It includes surgeries like open heart surgery modern beating heart surgery pediatric cardiovascular surgery etc Open heart surgery is a process in which the surgery is performed on the inner structure of an open heart Modern beating heart surgery is a kind of surgery where the heart is beating during the surgical process Pediatric cardiovascular surgery is concerned with the surgery of the heart of children This book contains some path breaking studies in the field of cardiothoracic surgery From theories to research to practical application case studies related to all contemporary topics of relevance to this field have been included herein This book will serve as a reference to a broad spectrum of readers *The Evidence for Cardiothoracic Surgery* Tom Treasure,2005 With an emphasis on randomly controlled trials when available the 28 contributed chapters present evidence for standard operations and innovative treatments for cardiothoracic disease including lung cancer bronchopulmonary tumors re vascularization and indications for cardiac transplantation The introductory chapter presents the case for evidence based medicine and its application in this surgical specialty Chapters include evidence summary tables surgical recommendations and further reading **Difficult Decisions in Cardiothoracic Critical Care Surgery** Vassyl A. Lonchyna,2019-02-13 Critical care medicine is responsible for many of the most important advances in outcomes after cardiothoracic surgery in the past two decades The expertise developed in this subspecialty accounts for the resiliency that characterizes gold standard results evident in institutions recognized for excellence This volume is intended to share ideas and algorithms that will improve outcomes in cardiothoracic critical care units This book is part of the Difficult Decisions in Surgery series that covers surgical specialties The volumes are multi authored containing brief chapters each of which are devoted to one or two specific questions or decisions within that specialty that are difficult or controversial The volumes are intended as a current and timely reference source for practicing surgeons surgeons in training and educators that describe the recommended ideal approach rather than customary care in selected clinical situations *Difficult Decisions in Thoracic Surgery* Mark K. Ferguson,2014-06-16 The complexity of decision making in thoracic surgery is growing exponentially As new technology is introduced physicians from nonsurgical specialties offer alternative and competing therapies for what was once the exclusive province of the thoracic surgeon In addition there is increasing knowledge regarding the efficacy of traditional thoracic surgical therapies How to select among these varied and complex approaches is becoming increasingly difficult The first two editions of this book have found wide acceptance among practicing surgeons trainees and educators Chapters from them are

regularly cited by the Thoracic Surgery Directors Association as valuable resources for their weekly curriculum exercises As in the first two editions chapters adhere to a specific format updated for the third edition This approach provides uniformity to the presentations making it possible to identify useful material at a glance The Operated Heart at Autopsy Stuart Lair Houser,2009-06-10 After 17 years of private practice as a cardiovascular surgeon my partners questioned the rationality of my decision to leave the clinical practice behind and become a cardiovascular pathologist Infact their disbelief of my intention to make the leap of faith was understandable For a surgeon the operating room is where the action is It is as simple as that And when a cardiac surgeon can hold in his hand a beating heart now off bypass and improved by an operation just completed satisfaction is real and profound However life is complex Throughout my surgical career questions regarding the pathogenesis of atherosclerotic cardiovascular disease arose curiosities of various phenotypes of the disease piqued my interest I became aware of the power of investigative techniques that might address these questions I then began to realize that my career in the operating room left me little time to address them I needed to study the disease full time in order to contribute to my understanding of it Ironically my first autopsy as a pathology resident was on an individual with a past history of coronary artery bypass surgery When it came to examining the heart the dissection as all pathologists know was complex However I found it to be straightforward and enjoyable But I subsequently learned that my fellow residents and mentors did not share my intrigue and comfort in defining the nuances of the operated heart *Physiotherapy for Respiratory and Cardiac Problems* Jennifer A. Pryor, Ammani S Prasad,2008-03-06 Now in its fourth edition *Physiotherapy for Respiratory and Cardiac Problems* continues to be an essential textbook and reference source for undergraduate and postgraduate students and for the clinician working with patients with cardiac and respiratory problems Its strengths lie in integrating the evidence with clinical practice and in covering the whole patient lifespan infants children adolescents and adults new chapters on critical care surgery and psychological aspects of care expanded evidence for clinical practice case studies multi contributed chapters written by internationally recognised experts extensively revised text with new illustrations and photographs comprehensive reference lists which direct the reader to further sources of information Part of the *Physiotherapy Essentials* series core textbooks for both students and lecturers Online image bank now available Log on to <http://evolve.elsevier.com> Pryor physiotherapy and type in your unique pincode for access to over 300 downloadable images *Cardiac Surgery* Shahzad G. Raja,2020-02-11 This textbook provides a succinct overview of cardiac surgery with key concepts being emphasized throughout An abundance of illustrations intra operative photographs tables as well as information boxes aids the reader to visualise grasp and retain difficult concepts The inclusion of evidence based approaches to the management of a range of cardiac surgical conditions equips the reader with an understanding of how to overcome a variety of potentially tough clinical challenges *Concise Cardiac Surgery A Complete Guide* comprehensively covers a range of techniques used in cardiac surgery It is therefore an ideal resource for the trainee and practising cardiac surgeon seeking a

practically focused text detailing how to apply the latest techniques and evidence based approaches in their day to day practice

**Johns Hopkins Manual of Cardiothoracic Surgery** David Daiho Yuh, Luca A. Vricella, William Baumgartner, 2012-09-01 The most up to date comprehensive single volume guide to adult congenital and general cardiothoracic surgery from many of the foremost experts in the field Developed by authorities from leading edge cardiothoracic surgical training programs this much needed reference succinctly reviews a wide range of important topics in cardiothoracic surgery The Johns Hopkins Manual of Cardiothoracic Surgery is especially timely given the recent development of many new scientific findings and emerging technologies You ll find it filled with precise information on surgical techniques and pre and postoperative strategies for managing cardiothoracic disease In this time saving sourcebook you ll get an in depth look at the full spectrum of disorders and their surgical and medical management options including congenital acquired and neoplastic diseases Supporting this detailed coverage is an easy to navigate format featuring focused tables and outline formatted bullets along with step by step explanations of the most complex operations Features Thorough coverage of all major areas of cardiothoracic surgery perfect for cardiothoracic surgery fellows getting ready for Board review exams oral and written and cardiothoracic surgeons preparing for Board certification or recertification Skill building perspectives on open minimally invasive and endovascular surgical procedures complete with relevant surgical anatomy Indications and techniques for heart and lung transplantation Balanced detailed presentation of both pediatric and adult patient care issues Innovative chapters on surgical ventricular remodeling endovascular repair of thoracic aortic pathologies correction of complex congenital defects and thoracic oncology that reflect the most promising new surgical technologies Key Concepts boxes throughout focus on important take home messages of chapter topics Expert authorship with most chapters written by current or past faculty and trainees from The John Hopkins Hospital

*Cardiothoracic Surgery in the Elderly* Mark R. Katlic, 2011-05-04 Cardiothoracic Surgery in the Elderly Evidence Based Practice is an important and timely book that reflects the thoughtful work of pioneers in geriatric surgery It encompasses their knowledge related to geriatric surgery and their reflections and guidance on the rapidly accumulating knowledge related to improving the health and surgical care of seniors This book provides a scholarly review of the constantly expanding knowledge base about cardiovascular and thoracic surgery in seniors The book follows a logical sequence covering general aspects of care cardiac surgery and thoracic surgery Chapters are focused on common devastating and often missed complications of surgical care in the seniors These include delirium depression pressure sores functional losses incontinence volume depletion and asymptomatic or atypical complications myocardial infarction post operative diarrhea urinary track infections and pneumonia Each is expertly reviewed Strategies to help the surgeons and the surgical team anticipate recognize and effectively prevent or manage such problems are discussed and the evidence basis for such strategies is provided Cardiothoracic Surgery in the Elderly Evidence Based Practice is particularly timely and the first to review the substantial

body of knowledge that has been developed in recent years related to geriatric cardiothoracic surgical problems It catalogs well the expanding knowledge basis for achieving successful surgical outcomes in the very old It provides a most useful resources for cardiovascular thoracic surgeons in training and those already in practice **Cardiothoracic Anaesthesia and Critical Care: Prepare for the FRCA** Nicholas Pace,2015-11-27 This eBook is one of 10 carefully selected collections of key articles from the Anaesthesia and Intensive Care Medicine journal a continually updated evidence based learning resource based on the RCOA Curriculum It is ideal for trainees approaching a new sub specialty and or when preparing for the FRCA or similar exams It will also prove an invaluable authoritative refresher for life long learning and CPD Related MCQs are included to test your understanding Cardiac Surgery Essentials for Critical Care Nursing Sonya R. Hardin,Roberta Kaplow,2025-02-07 Patients who undergo cardiac surgery require specialized care Critical care nurses are crucial to their postoperative recovery and health Cardiac Surgery Essentials for Critical Care Nursing Fourth Edition is an indispensable resource for new and experienced nurses caring for patients in critical care units immediately following cardiac surgery and in the transitioning to home With an evidence based foundation the Fourth Edition addresses nursing knowledge to meet the needs of acutely ill patients and strategies to optimizing patient outcomes Vital information has been added and updated to reflect AACN Scope and Standards and Procedures Published in partnership with American Association of Critical Care Nurses AACN Cardiac Surgery Essentials for Critical Care Nursing Fourth Edition is a must have reference for all nurses caring for acute and critically ill patients and an ideal resource to help prepare nurses who plan to take the Cardiac Surgery Certification CSC subspecialty exam offered by AACN Difficult Decisions in Thoracic Surgery Mark K. Ferguson,2007-03-12 Why do thoracic surgeons need training in decision making Many of us who have weathered harrowing residencies in surgery feel that after such experiences decision making is a natural extension of our selves While this is no doubt true correct de sion making is something that many of us have yet to master The impetus to develop a text on evidence based decision making in thoracic surgery was stimulated by a conference for cardiothoracic surgical trainees developed in 2004 and sponsored by the American College of Chest Physicians During that conference it became clear that we as thoracic surgeons are operating from a very limited fund of true evidence based information What was also clear was the fact that many of the decisions we make in our everyday practices are not only uninformed by evidence based medicine but often are contradictory to existing guidelines or evidence based recommendations The objectives of this book are to explain the process of decision making both on the part of the physician and on the part of the patient and to discuss speci c clinical problems in thoracic surgery and provide recommendations regarding their mana ment using evidence based methodology Producing a text that will purportedly guide experienced practicing surgeons in the decision making process that they are acc tomed to observe on a daily basis is a daunting task **Cardiac Surgery in the Adult 5/e** Lawrence H. Cohn,David H. Adams,2017-09-08 The most comprehensive and current full color cardiac surgery resource updated by

leading surgeons A Doody's Core Title for 2024 2022 In Cardiac Surgery in the Adult Fifth Edition the world's foremost cardiovascular surgeons deliver thorough up to date coverage of operative strategy decision making technique and pre and post operative management for treating the adult cardiac patient Unmatched in both scope and clinical rigor this classic text contains 63 chapters that highlight every important topic in cardiovascular surgery Presented in full color Cardiac Surgery in the Adult takes readers through the optimal treatment of congenital acquired infectious and traumatic diseases of the heart and great vessels The book opens with a history of cardiac surgery and basic cardiac science then moves into all types of cardiac surgery providing both practicing surgeons and residents with insight into the very latest surgical protocols Cardiac Surgery in the Adult is logically divided into ten sections Basics includes history anatomy physiology pharmacology computed tomography risk assessment simulation and the fully integrated cardiovascular center Perioperative Intraoperative Care Ischemic Heart Disease Aortic Valve Disease Mitral Valve Disease Surgery of the Great Vessels Rhythm Surgery Other Cardiac Operations including congenital heart disease pericardial disease and cardiac neoplasms Transplant and Mechanical Circulatory Support The Fifth Edition has been updated throughout and includes the latest advances in minimally invasive surgery and simulation

*Kaplan's Cardiac Anesthesia - E-Book* Joel A. Kaplan, 2023-06-09 Current comprehensive and evidence based Kaplan's Cardiac Anesthesia Perioperative and Critical Care Management 8th Edition offers practical guidance from today's international leaders in cardiac anesthesiology helping you to optimize perioperative outcomes avoid complications and ensure maximum patient safety Dr Joel A Kaplan along with an expert team of associate editors guides you through today's clinical challenges including expanded coverage of critical care the newest approaches to perioperative assessment and management state of the art diagnostic techniques and cardiovascular and coronary physiology Covers the full spectrum of contemporary cardiothoracic anesthesia practice including preoperative assessment physiology pharmacology monitoring transesophageal echocardiography coagulation specific cardiac procedures extracorporeal circulation postoperative pain treatment and management of the complex patient with cardiac disease Includes expanded coverage of critical care topics reflecting the increased perioperative care now provided by anesthesiologists in the ICU Contains new chapters on Structural Heart Disease Procedures Cardiorespiratory Effects of COVID 19 Critical Care Ultrasound Intensive Unit Management of Patients on Mechanical Circulatory Support and Postoperative Care of the Heart and Lung Transplant Patient Features more than 900 full color illustrations decision trees charts and graphs over one third are new that aid in visual understanding of complex topics Provides access to over 120 videos including a range of echocardiography clips Contains balanced dependable and updated content on all aspects of the anesthetic management of cardiac surgical procedures as well as cardiology procedures performed in catheterization and electrophysiologic laboratories Places new emphasis on cardiac devices requiring perioperative care including cardiac implanted electrical devices and ventricular assist devices An eBook version is included with purchase The eBook allows you to access all of the

text figures and references with the ability to search customize your content make notes and highlights and have content read aloud Key Trials in Cardiothoracic Surgery Ghaith Qsous, Malcolm Will, Vipin Zamvar, 2023-10-10 A concise summary of the most important clinical trials in cardiac and thoracic surgery The focus is on how evidence based decision making has helped to shape modern practice and guidelines The key trials are described and an overview of their impact provided Much research has been undertaken to study the efficacy of different drugs techniques and treatment strategies within cardiothoracic surgery As a result many randomised controlled trials have been published which discuss a wide variety of topics and with the intention of improving current practice and patient care This volume presents a selection of the key trials and assesses their impact Compact and easy to read the distillation of core information will enable the reader to understand the importance of the key papers that have influenced best practice across operating theatres clinics multi disciplinary meetings and inpatient management Including full summaries of more than 30 trials and reflecting the clinical scenarios encountered in everyday practice by cardiothoracic surgeons this concise volume is written for both trainee and more experienced members of the surgical team New York Court of Appeals. Records and Briefs. New York (State)., **CMR**, 2020 Archival snapshot of entire looseleaf Code of Massachusetts Regulations held by the Social Law Library of Massachusetts as of January 2020 **The Massachusetts Register**, 2017-07-14 California. Court of Appeal (1st Appellate District). Records and Briefs California (State)., **"Code of Massachusetts regulations, 2000"**, 2000 Archival snapshot of entire looseleaf Code of Massachusetts Regulations held by the Social Law Library of Massachusetts as of January 2020

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web 33mol o<sub>2</sub> 6mol br<sub>2</sub> 11mol o<sub>2</sub> 18mol br<sub>2</sub> identify the limiting reactant s and excess reactant s the limiting reactant is o<sub>2</sub> since it would yield the least amount of product 18 mol br<sub>2</sub> the excess reactant is c<sub>2</sub>h<sub>3</sub>br<sub>3</sub> since its complete reaction would have yielded up to 54 mol br<sub>2</sub> think about your result

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web step 4 the reactant that produces a smaller amount of product is the limiting reagent mg mg produces less mgo mgo than does o<sub>2</sub> o<sub>2</sub> 3 98 g mgo vs 25 2 g mgo therefore mg is the limiting reagent in this reaction step 5 the reactant that produces a larger amount of product is the excess reagent

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web if you start with 14 82 g of ca oh<sub>2</sub> c a o h<sub>2</sub> and 16 35 g of h<sub>2</sub>so<sub>4</sub> h<sub>2</sub> s o<sub>4</sub> a determine the limiting reagent b determine the number of moles of h<sub>2</sub>o h<sub>2</sub> o produced c determine the number of grams of caso<sub>4</sub> c a s o<sub>4</sub> produced d determine the number of grams of excess reagent left 1 make sure the equation is balanced

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