An Evaluation of a Clinical Documentation Improvement Program's Impact on Sepsis Documentation, Coding, Quality Reporting, and Hospital Reimbursement

by

Emily Emmons RN, BSN

A Thesis presented to the

FACULTY OF THE SCHOOL OF NURSING

POINT LOMA NAZARENE UNIVERSITY

In partial fulfillment of the

requirements of the degree

MASTER OF SCIENCE IN NURSING

July 2016

Committee

Jeanne Maiden, RN, MS, PhD, CNS-BC, Chair

Larry Rankin, RN, BSN, MA, PhD, Member-

POINT LOMA NAZARENE UNIVERSITY

School of Nursing

Master of Science in Nursing

NAME OF STUDENT: Emily Emmons RN, BSN

TITLE OF THESIS: An Evaluation of a Clinical Documentation Improvement Program's Impact on Sepsis Documentation, Coding, Quality Reporting, and Hospital Reimbursement

COMMITTEE:

Jeanne Maiden RN, PhD, CNS-BC 8/15/16
Jeanne Maiden, RN, MS, PhD, CNS-BC, Chair Date

Larry B. Rankin 8-15-16
Larry B. Rankin, PhD, RN, CNE Member Date

Acknowledgements

I would like to thank God for blessing me with the opportunity to pursue my Master's degree, and providing me the support necessary to complete the program. Thank you to my parents, who have always encouraged and supported my goals and pushed me to aim higher. Thank you to my loving husband, who without his love and support, this would not have been possible. Thank you to my family and friends, who believed in me and encouraged me to persevere. Thank you to Dr. Maiden, Dr. Kim, and Dr. Rankin who guided and supported me throughout this journey. Thank you to Jean Fuller and Greg Bantigue at Scripps for making this study possible.

Abstract

The purpose of this study is to evaluate the impact of a new clinical documentation improvement program on sepsis documentation, quality reporting, and hospital reimbursement in three hospitals. A retrospective chart review was conducted of patients admitted through the emergency department with a urinary tract infection as the principal diagnosis, but without documentation of sepsis at three medical centers in San Diego from 2009 to 2014, in order to evaluate potential missed query opportunities to clarify the diagnosis of sepsis for coding purposes. The study included a purposive sample of 25 records pre and post-implementation of a Clinical Documentation Program, for a total of 50 records. There were no statistically significant differences between the pre and post-implementation groups with respect to the sample demographics or the number of documentation opportunities or sepsis indicators present, however, positive potential financial and quality impacts were realized. In conclusion, the implementation of a Clinical Documentation Improvement Program had no significant impact on the documentation of sepsis consistent with the latest published diagnostic criteria at that time. Limitations include a small sample size and variations in program elements and education at each facility. Further strategies to improve documentation need to be explored and future chart review studies should consider a larger sample size in order to evaluate the potential significance.

Keywords: sepsis, documentation improvement, CDI, mortality, reimbursement, quality documentation

Table of Contents

List of Tables

Chapter One

Introduction

Sepsis is a major public health problem and the leading cause of death in non-cardiac intensive care units (ICU's) in the US (Lev et al., 2009). Since 2000, the number of septicemia cases has steadily increased each year (Elixhauser, Friedman, & Stranges, 2011). According to a publication released by the Agency for Healthcare Research and Quality (AHRQ), "Septicemia was the most expensive reason for hospitalization in 2009 – totaling nearly $15.4 billion in aggregate hospital costs" (Elixhauser et al., 2011). The $15.4 billion or 4.3% of all hospital costs represents 836,000 stays in which septicemia was listed as the principal diagnosis. AHRQ estimates there were 829,500 cases in which septicemia was listed as a secondary diagnosis in 2009, a number similar to that for septicemia as the principle diagnosis (Elixhauser et al., 2011). Interestingly, for cases in which septicemia was the secondary diagnosis, the mean length of stay was one week longer, and the mean cost per stay was $15,400 more in 2009. Mortality rates were 16.3% for septicemia as a principle diagnosis and 14.7% for septicemia as a secondary diagnosis in 2009 (Elixhauser, et al., 2011). The order of the mortality rate percentages was reversed in the year 2000, with a 16.7% mortality rate for septicemia as a principle diagnosis and 21.5% for septicemia as a secondary diagnosis (Elixhauser, et al., 2011).

Sepsis documentation is often inadequate for coding purposes. Providers leave out specific details needed to assign the most appropriate code or use medical terminology that is inconsistent with coding terminology and therefore prompts the inpatient coder to request clarification. This clarification process causes delays in coding and billing, and does not always result in the most appropriate code assignment. Often times, physicians may not respond to a retrospective coder query or the lag in time between the actual patient care and the query is so

great that it requires the physician to take extra time to review the record, so that he or she may answer the query appropriately (Bryant, et al., 2010). Clinical Documentation programs that staff registered nurses as Clinical Documentation Specialists (CDSs) can help with this problem by having nurses, who communicate using clinical language, query physicians before patients are discharged from the hospital (Bryant, et al., 2010). CDS nurses can also provide ongoing education to physicians on documentation, coding guidelines, and health information compliance (Dimick, 2008). The goal of a Clinical Documentation Improvement program is for CDS nurses to facilitate complete and accurate physician documentation for accurate coding, which results in accurate reporting of patient severity of illness, risk of mortality, and reimbursement (Dimick, 2008).

Significance of the Problem

It is possible that the great international efforts of the Surviving Sepsis Campaign from 2004 to 2008 had an impact on the identification of sepsis as a secondary diagnosis, but the mortality rate for sepsis as a principle diagnosis did not decrease significantly (16.7% to 16.3% decrease in 9 years). "From 1993 to 2009, septicemia-related hospital stays more than doubled (cumulative growth of 99 percent)" (Elixhauser, et al., 2011). The number of deaths associated with septicemia was 34,828, and sepsis was listed as the tenth leading cause of death in 2007 (Centers for Disease Control and Prevention, 2011). The preliminary data for 2009 reports 35,587 deaths (CDC, 2011).

According the Surviving Sepsis Campaign, mortality rates for sepsis may be higher than the statistics show, because "patients usually die of sepsis during the course of an underlying disease, and deaths are often attributed to these conditions rather than to sepsis (www.survivingsepsis.org, 2011). The previous statement infers the possibility of skewed statistics due to poor documentation or coding inaccuracies, because if sepsis or septicemia is

documented in the record, it should be coded and would thereby be included in the statistics. The data listed above was extracted based on the ICD-9 codes assigned, and therefore only accounts for cases in which septicemia or sepsis was documented in the record and then coded.

ICD-9 stands for International Classification of Diseases – Ninth Revision, which is the coding and classification system that was used by hospitals in many countries, including the U.S. until October 1st of 2015. The mortality rates listed in the statistics mentioned above are based on data from ICD-9 codes, which means that if the data was incomplete, the mortality rates could be inaccurate or reported as lower than the actual number. This has significant implications for hospitals, as their mortality rates are based on the data reported in the coding summaries. Hospital inpatient coders are only allowed to assign diagnosis and procedure codes based on documentation by physicians or healthcare providers that are qualified to diagnose patients ("American Medical Association: ICD-9 Official coding guidelines 2009," n.d.). They are not allowed to assign codes based on nursing or respiratory therapy or any other discipline's documentation. Therefore, the hospital must depend on physicians or providers to document every diagnosis that requires management or treatment, in order for the appropriate ICD-9 codes to be reported (Bryant, et al., 2010). In October of 2015, ICD-10 (International Classification of Diseases, 10th Revision) became the required coding and classification system used by all acute care hospitals, which requires even greater specificity in provider documentation in order for the appropriate codes to be assigned (Breuer & Arquilla, 2011). The number of codes increased from approximately 13,000 in ICD-9 to approximately 68,000 codes in ICD-10 (Kuehn, 2009).

Problem Statement

The Surviving Sepsis Campaign, initiated in 2004 and updated in 2008 and 2012, is a highly regarded set of guidelines for sepsis treatment. It supports the early identification and treatment of sepsis, as the key to reducing mortality and length of stay associated with the

diagnosis (www.survivingsepsis.org, 2011). According to the Surviving Sepsis Campaign guidelines, identification of sepsis is the first step to treating it, so that is why hospital administrators chose sepsis as the first focus topic for this new Clinical Documentation Improvement program (www.survivingsepsis.org, 2011). In an effort to assist physicians in appropriately documenting sepsis, registered nurses, working as clinical documentation specialists, reviewed records for signs, symptoms, diagnostic tests, and treatments of sepsis. If documentation of the patient's condition appeared incomplete or did not support the clinical picture or treatments administered, then physicians were queried to clarify the documentation, so the appropriate diagnosis could be coded. The appropriate coding of diagnoses and procedures impacts length of stay, patient acuity and risk-adjusted mortality, quality and data reporting, and reimbursement for the hospital (Grogan et al., 2004). Documentation of non-specific diagnoses, when greater specificity is possible, can negatively impact reimbursement and quality reporting. For example, the diagnosis of acute kidney failure is linked to a higher severity of illness / risk of mortality and a higher reimbursement value than kidney failure, unspecified. Incomplete documentation or inaccurate coding based on poor documentation can place a hospital at risk for audits, non-compliance, inaccurately low quality scores, and lost revenue. Accurate and complete medical records can also positively impact patient care by providing a better communication tool among providers, which promotes patient safety, early recognition, and proper treatment.

Purpose Statement

The purpose of this study is to evaluate the impact of a new clinical documentation improvement program on sepsis documentation, quality reporting, and hospital reimbursement in three hospitals. Prior to the implementation of a new Clinical Documentation program, the major form of communication between physicians and coders regarding the physician's

documentation consisted of written or electronic retrospective coder queries, which are done after the patient is discharged. With the implementation of a Clinical Documentation program, nurses practicing as Clinical Documentation Specialist (CDS) nurses query physicians concurrently or prior to the patient's discharge. Their queries can be in verbal, written, or email format. CDS nurses also provide education for physicians regarding their documentation. This study will evaluate the impact of this program by performing a retrospective chart review of the pre and post-implementation phase, and use certain metrics that will be further described to measure the impact on quality and reimbursement. The program's impact on sepsis documentation will be measured by the change in the number of sepsis-related query opportunities in patients with a urinary tract infection coded as the principal diagnosis in both the pre and post-implementation phase. Other measures may include the pre and post-program implementation change in the hospitals' mortality rate for patients with a principal or secondary diagnosis of sepsis, the number of urosepsis and sepsis coding queries, the frequency of sepsis or septicemia documentation as a principal or secondary diagnosis, the number of cases with a urinary tract infection coded as the principal diagnosis, the number of sepsis indicators present in cases with urinary tract infection coded as the principal diagnosis in the sample and those that include documentation of urosepsis, the number of sepsis-related DRGs, and the potential dollar impact of queries related to urosepsis.

Chapter Two

Literature Review

PubMed, Google Scholar, Ovid, EBSCO Host, and CINAHL were the main databases used to find the articles referenced in this study. Keywords used to search for articles included: clinical documentation, documentation improvement, APR-DRG's, MS-DRG's, coding, patient severity, risk of mortality, risk-adjusted mortality, sepsis, septicemia, acuity, severe sepsis, septic shock, sepsis bundle, Surviving Sepsis Campaign, better documentation, better care, performance improvement, public reporting, and mortality rates.

Clinical Documentation Improvement Programs

Purpose. Clinical Documentation Improvement (CDI) Programs are gaining popularity in hospitals due to the increasing need for more accurate and complete documentation. Evidence in the research supports the theory that Clinical Documentation Improvement Programs can lead to better documentation, better care, audit protection, and higher reimbursement (Dimick, 2008). Coding the appropriate severity of illness and risk of mortality related to patient diagnoses and procedures depends on accurate and complete physician documentation. CDI Programs help facilitate accurate coding through physician queries and education that leads to more accurate and complete documentation. Patient severity of illness and risk of mortality indicators directly impact quality reporting and reimbursement (Rollins, (2009). DRG stands for diagnosis-related group, and "DRG classification represents similar resource consumption and length-of-stay patterns so that reimbursement is based on these expectations" (Spurgeon, et al., 2011, p. 155). It is a measure of resources utilized to care for patients based on their diseases or diagnoses and services required to treat those diagnoses. The MS-DRG or Medicare Severity – DRG system was implemented by CMS (Centers for Medicare and Medicaid Services) in 2007 and adjusts for patient severity of illness (Spurgeon, et al., 2011). This requires providers to be cognizant of

their documentation, as each secondary diagnosis is rated for severity of illness and risk of mortality on a scale of 1, being minor, to 4, being extreme or most severe (Spurgeon, et al., 2011). Complications and comorbities (CC's) and major complications and comorbidities (MCC's) are terms used in the MS-DRG system for diagnoses that can drive the DRG assignment to a higher paying DRG or increased reimbursement. They are typically assigned to diagnoses that reflect a higher severity of illness and require more expensive treatment (Rollins, 2009). With decreasing reimbursement from DRG-based payers and value based purchasing, implemented by the Centers for Medicare and Medicaid, the need for the most specific and appropriate documentation has increased, so CDI Programs were developed in order to accommodate the need for better documentation when the MS-DRG system was initiated in 2007, (Breuer & Arquillo, 2011).

Structure. Some Clinical Documentation Improvement programs are managed by the Health Information Department. Others may be a part of the Case Management department or Finance or Quality. The designated department for a Clinical Documentation program depends upon each individual hospital or institution, the focus of the program, and the responsibilities of the staff. Some programs may assign other additional chart-review responsibilities to the Clinical Documentation Specialists, depending on the needs of the department. For example, a CDI program in a Case Management department may task their CDSs with also reviewing records for level of care, medical necessity, or utilization review, whereas, as a CDI program in a Quality Department may require their staff to review for Core Measures or other quality measures in addition to reviewing the physician's documentation of diagnoses and procedures (Dimick, 2008).

Performance tracking. Several metrics are used to measure the impact of a CDI program. Case mix index is a metric used to determine reimbursement, as it reflects the "level of resources

required for patient care" (Breuer and Arquillo, 2011). The All-patient-refined DRG (APR-DRG), which is proprietary to 3M, a company that sells coding software and references, is used to measure patient severity of illness (SOI) and risk of morality (ROM) (Spurgeon et al., 2011). APR-DRG's (DRGs) classify all inpatient admission based on the SOI and ROM levels represented by *International Classification of Disease,* ninth revision (ICD-9) codes (Spurgeon et al., 2011). ICD-9 was the coding and classification system used for hospital inpatient coding from 1975 until October 1st of 2015, when ICD-10 was implemented. Many CDI programs also track the number of queries placed by the Clinical Documentation Specialists (CDSs). Program managers or staff also track the percentage of queries answered or query response rate, the query agree rate (percentage of queries validated with a physician response that further clarification was needed), the estimated financial impact, and change in SOI and ROM.

Staffing. Clinical Documentation Specialists (CDSs) are usually either coders or registered nurses. Some programs are staffed with both coders and nurses, and some even employ doctors, nurse practitioners, or physician assistants. Some programs may have a physician champion or liaison, a manager, or a consultant. Often the manager or consultant will be responsible for performance tracking and data analysis. A physician liaison or champion can help with physician communication, peer-to-peer education, and address physician issues, such as incomplete records, missing dictations, repeated documentation issues, or poor query response (Bryant, et al., 2010).

Benefits. A successful CDI program offers many benefits to an organization, its providers, and patients. A rise in the hospital's case mix index results in increased reimbursement for services, as it reflects a higher patient severity of illness and increased utilization of resources. CDI programs can facilitate an increase in the case mix index or CMI by educating providers to document greater specificity of diagnoses. Rollins (2009) uses the example of heart failure

specificity to illustrate how more specific codes can lead to different DRG assignments. A diagnosis of heart failure, unspecified, does not carry the same reimbursement power as a diagnosis of acute on chronic diastolic congestive heart failure. The added specificity changes the diagnosis from a CC to an MCC, which can cause a significant increase in reimbursement, depending on the principle diagnosis and DRG-assignment (Rollins, 2009).

Queries

A query is the communication tool used by Clinical Documentation Specialists and hospital coders to clarify information within the record that is documented by providers (physicians, nurse practitioners, and physician assistants). Queries can be in verbal, written, or email format, and may be kept as a part of the permanent record, depending on the decision of each individual facility or institution. The American Health Information Management Association (AHIMA) has written guidelines for the query process (AHIMA, 2008). Their practice brief, *Managing an Effective Query Process* outlines the query process and offers recommendations to ensure that queries are formatted in a non-leading manner (AHIMA, 2008). Those guidelines were updated in 2013 when AHIMA published the It is important that queries provide "clinically supported options, include clinical indicators, and must not result in a yes/no answer (with the exception of present on admission status)" (Bryant, et al., 2010, p. 49). The Clinical Documentation Specialist RN or coder provides clinical indicators on the written query form or in discussion with the provider, as a means to support the reason for the clarification request (Bryant, et al., 2010).

Hospitals may choose whether or not to keep queries as a permanent part of the medical record, however, query records must be available upon request to auditors, regardless of the query's status or the hospital's decision (Bryant, et al., 2010). This requirement should motivate

CDI programs to carefully construct their queries in a non-leading manner, regardless of whether or not the queries remain in the record.

Clinical Documentation Specialists may query for a variety of reasons. Examples of information one may request in a documentation-related query include specificity of a diagnosis such as acuity, etiology, type, severity, stage, class, etc. Other queries may ask a physician to document a diagnosis to validate lab findings, medication administered, or other treatments provided (Bryant, et al., 2010). A sepsis-related query may ask a physician to review patient-specific clinical indicators and choose a diagnosis that best explains the clinical picture and documentation. Terms that physicians or providers commonly use such as urosepsis and bacteremia are not consistent with current coding terminology, and require clarification from physicians in order for coders to assign the appropriate diagnosis code. For example, a physician may document the term urosepsis and mean that the patient is septic due to a urinary tract infection, but the sepsis code cannot be assigned based on the documentation of urosepsis. A code would only be assigned for a urinary tract infection, unless the physician explicitly documented or dictated the term sepsis (*ICD-9-CM Standard for hospitals 2011.,* 2010). In ICD-10, there is no code associated with the term urosepsis, so a clarification query is necessary every time the word is used.

Physician Collaboration and Response

Physician participation or response is imperative in order for a CDI program to be successful. Dimick (2008) recommends a CDI program "focus on the improvements it can bring to quality of care and public reporting of severity of illness" in order to gain physician participation (p. 42). A physician champion or advisor can assist with educating the medical staff by providing educational presentations at meetings, writing articles for the hospital newsletter, and communicating with individual physicians (Bryant, et al., 2010).

Education is a major component of any successful CDI program. Provider education must be ongoing and takes many forms, including the query process. One-on-one education and attending physician group meetings are two other effective methods used by the CDI program (Dimick, 2008). Clinical Documentation Specialists audit the records and provide feedback to physicians through queries. This form of audit and feedback is used to inform physicians what information is needed in their documentation. "Audit and feedback has been used for decades as a strategy for changing the clinical practice behaviors of health care personnel," (Hyson, Best, & Pugh, 2006, p. 2).

Documenting Sepsis

Documenting sepsis is critical in order to capture the appropriate severity of illness and risk of mortality for public reporting and appropriate reimbursement. It also ensures that the patient's condition will be clearly communicated in the medical record for all to read, including patients who may request a copy of their medical record, nursing staff, other providers, insurance reviewers, auditors, and coders. Incomplete documentation of sepsis or septicemia (or any diagnoses) may lead to errors or delays in treatment. According to an article that evaluated the results of the Surviving Sepsis Campaign's international guideline-based performance improvement program targeting severe sepsis, "The observation that early detection of infection and institution of antibiotic therapy led to improved survival is consistent with both empirical data and generally held professional opinion" (Levy, 2010, p. 227). Improper documentation or failure to document sepsis can also lead to decreased reimbursement for services provided, inaccurate coding, public reporting, and risk-adjusted mortality rates that do not reflect the patient population treated a facility.

Some providers still use the term urosepsis to describe sepsis caused by a urinary source. There is no corresponding ICD-10 code to assign for the term urosepsis, so a provider must be

queried for clarification if the diagnosis of urosepsis is documented. Prior to the implementation of ICD-10 on October 1st 2015, coders were required to either query the provider or assign the corresponding ICD-9 code for urinary tract infection if urosepsis was documented (International Classification of Diseases – Ninth Revision). Another term used to describe sepsis is bacteremia, which results in a code assignment that indicates only a lab finding. The codes assigned for urosepsis and bacteremia have lower severity of illness and risk of mortality rankings and associated reimbursement than the code for septicemia or sepsis. This inconsistency in medical and coding terminology has prompted a need for CDI programs, so that documenting providers can be made aware of documentation requirements necessary to maintain compliance for proper reporting of diseases and procedures.

The definition of and diagnostic criteria for sepsis has evolved over the last 25 years. The Journal of American Medical Management (JAMA) published *The third international consensus definitions of sepsis and septic shock,* in February of 2016, which defined sepsis as a "life threatening organ dysfunction caused by a dysregulated host response to an infection" (Singer et al., 2016). These latest recommendations outline an assessment method for diagnosing organ dysfunction called sepsis-related organ dysfunction assessment (SOFA) and the quick or qSOFA (see Appendix E for a table detailing the SOFA scoring criteria).

The Surviving Sepsis Campaign: *International guidelines for management of severe sepsis and shock*, Dellinger, et al. (2008) previously supported a scheme of diagnostic criteria for sepsis, and defined sepsis "as infection plus systemic manifestations of infection (p. 2). The scheme included various signs and symptoms, lab values, secondary diagnoses, etc. known as systemic inflammatory response syndrome (SIRS) criteria that may indicate the presence of sepsis. Some of the variables considered in the scheme include the classic SIRS criteria: fever or hypothermia, tachycardia, tachypnea, and leukocytosis. Other variables included in the

scheme were: lacticemia; altered mental status; significant edema; hyperglycemia in the absence of diabetes; leucopenia; normal white blood cell count with > 10% immature forms; plasma C-reactive protein > 2; plasma procalcitonin > 2; arterial hypotension; arterial hypoxemia; acute oliguria; creatinine increase > 0.5 mg/dl; coagulation abnormalities (INR > 1.5 or a PTT > 60 seconds); ileus; thrombocytopenia; hyperbilirubinemia; and decreased capillary refill or mottling (Dellinger, et al., 2008).

SIRS was also described in a secondary analysis study on septic patients (Crowe, et al., 2010). According this study, a person meets SIRS criteria if they exhibit two or more of the following symptoms: a fever > 38 C or < 36 C, a heart rate > 90 beats/minute, a respiratory rate > 20 breaths/minute or a PaCO2 < 32 mmHg, and a WBC > 12,000 or < 4,000 or a differential cell count with > 10% bands (Crowe, et al., 2010). The SIRS score is an instrument that was developed in 1991 at the American College of Chest Physicians/Society of Critical Care Medicine Consensus Conference that assigns one point for each SIRS criterion met (NeSmith, et al., 2009). A score of zero to one does not qualify for SIRS. A score of two is interpreted as mild SIRS, three is moderate, and four is severe. A patient with two or more systemic inflammatory response syndrome criteria and a suspected or documented infection may prompt the CDS to query a provider for a suspected diagnosis of infection, bacteremia, septicemia, sepsis, or septic shock, as long as the indicators are not easily explained by or attributed to another co-existing condition (Pinson, 2016).

Bone, et al., (1992) during a consensus conference in 1992 with the American College of Chest Physicians and the Society for Critical Care Medicine, defined sepsis as SIRS due to infection. SIRS criteria can be referenced in written queries created by the Clinical Documentation Specialists as clinical indicators or supportive evidence. Written template queries request that providers select the appropriate known or suspected diagnosis based on the

clinical indicators referenced in the query and the provider's medical interpretation of the findings. The choices listed in the query must be appropriate for that specific patient and not leading to only one response (Bryant, et al., 2010).

Patient Outcomes

An article evaluating a pre/post-intervention pilot study of Protocol Watch, a bedside clinical decision support system designed to help clinicians adhere to the Surviving Sepsis Campaign guidelines, found that protocol watch implementation improved compliance with the sepsis resuscitation bundle and decreased the time from patient arrival to antibiotic administration (Giuliano, Lecardo, & Staul, 2011). This article stresses the importance of early goal-directed therapy (EGDT) as one of the key recommendations from the Surviving Sepsis Campaign, and states that, "EGDT requires prompt identification and diagnosis of sepsis in patients who are experiencing signs and symptoms" (Giuliano, Lecardo, & Staul, 2011, p. 314). A CDI program can assist providers in the identification of sepsis via queries requesting a diagnostic interpretation of clinical indicators that meet sepsis criteria.

Hospital Reimbursement

Proper documentation of septicemia or sepsis and any associated secondary diagnoses can significantly impact reimbursement by changing DRG assignment. Each DRG has a relative weight, and the relative weight is multiplied by the hospital's base rate (which is calculated based on the hospital's wage-index) to calculate the reimbursement (www.cms.gov/acuteinpatientpps, 2011). Other factors are also considered in the reimbursement calculation, such as the patient's discharge disposition and length of stay and if the hospital is a disproportionate share or teaching hospital (www.cms.gov/acuteinpatientpps, 2011). An MCC is a major complication or comorbidity and usually carries a higher severity of illness and risk of mortality indicator. Examples of MCC's include acute respiratory failure, brain death,

pneumonia, acute systolic congestive heart failure, encephalopathy, coma, and shock. For sepsis, there are three main DRG's: 870 Septicemia with mechanical ventilation for more than 96 hours; 871 Septicemia without mechanical ventilation for more than 96 hours with MCC (major complication or comorbidity); and 872 Septicemia without mechanical ventilation for more than 96 hours without MCC (www.cms.gov/acuteinpatientpps, 2011). The difference in reimbursement with a patient with septicemia as a principle diagnosis who has an MCC and one without can be greater than $10,000. Sepsis requiring ventilator support for greater than 96 hours can impact reimbursement by $50,000.

If sepsis is not documented in the record, but the patient's source infection is documented or assigned as the principle diagnosis instead, the revenue loss can be devastating. Grogan, et al. (2004) acknowledges that incomplete documentation and coding negatively impact quality reporting and reimbursement.

Quality Reporting

The severity of illness and risk of mortality indicators linked to each secondary diagnosis in ICD-9 are used to calculate risk-adjusted mortality rates. Survival rates or adjusted mortality rates can be viewed online on several different public reporting websites. Cassel, et al. (2010), performed a comparison of four popular publicly accessible websites that feature hospital ratings and care data, found that all four entities utilize MedPar or Medicare data to calculate risk-adjusted mortality rates, and consider mortality to be all-cause or do not attribute the cause of death to any one disease or hospital care. The four entities compared were *CMS Hospital Compare*, *U.S. News & World Report Best Hospitals*, *Thompson-Reuters 100 Top Hospitals*, and *HealthGrades* (Cassel, et al., 2010). The comparison study of these four entities found more differences than similarities, especially in their risk adjustment methodology (Cassel, et al., 2010). In fact, not one of the four entities calculated their risk-adjusted mortality rates in the

same manner. *U.S. New & World Report Best Hospitals* was the only entity to use the trademarked 3M APR-DRG methodology, which is based on patient-level data only; CMS "Hospital Compare" used a two-level methodology that considered both patient and hospital data; *Thompson Reuters 100 Top Hospitals* used a logistic regression methodology that accounted for both patient and hospital data; and *HealthGrades* only used patient level data with no explanation of the exact methodology (Cassel et al., 2010). Each of the four entities also had different inclusion and exclusion criteria for hospice and palliative care patients. Two out of four of the entities only included deaths within 30 days from admission in their mortality calculations, one only considered death within the index admission, and one included deaths within the index admission, admit through 30 days post-discharge, and admit through 180 days post-discharge (Cassel, et al., 2010).

The variability in risk-adjusted mortality rate calculations among multiple entities intensifies the need for hospitals to provide the best possible documentation in order to ensure accurate reporting. Educating providers on the importance of documenting each diagnosis to the highest degree of specificity that is true or suspected for that patient is an important message that must be heard and embraced by providers in order for change to occur.

Adding specificity to the record can dramatically increase the associated severity of illness and risk of mortality for each patient (Grogan et al., 2004). "Documentation errors can lead to over or underestimation of expected mortality, affecting a hospital's comparison with other institutions" (Grogan et al., 2004, p. 468). In a 1-year prospective cohort study performed by Grogan et al. (2004), the authors evaluated the use of a progress note template on documentation improvement by measuring outcomes including APR-DRG, DRG relative weight, and University Healthcare Consortium (UHC) predicted mortality. They found that all three of the above-mentioned outcomes were higher in the intervention group and estimated that

if all providers would correctly document each patient's comorbidities at their hospital, the observed-to-expected mortality ratio comparisons would decrease 7 % to 10% (Grogan et al., 2004).

Summary

Evaluating sepsis documentation in a CDI Program may be a productive strategy to show the potential positive impacts a CDI Program could have at a hospital, because sepsis as a principle diagnosis can often increase reimbursement. Without clear, complete documentation of sepsis as the principle or secondary diagnosis, sepsis cannot be coded. Clinical Documentation Improvement Programs can facilitate accurate coding by querying physicians when they find incomplete or missing documentation. Clinical Documentation Specialist nurses review the records to ensure that there is a diagnosis to explain every treatment or medication administered and every significant finding in lab or diagnostic reports that requires utilization of hospital resources or staff. Clinical Documentation Specialists evaluate provider documentation of all diagnoses and procedures throughout the record, but the focus topic of this program in its first quarter was sepsis. Clarifying the record for quality patient care and accurate reporting are the two main goals for most documentation programs. By accomplishing those two goals, programs inevitably make a positive financial impact and increase the APR-weight and SOI & ROM of the queried records.

Theoretical Framework

John Kotter's 8-step change process details the steps an organization must take to successfully implement change. Kotter (2011) believes that seventy-five percent of a company's management must agree with and believe in a change in order for it to successfully occur (www.mindtools.com/pages/article/newPPM_82.htm,). Kotter's work (1995) outlines eight-steps to implementing change: (a) create urgency; (b) form a powerful coalition; (c) create

a vision for change; (d) communicate the vision; (e) remove obstacles; (f) create short-term wins; (g) build on the change; and (h) anchor the changes in corporate culture (www.mindtools.com/pages/article/newPPM_82.htm).

These steps toward organizational change can be applied to the implementation of any new program that requires change. This process seems helpful and fitting for this new CDI program, as the program's success depends on the physician's willingness to change their current documentation practices. A Clinical Documentation Program can create urgency by raising awareness of future healthcare changes that will impact physician's online profiles and reimbursement. Currently, only hospital's online profiles are linked directly to their own risk-adjusted mortality rates, but it is possible that in the near future, some public reporting agencies will link risk-adjusted mortality rates to individual physicians. The Centers for Medicare and Medicaid are now collecting data for a two-year period that will link mortality rates to individual physicians, based on the attending physician at the time the patient is discharged from the hospital.

Currently, hospitals and physicians bill Medicare and private insurance companies separately, but with the advent of value-based purchasing, Accountable Care Organizations (ACOs), and bundled payments, physicians may soon be sharing reimbursement from the Centers for Medicare and Medicaid (Gapenski & Pink, 2011). An ACO is an organized group of providers that must apply to Medicare to share in cost saving from the Centers for Medicare and Medicaid. An ACO must meet certain quality measures, agree to report on certain quality measures, be accountable for a group of patients, and participate in the program for three years. Bundled payments were initiated in some hospitals in 2013, and involve groups of providers (hospital, physicians, post-acute, nursing homes, home health, etc.) to share one payment for each episode of care, and an episode of care could mean hospital stay and post-discharge. Value

Based Purchasing (VBP) is a term used to describe the program that CMS (Centers for Medicare and Medicaid) that was implemented in 2013, in which payment to hospitals form CMS is based on the hospital's performance on quality measures (Gapenski & Pink). This requires physicians and hospitals to work together to minimize unnecessary costs by providing quality, fiscally responsible healthcare and ensuring that documentation is complete and accurate to support accurate coding and reimbursement.

Step two of Kotter's 8-step process, which is to form a powerful coalition, can be achieved if Clinical Documentation Specialists work closely with the hospital inpatient coders and physicians to create a team atmosphere. Steps three and four, creating and communicating the vision for change, will require the CDS nurses to regularly educate hospital physicians, nurses, and coders on the goals of the program. Communicating a clear vision for changing the way physicians approach documentation, so the record is complete and accurate for coding will require repetition and creative marketing. Every attempt to sell the program to physicians should include emphasis on accuracy in quality reporting, the transition to ICD-10, which requires greater specificity, and bridging the gap between coding and medical terminology. Removing obstacles is step five, and physicians see many obstacles to improving their documentation. The one that is most often stated is time. It is critical to the mission of the Clinical Documentation Program to create ways to save physicians time. CDS nurses can facilitate the logistics of improving documentation by participating in committees aimed at creating progress note templates that include the proper terminology required for accurate coding (Spurgeon, et al., 2011).

Creating short-term wins is step six, and may be as simple as recognizing physicians for excellent documentation, providing feedback to physicians on their participation and progress in the program (Breuer & Arquilla, 2011). Building on the change and anchoring the changes in

corporate culture are steps seven and eight, and require constant re-evaluation of the program, its impact, and positive reinforcement of progress, flexibility with ineffective approaches, and administrative support and enforcement of rules and regulations. A constant and reliable presence created by dependable, knowledgeable CDS nurses coupled with a thorough understanding of the program and its goals by physicians and coders may solidify the foundation of a long-lasting program (Breuer & Arquilla, 2011).

Chapter Three

Methods

Design

This pre/post-implementation, non-randomized, non-experimental retrospective chart review will be done to evaluate the impact of a new Clinical Documentation Improvement Program on sepsis documentation, quality reporting, and reimbursement. The Clinical Documentation Improvement Program was implemented at Scripps Memorial Hospital, La Jolla in March of 2011, Scripps Encinitas in December of 2011, and Scripps Chula Vista in 2013. This program was implemented, because Scripps wanted to improve physician documentation to ensure accurate coding. The Clinical Documentation Program at each hospital was a part of the Health Information Department and consisted of one to two full time registered nurses that worked as Clinical Documentation Specialists to help physicians with their documentation. The nurses worked directly with the physicians and hospital coders to identify documentation in the medical records that requires clarification or greater specificity for coding purposes. A Clinical Documentation Specialist nurse may ask a physician to document a diagnosis to explain a treatment or clinical picture, specify a diagnosis, or specify the present on admission status of a condition. These types of clarifications make it possible for the hospital coder to assign the most specific code available.

A retrospective electronic chart review of records for three months prior to the program's implementation and four years post-program implementation will be performed to collect data. Medical records of hospitalized adult patients with a urinary tract infection coded as the principal diagnosis and without sepsis or septicemia coded as a secondary diagnosis during the study period from December 2010 to Dec 2014. In the post-implementation phase, records will be reviewed again using a similar data abstraction tool used to review records in the pre- and post-

implementation phase. If a chart is found to have a query opportunity for sepsis in the pre-implementation phase or if the patient had two or more indicators for sepsis, the potential impact in CMS-weight, estimated dollars, SOI/ROM, or APR-weight, will be measured and recorded, as if the query was answered with the expected response, sepsis. The controls in the pre- and post-implementation group will be adult inpatients with a urinary tract infection that was documented and coded as the principal diagnosis, but without a code assigned for sepsis or septicemia, admitted through the emergency department and not admitted for elective surgery.

Setting/Sample

This study will be conducted at three hospitals. One is a 312-bed tertiary care magnet hospital, the second is a 183-bed community hospital, and the third is a 154-bed tertiary hospital. All three hospitals have an emergency room. Charts will be included in the pre-and post-implementation group if they are of adult inpatients with a urinary tract infection coded as the principal diagnosis, but without septicemia, sepsis, or septic shock coded. Charts will be excluded if sepsis, septicemia, or septic shock was coded in the coding summary. They will also be excluded if there is no infection coded or if they are admitted for elective surgery or are not admitted through the Emergency Department in order to identify missed opportunities for sepsis-related queries. The sample size will be approximately 50 charts, approximately 25 each in both the pre and post-implementation groups.

Instruments

The same data abstraction tool will be used for both groups. It is the exact criteria for the Surviving Sepsis Campaign table published in 2012 that includes the same criteria published by the Surviving Sepsis Campaign from 2001. It includes the hospital name, patient's age, gender, ethnicity, infection coded, fever or hypothermia, tachycardia, tachypnea, and leukocytosis, lacticemia; altered mental status; significant edema; hyperglycemia in the absence of diabetes;

leucopenia; normal white blood cell count with > 10% immature forms; plasma C-reactive protein > 2; plasma procalcitonin > 2; arterial hypotension; arterial hypoxemia; acute oliguria; creatinine increase > 0.5 mg/dl; coagulation abnormalities (INR > 1.5 or a PTT > 60 seconds); ileus; thrombocytopenia; hyperbilirubinemia; and decreased capillary refill or mottling (Dellinger, et al., 2008) (see Appendix A for the data abstraction tool). The demographic form information is included in the data abstraction tool.

Procedure

Based on reports of data collected from coding summaries, a sample of approximately 50 records will be chosen from December 2010 to March 2011 for the pre-implementation phase. These records representing the pre-implementation phase will be reviewed using the data abstraction tool, which is based on a table from an article on sepsis published in the New England Journal of Medicine that is consistent with the 2008 and 2012 Surviving Sepsis Campaign International Guidelines for Management of Severe Sepsis and Septic Shock sepsis definitions and criteria (Angus & van der Poll, 2013) (Dellinger et al., 2008, 2012) (see Appendix A for data abstraction tool). The same data abstraction tool will be used to review records in the post-implementation phase.

In order to ensure patient confidentiality, all protected health information will be de-identified prior to sharing results. The IRB review was waived due to the fact that there was no inherent risk to patients in a retrospective chart review (see Appendix B for a copy of the email communication). I received confirmation from the Director of Quality at Scripps Memorial Hospital La Jolla and the corporate VP of Health Information and Patient Financial Services stating that no IRB review was necessary. Each patient's privacy will be protected through de-identification of protected health information, and the only demographic information that will be abstracted is the patient's age, gender, and ethnicity. Therefore, there is virtually no risk to the

patients of violation of privacy rights. There are no direct benefits involved for the individual patients in this study. Most benefits to patients are indirect, as the program currently primarily benefits the hospital, its reputation, and reimbursement. Patients can benefit from timely, accurate documentation, as this prevents delays in patient care and facilitates accurate billing, which impacts the patient's experience. Any benefit to the hospital could indirectly benefit patients that receive care or services at that hospital, as the hospital depends on accurate reimbursement and consumer support to maintain operation.

No written consent was necessary for this retrospective chart review, as each patient's hospital informed consent for treatment covers the potential use of de-identified health information for study purposes. Careful attention to the de-identification process will be given to ensure that every piece of identified health information is either concealed in a computer and protected by password encryption or shredded in locked hospital shredding bins designated for disposal of patient information.

Data collection for the pre-implementation group will be done using an electronic medical record system and reports printed based on coding summaries. Health Information Department reports will be used to identify 25 records in the pre-implementation phase that meet the inclusion/exclusion criteria. The principal investigator will then gain access to the McKesson data base to review each electronic medical record and ensure that each record meets the inclusion / exclusion criteria. Once it has been determined that a record meets the criteria for review, the record will be more thoroughly reviewed using the data abstraction tool. Data collection for the post-implementation group will be done using the McKesson electronic health record repository Horizon Patient Folder (HPF), Centricity electronic health record, and 3M Health Data Management (HDM). Each record will be reviewed using the post-implementation data abstraction tool.

Data will be stored in a password-protected computer, and only the researchers will have access to the data. Data from the pre- and post-implementation groups/phases will be collected with the data abstraction tool. Records from the pre-implementation group that have urinary tract infection coded as the principal diagnosis and 2 or more sepsis indicators will be considered a missed query opportunity. The data recorded will then reflect the potential revenue in estimated dollars and change in CMS-weight that would have occurred if a query had been placed and answered with a response of sepsis. CMS-weight and the estimated reimbursement in dollars will be abstracted for both pre- and post-phases.

Data Analysis

Descriptive statistics will be utilized to calculate the frequencies, percentage, means, medians and standard deviations. Independent t-test and chi square test will be performed to compare the outcome variables between the pre- and post-implementation data. Analyses will be performed using Microsoft Excel. For the purpose of this study, the significance level will be set at 0.05.

Chapter Four

Results

Pre-Implementation Group

Seventy-two percent of all of the patients in the pre-implementation group had at least two or more sepsis indicators. Twenty-eight percent of records included documentation of urosepsis, and 100% of records with urosepsis documentation had at least 2 or more sepsis indicators, meeting the Surviving Sepsis Campaign Criteria for sepsis. Sixty percent of the patients had altered mental status, 32% had tachycardia, 32% had an elevated WBC, 28% had hyperglycemia in the absence of diabetes, 16% had hyperlactatemia, and 16% had an elevated temperature. The mean number of sepsis indicators per patient for all patients in the pre-implementation group was 2.2, but it was 2.7 when only including records with urosepsis documentation. The sample standard deviation for the number of sepsis indicators per patient was 1.3229, and the population standard deviation for the same group was 1.2961.

Sample Demographics

The mean age was 79.32 in both groups. The pre-implementation group consisted of 80% female patients. Fifteen of the 25 records were pulled from one site, and 5 records each were pulled from two other sites in both the pre and post groups.

Post-Implementation Group

Sixty-eight percent of all patients in the post-implementation group had at least 2 or more sepsis indicators. Twenty percent of records included urosepsis documentation, and 80% of those with urosepsis documentation had at least 2 or more sepsis indicators. Forty-eight percent of patients had tachycardia, 48% had altered mental status, 40% had an elevated white blood cell count, 32% had tachypnea, 28% had hyperlactatemia, and 20% had hyperglycemia in the

absence of diabetes. The mean number of sepsis indicators per patient for all patients in the post-implementation group was 2.56, but it was 3 when only including records with urosepsis documentation. The sample standard deviation for the number of sepsis indicators per patient was 1.4742, and the population standard deviation for the same group was 1.4444.

Comparison

Descriptive and inferential statistics were utilized to compare the two groups. There was a decrease in the number of records with urosepsis documentation in the post-implementation group, however, the small sample size may have diluted the significance. Both groups had the exact same mean age and similar demographics, so the pre and post-implementation populations were comparable. The number of records with at least two or more sepsis indicators only differed by one between the two groups. A two-sample t-test assuming unequal variances was performed, which revealed no statistically significant differences between the pre and post-implementation groups with respect to the sample demographics or the number of documentation opportunities or sepsis indicators present. The result was 2.032244509, and the significance level was set at < 0.05. In conclusion, the implementation of a Clinical Documentation Improvement Program had no significant impact on the documentation of sepsis consistent with the latest published diagnostic criteria at that time, based on this study. Results and comparisons are shown in Tables 1 through 6.

Table 1: Overall comparison of pre and post intervention metrics

Metrics	Pre	Post
2 or more sepsis indicators	72%	68%
Urosepsis documented	28%	28%
2 or more sepsis indicators if urosepsis documented	100%	80%
Mean # of sepsis indicators per patient	2.2	2.56
Mean # of sepsis indicators per patient with urosepsis	2.7	3
Sample standard deviation for # of indicators per patient	1.3229	1.4742
Population standard deviation for # of indicators per patient	1.2961	1.4444

Table 2: Sepsis indicator comparisons for pre- and post-implementation samples

Metrics	Pre	Post
Altered Mental Status	60%	48%
Tachycardia	32%	48%
Elevated White Blood Cell Count	32%	40%
Hyperglycemia in the Absence of Diabetes	28%	20%
Hyperlactatemia	16%	28%
Fever	16%	0%
Tachypnea	0%	32%

Table 3: Pre- and post-implementation sample characteristics

Results	Pre	Post
Average Age	79.32	79.32
Number of Female Patients	20	17
Number of Male Patients	5	8
Number of Patients from Site 1	15	15
Number of Patients from Site 2	5	5
Number of Patients from Site 3	5	5
Number of White Patients	11	11
Number of Asian-Pacific Patients	3	0
Number of Hispanic Patients	10	13
Number of African-American Patients	1	1
Average Length of Stay	5.64	5.2
Number of Patients with DRG 690	15	14
Number of Patients with DRG 689	10	11
Average Number of Sepsis Indicators per Patient	2.2	2.56
Number of Cases with 2 or More Sepsis Indicators	18	17
Number of Cases with Urosepsis Documented	7	5
Number of Cases with Urosepsis Documented and 2 or More Sepsis Indicators	7	4
Total number of patient records in sample (n)	25	25

Table 4: T-test results

T-Test	Pre	Post
t-Test: Two-Sample Assuming Unequal Variances		
	Variable 1	*Variable 2*
Mean	13.56444444	13.22666667
Variance	312.9068967	315.7206588
Observations	18	18
Hypothesized Mean Difference	0	
Df	34	
t Stat	0.057157157	
P(T<=t) one-tail	0.4773773	
t Critical one-tail	1.690924255	
P(T<=t) two-tail	0.954754599	
t Critical two-tail	2.032244509	

Potential Financial Impact

Potential financial impact was calculated based on the estimated DRG-associated reimbursement for Medicare patients, since the average patient age was 79.32 in both groups. A DRG-shift would occur if a physician were to answer a clarification query with a diagnosis of sepsis. In order to calculate the estimated financial impact of improved documentation, the number of patients that met the sepsis criteria but did not have sepsis coded is multiplied by the dollar amount associated with a DRG shift from either 689 to 871 or 690 to 872, depending on the original DRG. The dollar impact of a shift from DRG 689 to 871 is $7,447.94, and the change in CMS-weight is 0.7105 per case. The dollar impact of a shift from DRG 690 to 872 is $2,724.44, and the change in CMS-weight is 0.2599 per case. These values are based on the blended Medicare rate for each hospital that is multiplied by the CMS relative weight to calculate the estimated reimbursement. These values do not take into consideration any outlier

or length of stay-based adjustments. There were 8 patients with at least 2 or more sepsis indicators in the pre-implementation group with an original DRG of 689 and 10 with an original DRG of 690. Therefore, the total potential financial impact of sepsis queries for the pre-implementation group was $86,827 ((8 x $7,447.94) + (10 x $2,724.44)). The financial impact of the potential DRG shifts for the post-implementation group patients with at least 2 or more indicators was $88,826.98 ((9 x $7,447.94) + (8 x $2,724.44)). If only patients with urosepsis documentation and at least 2 or more sepsis indicators are considered for the financial impact, then the pre-implementation group had a potential impact of $33,241.58 versus $29,791.76 in the post-implementation group. Potential reimbursement and length of stay impact estimates are shown in Table 5.

Table 5: Potential reimbursement and length of stay impact

Metric	Pre	Post
DRG-Shifts from 689 to 871 Value: $7,447.94, 2 additional days	8	9
DRG-Shifts from 690 to 872 Value: $2,724.44, 1.5 additional days	10	8
Expected Length of Stay (Extra Days)	31	30
Total $ Impact	$86,627	$88,827

Quality Data

Morality data was found on the HealthGrades website, which has a data lag 1-4 years, depending on the medical specialty area of the sourced data. The in-hospital mortality rates for one of the three hospitals evaluated improved from three stars in 2011 to 5 stars in 2016. Five stars represent a survival or mortality rating of better than the national average, three stars

represents the average, and one star represents worse than average for the specified specialty area, diagnosis, or procedure. The other two of the three hospitals were rated with 5 stars in both 2011 and 2016. HealthGrades overall mortality rate comparisons of the three hospitals to other local San Diego hospitals are shown in Table 6.

Table 6: Healthgrades mortality rate comparisons for 2011 and 2016

Hospital	2011 Hospital	2011 30-Day	2016 Hospital	2016 30-Day
Scripps Memorial La Jolla	★★★	★★★★★	★★★★★	★★★★★
Scripps Mercy	★★★★★	★★★★★	★★★★★	★★★★★
Scripps Mercy Chula Vista	★★★★★	★★★★★	★★★★★	★★★★★
Scripps Encinitas	★★★★★	★★★★★	★★★★★	★★★★★
Scripps Green Torrey Pines	★★★★★	★★★★★	★★★★★	★★★★★
UC San Diego	★★★★★	★★★	★★★★★	★★★★★
Sharp Memorial	★	★	★	★
Sharp Grossmont	★	★	★	★★★
Sharp Chula Vista	★★★★★	★★★	★★★	★★★★★
Sharp Coronado	★★★	★★★	★★★	★★★
Palomar	★★★	★★★	★★★	★★★
Pomerado	★★★	★★★	★★★	★★★
Alvarado	★★★★★	★★★	★★★★★	★★★★★
Paradise Valley	★★★★★	★★★★★	★★★	★★★★★
Kaiser San Diego	★	★	★	★★★

(Healthgrades, 2011, 2016)

Chapter Five

Discussion

Implications for Nursing

Clinical Documentation Specialist nurses and staff nurses alike can help identify patients who meet sepsis criteria in both the Emergency Department and on the nursing units or even in the outpatient setting. "Early recognition saves lives," is the motto of the Surviving Sepsis Campaign (SSC.org, 2016). A query from a Clinical Documentation Specialist may trigger a provider to acknowledge a diagnosis and then treat it accordingly. In this way, a CDS nurse can be a patient advocate.

Changes in diagnostic criteria not only impacts the documentation practices of providers, but most importantly impacts patient care, as well as survival/mortality rates for both sepsis and urinary tract infections. Clinical Documentation Improvement programs may positively impact patient care by sharing the latest diagnostic criteria education.

Study Limitations

Due to the small sample size, the findings may not be generalizable. The records reviewed were from different hospitals with Clinical Documentation Programs of different ages. This may influence the effectiveness of the education shared at each hospital, since certain hospital CDI programs were more established than others.

Hospitals did not have a policy requiring or encouraging all providers to use the Surviving Sepsis Campaign diagnostic criteria, so even though the CDI program shared this education, it was not enforced. Therefore, variation in diagnostic criteria for each provider must be considered.

Each Clinical Documentation Specialist nurse used the same queries and provided the same

educational material to the doctors at their respective hospitals, but the frequency of educational presentations and the percentage of providers educated at each hospital varied. Due to this variation, it is difficult to compare the effectiveness of each Clinical Documentation Program.

Clinical Documentation Specialist nurses educate providers on the latest changes to coding guidelines and the associated diagnostic criteria for frequently documented conditions, such as sepsis. Differing opinions on diagnostic criteria can impact patient care, documentation, and survival rates. Consistent standardized criteria for the diagnosis and treatment of sepsis can positively impact patient care and survival rates. The recent JAMA publication on the third international consensus definitions of sepsis and septic shock recommends different definitions and criteria for sepsis, severe sepsis, and septic shock. The new definition of sepsis is closer to the old definition of severe sepsis, as it requires the presence of organ failure (Singer et al., 2016). This means that patients must be sicker in order to be diagnosed with sepsis. This change in criteria may significantly impact mortality rates.

Considerations for Future Studies

Future studies may consider evaluating only the new sepsis criteria recommended by JAMA using the sepsis-related organ failure scoring method (Singer et al., 2016) and examining the impact of The Joint Commission clinical quality measure for severe sepsis and septic shock on the treatment of sepsis. Evaluating records from only one hospital would minimize the potential impact of variation in provider diagnostic criteria and education delivered by the Clinical Documentation Program.

Conclusion

Literature supports that Clinical Documentation Programs can facilitate accurate and complete documentation, which facilitates quality patient care and accurate coding and data. The data derived from the numerical code assignment of diagnoses and procedures is used to

calculate quality scores and reimbursement. Therefore, in theory, a Clinical Documentation Program should facilitate quality patient care and accurate quality scores and reimbursement. Although the findings from this retrospective chart review were statistically insignificant, a potential positive financial impact was projected based on the study parameters, and the mortality rates of one facility improved between the pre and post program implementation time periods. Future retrospective chart reviews intended to evaluate the impact of a Clinical Documentation Program may be more likely to realize statistically significant findings if the researchers evaluate a larger sample size and are able to better control the variables related to the education of diagnostic criteria and documentation for providers.

References

AHIMA. (2013). Guidelines for achieving a compliant query practice. *Journal of AHIMA,84*(2), 50-53. Retrieved March 27, 2016, from http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_050018.hcsp?dDocName=bok1_050018

American Medical Association: ICD-9 Official coding guidelines 2009. (n.d.). *AMA*. Retrieved November 25, 2011, from www.ama-assn.org/resources/.../icd9cm_coding_guidelines_08_09_full.pdf

Angus, D. C., & Van der Poll, T. (2013). Severe Sepsis and Septic Shock. *New England Journal of Medicine, 369*(21), 2069-2069. doi:10.1056/nejmx130051

Bone, R. C., Balk, R. A., Cerra, F. B., Dellinger, R. P., Fein, A. M., Knaus, W. A., ... Sibbald, W. J. (1992). Definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. The AACP/SCCM Consensus Conference Committee. American College of Chest Physicians/Society of Critical Care Medicine. *Chest*, *101*, 1644-1655. doi: DOI 10.1378/chest.101.6.1644

Breuer, S., & Arquilla, V. (2011). Clinical documentation improvement: focus on quality. *Healthcare Financial Management*, *65*(8), 84-90.

Bryant, G., DeVault, K., Erickson, C., Garrett, G., Haik, W., Holmes, R., & Mandler, E. (2010). Practice brief: practice guidelines for managing health information. Guidance for clinical documentation improvement programs. *Journal of AHIMA*, *81*(5), 45-50.

Cassel, J. B., Jones, A. B., Meier, D. E., Smith, T. J., Spragens, L. H., & Weissman, D. (2010). Hospital mortality rates: How is palliative care taken into account? *Journal of Pain and Symptom Management*, *40*(6), 914-925. doi: 10.1016/j.jpainsymman.2010.07.005

Dellinger, R. P., Levy, M. M., Carlet, J. M., Bion, J., Parker, M. M., Jaeschke, R., ... Vincent, J. (2008). Surviving sepsis campaign: International guidelines for management of severe sepsis and septic shock: 2008. *Critical Care Medicine*, *36*(1), 296-327. doi: 10.1097/01.CCM.0000298158.12101.41

Dellinger, R. P., Levy, M. M., Rhodes, A., Annane, D., Gerlach, H., Opal, S. M., . . . Moreno, R. (2013). Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock, 2012. *Intensive Care Med Intensive Care Medicine, 39*(2), 165-228. doi:10.1007/s00134-012-2769-8

Dimick, C. (2008). Leading clinical documentation improvement: three successful HIM-led programs. *Journal of AHIMA*, *79*(9), 40-47.

Elixhauser, A., Friedman, B., & Stranges, E. (2011). Septicemia in U.S. hospitals, 2009. *HCUP Statistical Brief #122*, 1-13. Retrieved October 10, 2011, from http://www.hcup-us.ahrq.gov/reports/statbriefs/sb122.pdf

FASTSTATS - Leading causes of death. (n.d.). *Centers for Disease Control and Prevention*. Retrieved October 16, 2011, from http://www.cdc.gov/nchs/fastats/lcod.htm

FY 2011 IPPS final rule home page. (n.d.). *Centers for Medicare & Medicaid Services*. Retrieved October 19, 2011, from http://www.cms.gov/AcuteInpatientPPS/IPPS2011/list.asp

Gapenski, L. C., & Pink, G. H. (2011). Understanding healthcare financial management, sixth edition. *Health Administration Press*, 1-10.

Giuliano, K. K., Lecardo, M., & Staul, L. (2011). Impact of protocol watch on compliance with the Surviving Sepsis Campaign. *American Journal of Critical Care*, *20*(4), 313-321.

Grogan, E. L., Speroff, T., Deppen, S. A., Roumie, C. L., Elasy, T. A., Dittus, R. S., ... Holzman, M. D. (2004). Improving documentation of patient acuity level using a progress note template1 , *1. *Journal of the American College of Surgeons*, *199*(3), 468-475. doi: 10.1016/j.jamcollsurg.2004.05.254

Hayden, J. (2009). Motivation and behavior change. In S. DeYoung (Author), *Teaching strategies for nurse educators* (pp. 39-53). Upper Saddle River, NJ: Prentice Hall.

Healthgrades. (n.d.). *Healthgrades Find a Doctor | Doctor Reviews | Hospital Ratings*. Retrieved December 07, 2011, July 10, 2016, from http://www.healthgrades.com

Hysong, S. J., Best, R. G., & Pugh, J. A. (2006). Audit and feedback and clinical practice guideline adherence: Making feedback actionable. *Journal of Implementation Science*, *1*(9), 1-10. doi: 10.1186/1748-5908-1-9

ICD-9-CM 2012 Standard for Hospitals. (2011). Ingenix.

Kochanek, K. D., Xu, J., Murphy, S. L., Minino, A. M., Kung, H., & Division of Vital Statistics. (2011). *Deaths: Preliminary data for 2009* (4th ed., Vol. 59, National vital statistics reports, pp. 1-6) (U.S., U.S. Department of Health and Human Services Centers for Disease Control and Prevention, National Center for Health Statistics). National Center for Health Statistics. Retrieved October 10, 2011, from http://www.cdc.gov/nchs/data/nvsr/nvsr59/nvsr59_04.pdf

Kuehn, L. (2009). Preparing for ICD-10-CM in Physician Practices. *Journal of AHIMA*, *80*(8), 26-29.

Kulstad, C., Crowe, C., Kulstad, E., & Mistry, C. (2010). Comparison of severity of illness scoring systems in the prediction of hospital mortality in severe sepsis and septic shock. *Journal of Emergencies, Trauma, and Shock*, *3*(4), 342. doi: 10.4103/0974-2700.70761

Levy, M. M., Dellinger, R. P., Townsend, S. R., Linde-Zwirble, W. T., Marshall, J. C., Bion, J., ... Angus, D. C. (2010). The Surviving Sepsis Campaign: Results of an international guideline-based performance improvement program targeting severe sepsis*. *Critical Care Medicine*, *38*(2), 367-374. doi: 10.1097/CCM.0b013e3181cb0cdc

Melnyk, B. M., & Fineout-Overholt, E. (2011). *Evidence-based practice in nursing & healthcare: A guide to best practice*. Philadelphia, PA: Wolters Kluwer Health & Lippincott Williams & Wilkins.

Mind Tools. (2011). Kotter's 8-step change model: Implementing change powerfully and successfully. *Mind Tools - Management Training, Leadership Training and Career Training*. Retrieved October 18, 2011, from http://www.mindtools.com/pages/article/newPPM_82.htm

NeSmith, Elizabeth G., Sally P. Weinrich, Jeannette O. Andrews, Regina S. Medeiros, Michael L. Hawkins, and Martin Weinrich. "Systemic Inflammatory Response Syndrome Score and Race as Predictors of Length of Stay in the Intensive Care Unit." *American Journal of Critical Care* 18.4 (2009): 339-46. Print.

Polit, D. F., & Beck, C. T. (2008). *Nursing research: generating and assessing evidence for nursing practice* (Ninth Edition). Philadelphia: Wolters Kluwer Health/lippincott Williams & Wilkins.

Rollins, G. (2009). Clinical documentation improvement gauging the need, starting off right. *AHIMA*, *80*(9), 24-30.

Singer, M., Deutschman, C. S., Seymour, C. W., Shankar-Hari, M., Annane, D., Bauer, M., . . . Angus, D. C. (2016). The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). *Jama, 315*(8), 801-810. doi:10.1001/jama.2016.0287

Spurgeon, A., Hiser, B., Hafley, C., & Litofsky, N. S. (2011). Does improving medical record documentation better reflect severity of illness in neurosurgical patients? *Clinical Neurosurgery*, *58*, 155-163. doi: 10.1227/NEU.0b013e318227049

Understanding Progress in The Management of Sepsis. (n.d.). *Surviving Sepsis Campaign*. Retrieved October 18, 2011, from http://www.survivingsepsis.org

Xu, J., Kochanek, K. D., Murphy, S. L., Tejada-Vera, B., & Division of Vital Statistics. (2011). *Deaths: Final data for 2007* (19th ed., Vol. 58, National Vital Statistics Reports, pp. 1-8) (U.S., U.S. Department of Health and Human Services Centers for Disease Control and Prevention, National Center for Health Statistics National Vital Statistics System). National Center for Health Statistics. Retrieved October 10, 2011, from http://www.cdc.gov/nchs/data/nvsr/nvsr58/nvsr58_19.pdf

Appendix A

Data Abstraction Tool

Blind ID
Site
Year
Age
Gender
LOS
DRG
Race
of Indicators
Urosepsis Documented
Temp >38.3
Temp <36
HR >90
RR >20
AMS
Edema
Hyperglycemia
WBC >12
WBC <4
WBC WNL w > 10% Bands/Stabs
Plasma C-Reactive Protein >2 SD above upper limit of normal
Plasma Procalcitonin >2 SD above upper limit of normal
Arterial hypotension (syst. BP <90 mm Hg; MAP <70 mm Hg; or decrease in syst. BP > 40mmHg or less than two SD below normal for age)
Arterial hypoxemia (ratio of the partial pressure of arterial oxygen to the fraction of inspired oxygen, <300)
Acute oliguria (urine output, <0.5 ml/kg/hr or 45 ml/hr for at least 2 hrs, despite adequate fluid resuscitation)
Increase in creatinine of >0.5 mg/dl (>44 μmol / liter)
INR >1.5 or activated PTT >60 sec
Paralytic ileus (absence of bowel sounds)
Thrombocytopenia (platelet count, <100,000/mm3)
Hyperbilirubinemia (plasma total bilirubin, >4 mg/dl [68 μmol/liter])

Hyperlactatemia (lactate, >1 mmol/liter)
Decreased capillary refill or mottling
Severe sepsis (sepsis plus organ dysfunction)
Septic shock (sepsis plus either hypotension [refractory to intravenous fluids] or hyperlactatemia
CMS-weight
Estimated reimbursement
Estimated change in reimbursement

Appendix B

IRB Waiver | Emails from Dr. Judy Davidson

Davidson, Judy Davidson.Judy@scrippshealth.org to Barbara, Tamara, me, Son,
show details Nov 21

Emily,
Because there is evidence in the literature that this type of clinical documentation program is effective, and you are working on transferring evidence into practice through this project, it will be considered an "Evidence-based practice change project" and not research. Given that the project is already implemented and that you are proposing a retrospective review of records to evaluate the benefit of the program,
there is no inherent risk to patients. Since, there is no risk to patients, and you are transferring evidence into practice to improve a process within Scripps and quantify the results of that improvement, the project will require approval through the department of Quality and not the investigative review board.

With that, I will refer you to Tamara Winkler who is in charge of the Quality Dept. at Scripps La Jolla. She will need to approve your project and log it in to her system.
Please complete a data-use agreement form, and the critical indicator template (attached). The critical indicator template is a simple PICO question plus Plan/Do/Check/Act guide.

Best of wishes as you move forward.
Contact me again if you have further questions.
At your service,

Judy E. Davidson
DNP RN FCCM CNS

Director Research Integration and Management
Scripps Clinical Research Center
619 243 6902
11025 N. Torrey Pines Road
SCRC 200
La Jolla, CA 92037-1030
davidson.judy@scrippshealth.org

Davidson, Judy Davidson.Judy@scrippshealth.org to me, Son show details Nov 21

Emily,

Save the last email I sent you for your school records.
That email serves as evidence that Scripps will not require IRB approval for your project.

If you should write a manuscript from your project,

please adhere to the SQUIRE guidelines for publishing performance improvement efforts that have not undergone IRB approval.
(I sent an attachment about SQUIRE on the last email).

The manuscript will undergo a review process within Scripps prior to submission for publication. Contact me again when you get to that point.

Judy E. Davidson
DNP RN FCCM CNS

Director Research Integration and Management
Scripps Clinical Research Center
619 243 6902
11025 N. Torrey Pines Road
SCRC 200
La Jolla, CA 92037-1030
davidson.judy@scrippshealth.org

Appendix C

Sample Query Forms

Physician Query Form

Permanent Part of the Medical Record

Documentation clarification is required to meet compliance, accuracy in coding and severity of illness reflection. In responding to this query, please exercise your independent professional judgment. The fact that a question is asked does not imply that any particular answer is desired or expected. We greatly appreciate you taking the time to respond to this request.

Date: _____

To:

From: CDS Name
Documentation Specialist
Scripps Memorial Hospital La Jolla
CDS email address
CDS phone number(s)

Subject: Question / Clarification

Questions / Comments:

There is documentation of bacteremia in the clinical record and additional clarification is requested. Per coding guidelines, the term bacteremia refers to the presence of bacteria in the blood and is denoted as a laboratory finding. Please see attached page for coding reporting requirements.

Documentation / Clinical Indicators / Medical Evidence	Location in the medical record

Based on these guidelines please initial the status below (if known) or indicate an alternative diagnosis. Thank you.

[ ] BACTEREMIA

[ ] SEPTICEMIA

[ ] SIRS

[ ] SEPSIS

[ ] Other _____

[ ] Causative organism (if known or suspected) _____

[ ] No further clarification needed, _____ is already documented.

_____ _____

Physician Signature **Date Signed**

Per coding guidelines*:

BACTEREMIA

Applies a code of abnormal lab finding (Defined as the presence of bacteria in the blood).

SEPTICEMIA

Defined as a condition caused by the presence of bacteria, fungi, viruses, or other pathogenic organisms in the bloodstream.

SIRS

Defined as the systemic response to infection **or** trauma, with symptoms including fever, tachycardia, tachypnea, and leukocytosis.

SIRS Criteria per American College of Chest Physicians/Society of Critical Care Medicine:

- Temperature > 38 degrees Celsius or < 36 degrees Celsius
- Heart rate > 90 bpm
- Hyperventilation (RR >20 breaths/min or PaCo2 <32 mm Hg)
- WBC > 12,000 or < 4,000

SEPSIS

Defined as SIRS due to infection

American College of Chest Physicians/Society of Critical Care Medicine defines as:

Clinical or microbiologic evidence of infection along with two out of four of the criteria to demonstrate evidence of SIRS.

*Referenced from Coding Clinic Guidelines for SIRS, Sepsis, Severe Sepsis and Septic Shock

American College of Chest Physicians/Society of Critical Care Medicine. American College of Chest Physicians/Society of Critical Care Medicine Consensus Conference: definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. Critical Care Med 1992; 20: 864-874

SEVERE SEPSIS

Defined as sepsis with associated organ dysfunction.

SEPTIC SHOCK

Sepsis with hypotension, a failure of the cardiovascular system.

*Referenced from Coding Clinic Guidelines for

- SIRS, Sepsis, Severe Sepsis and Septic Shock
- Urosepsis

Name:

AN EVALUATION OFA CLINICAL DOCUMENTATION I Acct #:

Physician Query Form

Permanent Part of the Medical Record

Documentation clarification is required to meet compliance, accuracy in coding and severity of illness reflection. In responding to this query, please exercise your independent professional judgment. The fact that a question is asked does not imply that any particular answer is desired or expected. We greatly appreciate you taking the time to respond to this request.

Date: _____

To:

From: CDS Name
Documentation Specialist
Scripps Memorial Hospital La Jolla
CDS email address
CDS phone number(s)

Subject: Question / Clarification

Questions / Comments:

For accurate coding and severity-of-illness compilation, this query is directed to you. When responding to this query, please exercise your independent professional judgment. The fact that a question is asked does not imply that any particular answer is desired or expected.

Documentation / Clinical Indicators / Medical Evidence	Location in the medical record

Based on the above clinical indicators and the coding guidelines on the following page, please initial any additional appropriate diagnosis(es) below (if known or suspected) or indicate an alternative diagnosis. Thank you.

[ ] BACTEREMIA

[ ] SEPTICEMIA

[ ] SIRS

[ ] SEPSIS

[ ] SEPTIC SHOCK

[ ] Other _____

[ ] Causative organism (if known or suspected) _____

[ ] No further clarification needed, _____ is already documented.

_____ _____

Physician Signature **Date Signed**

Per coding guidelines*:

BACTEREMIA

Applies a code of abnormal lab finding (Defined as the presence of bacteria in the blood).

SEPTICEMIA

Defined as a condition caused by the presence of bacteria, fungi, viruses, or other pathogenic organisms in the bloodstream.

SIRS

Defined as the systemic response to infection **or** trauma, with symptoms including fever, tachycardia, tachypnea, and leukocytosis.

SIRS Criteria per American College of Chest Physicians/Society of Critical Care Medicine requires two or more:

Temperature > 38 degrees Celsius or < 36 degrees Celsius
Heart rate > 90 bpm
Hyperventilation (RR >20 breaths/min or PaCo2 <32 mm Hg)
WBC > 12,000 or < 4,000

SEPSIS

Defined as SIRS due to infection

American College of Chest Physicians/Society of Critical Care Medicine defines as:

Clinical or microbiologic evidence of infection along with two out of four of the criteria to demonstrate evidence of SIRS.

*Referenced from Coding Clinic Guidelines for SIRS, Sepsis, Severe Sepsis and Septic Shock

American College of Chest Physicians/Society of Critical Care Medicine. American College of Chest Physicians/Society of Critical Care Medicine Consensus Conference: definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. Critical Care Med 1992; 20: 864-874

SEVERE SEPSIS

Defined as sepsis with associated organ dysfunction.

SEPTIC SHOCK

Sepsis with hypotension, a failure of the cardiovascular system.

*Referenced from Coding Clinic Guidelines for

- SIRS, Sepsis, Severe Sepsis and Septic Shock
- Urosepsis

NAME:
AN EVALUATION OFA CLINICAL DOCUMENTATION I ACCT#:

Physician Query Form

Permanent Part of the Medical Record

Documentation clarification is required to meet compliance, accuracy in coding and severity of illness reflection. In responding to this query, please exercise your independent professional judgment. The fact that a question is asked does not imply that any particular answer is desired or expected. We greatly appreciate you taking the time to respond to this request.

Date: _____

To:

From: CDS Name
Documentation Specialist
Scripps Memorial Hospital La Jolla
CDS email address
CDS phone number(s)

Subject: Question / Clarification

Queries are increasingly necessary for quality documentation and accurate code assignment. Thank you for clarifying your patient information for improved on-going patient care.

Questions / Comments:

There is documentation of **urosepsis** in the clinical record and additional clarification is requested. Per coding guidelines, the term urosepsis refers to pyuria or bacteria in the urine (not the blood) and is coded as urinary tract infection.

Documentation / Clinical Indicators / Medical Evidence	Location in the medical record

In order to ensure accurate coding of the patient condition, can you please clarify by initialing (if known) whether the patient has

[ ] Sepsis from a urinary source

[ ] Septicemia from a urinary source

[ ] UTI

[ ] Unable to determine at this time

[ ] No further clarification needed _____ already documented

Causative organism (if known): _____

_____ _____

Physician Signature **Date Signed**

Per coding guidelines*:

UROSEPSIS

Defined as pyuria or bacteria in the urine and codes to UTI.

BACTEREMIA

Defined as presence of bacteria in the blood.

SEPTICEMIA

Defined as systemic disease associated with the presence of pathological microorganisms or toxins in the blood, which can include bacteria, viruses, fungi or other organisms

SIRS

Defined as the systemic response to infection **or** trauma, with symptoms including fever, tachycardia, tachypnea, and leukocytosis

SIRS Criteria per American College of Chest Physicians/Society of Critical Care Medicine:

- Temperature > 38 degrees Celsius or < 36 degrees Celsius
- Heart rate > 90 bpm
- Hyperventilation (RR >20 breaths/min or PaCo2 <32 mm Hg)
- WBC > 12,000 or < 4,000

SEPSIS

Defined as SIRS due to infection

American College of Chest Physicians/Society of Critical Care Medicine defines as:

Clinical or microbiologic evidence of infection along with two out of four of the criteria to demonstrate evidence of SIRS.

SEVERE SEPSIS

Defined as sepsis with associated organ dysfunction.

SEPTIC SHOCK

Sepsis with hypotension, a failure of the cardiovascular system.

*Referenced from Coding Clinic Guidelines for

- SIRS, Sepsis, Severe Sepsis and Septic Shock
- Urosepsis

Appendix D

2012 Surviving Sepsis Campaign International Guidelines

Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock: 2012
Critical Care Medicine Journal, Volume 41 Number 2 www.ccmjournal.org February 2013
Table 1. Diagnostic Criteria for Sepsis
Infection, documented or suspected, and some of the following:
General variables
Fever (core temperature, >38.3°C)
Hypothermia (core temperature, <36°C)
Elevated heart rate (>90 beats per min or >2 SD above the upper limit of the normal range for age)
Tachypnea
Altered mental status
Significant edema or positive fluid balance (>20 ml/kg of body weight over a 24-hr period)
Hyperglycemia (plasma glucose, >120 mg/dl [6.7 mmol/liter]) in the absence of diabetes
Inflammatory variables
Leukocytosis (white-cell count, >12,000/mm3)
Leukopenia (white-cell count, <4000/mm3)
Normal white-cell count with >10% immature forms (bands or stabs)
Elevated plasma C-reactive protein (>2 SD above the upper limit of the normal range)
Elevated plasma procalcitonin (>2 SD above the upper limit of the normal range)
Hemodynamic variables
Arterial hypotension (systolic pressure, <90 mm Hg; mean arterial pressure <70 mm Hg; or decrease in systolic> 40mmHg in adults or less than two SD below normal for age)
Organ-dysfunction variables
Arterial hypoxemia (ratio of the partial pressure of arterial oxygen to the fraction of inspired oxygen, <300)
Acute oliguria (urine output, <0.5 ml/kg/hr or 45 ml/hr for at least 2 hrs, despite adequate fluid resuscitation)
Increase in creatinine level of >0.5 mg/dl (>44 µmol/liter)
Coagulation abnormalities (international normalized ratio, >1.5; or activated partial-thromboplastin time, >60 sec)
Paralytic ileus (absence of bowel sounds)
Thrombocytopenia (platelet count, <100,000/mm3)
Hyperbilirubinemia (plasma total bilirubin, >4 mg/dl [68 µmol/liter])
Tissue-perfusion variables
Hyperlactatemia (lactate, >1 mmol/liter)
Decreased capillary refill or mottling
Severe sepsis (sepsis plus organ dysfunction)
Septic shock (sepsis plus either hypotension [refractory to intravenous fluids] or hyperlactatemia)¶

Appendix E

JAMA Sepsis-Related Organ Failure (SOFA) Criteria

JAMA. 2016;315(8):801-810. doi:10.1001/jama.2016.0287

Table 1. Sequential [Sepsis-Related] Organ Failure Assessment Score[a]

	Score				
System	0	1	2	3	4
Respiration					
Pao_2/Fio_2, mm Hg (kPa)	≥400 (53.3)	<400 (53.3)	<300 (40)	<200 (26.7) with respiratory support	<100 (13.3) with respiratory support
Coagulation					
Platelets, $\times 10^3/\mu L$	≥150	<150	<100	<50	<20
Liver					
Bilirubin, mg/dL (μmol/L)	<1.2 (20)	1.2-1.9 (20-32)	2.0-5.9 (33-101)	6.0-11.9 (102-204)	>12.0 (204)
Cardiovascular	MAP ≥70 mm Hg	MAP <70 mm Hg	Dopamine <5 or dobutamine (any dose)[b]	Dopamine 5.1-15 or epinephrine ≤0.1 or norepinephrine ≤0.1[b]	Dopamine >15 or epinephrine >0.1 or norepinephrine >0.1[b]
Central nervous system					
Glasgow Coma Scale score[c]	15	13-14	10-12	6-9	<6
Renal					
Creatinine, mg/dL (μmol/L)	<1.2 (110)	1.2-1.9 (110-170)	2.0-3.4 (171-299)	3.5-4.9 (300-440)	>5.0 (440)
Urine output, mL/d				<500	<200

Abbreviations: Fio_2, fraction of inspired oxygen; MAP, mean arterial pressure; Pao_2, partial pressure of oxygen.

[a] Adapted from Vincent et al.[27]

[b] Catecholamine doses are given as μg/kg/min for at least 1 hour.

[c] Glasgow Coma Scale scores range from 3-15; higher score indicates better neurological function.