# IMPACT OF EFFECTIVE MANAGEMENT OF HOSPITAL ACQUIRED INFECTIONS IN ENSURING PATIENT SAFETY: A SYSTEMATIC REVIEW OF THE LITERATURE (*)

*Seda BEHLÜL* (**)
*Daana BEKTARGANOVA* (***)
*Macide ARTAÇ OZDAL* (****)

***Abstract***

*A culture of safety and the prevention of health care associated infections are among important issues in health care quality and patient safety. This study aimed to evaluate the effectiveness of prevention strategies for eliminating hospital acquired infections, with a focus on ensuring patient safety. Systematic review of the literature reporting the factors essential for effective prevention of hospital acquired infections. Literature compilation was carried out between 9 April and 16 April. Keywords under the search criteria were entered to databases such as PubMed/ Medline to find relevant resources published between 2008 and 2018. Among 40 articles identified in the literature search, 6 articles were included in this review. Implementation of the fundamental infection monitoring, prevention and control of recommendations for all hospitals will assist to enhance the control of infection rates and development of patient safety programs. Transparency and frequent evaluation of the effectiveness and proper training of health professionals, as well as institutional packages and guidelines have been identified as crucial factors contributing to the prevention of health associated infections and patient safety. Health care manager has to focus on improving infection control practices, such as an active learning collaboration, to improve patient safety. Guidelines and comprehensive care quality improvement programs should be prepared and effectively applied in order to prevent Hospital Acquired Infections and to improve patient safety.*

***Keywords:*** *Hospital Infections, Health Quality, Patient Safety, Intervention Methods, Infection Control.*

*) This paper is presented as an oral presentation at the IV. International Conference on Applied Economics and Finance &EXTENDED WITH SOCIAL SCIENCES (ICOAEF'18) held in Kuşadası 28-30 November 2018.

**) Arş. Gör., Near East University Faculty of Health Sciences, Department of Health Management, Near East Boulevard, Nicosia, Northern Cyprus, TRNC Mersin 10 – Turkey (e-posta: seda.behlul@neu.edu.tr). ORCID ID: http://orcid.org/0000-0003-0324-5380

***) European University of Lefke, Faculty of Health Sciences, Department of Health Management, Lefke, Northern Cyprus, TR-10 Mersin, Turkey (e-posta: dana.bekturganova@gmail.com). ORCID ID: http://orcid.org/0000-0001-5635-8931

****) Yrd. Doç. Dr., European University of Lefke, Faculty of Health Sciences, Department of Health Management, Lefke, Northern Cyprus, TR-10 Mersin, Turkey (e-posta: mozdal@eul.edu.tr). ORCID ID: http://orcid.org/0000-0002-9334-2485

***Hastane Kaynaklı Enfeksiyonların Etkin Önlenmesinin Hasta Güvenliğine Etkisi: Sistematik Literatür Derlemesi***

***Öz***

*Hastane kaynaklı enfeksiyonların etkin önlenmesi sağlık bakım kalitesinin dolayısı ile hasta güvenliğinin sağlanmasında önemli bir konudur. Çalışmada hastane kaynaklı enfeksiyonların etkin önlenmesinin hasta güvenliği açısından değerlendirilmesi amaçlanmıştır. Hastane enfeksiyonlarının etkin olarak önlenmesi için gerekli faktörler sistematik literatür derlemesi yöntemi kullanılarak incelenmiştir. Literatür taraması PUBMED/MEDLINE veri tabanında "hospital infections", "health quality", "patient safety", "intervention" anahtar kelimeleri ile 9 Nisan -16 Nisan 2018 tarihleri arasında yapılmıştır. 2008-2018 yılları arasında yayım dili sadece ingilizce olan çalışmalar derlemeye dâhil edilmiştir. Yapılan inceleme sonunda, 2008-2018 yılları arasında hastane enfeksiyonlarının etkin olarak önlenmesi üzerine sağlık bakım kalitesi ve hasta güvenliğine dayalı olarak yapılmış 40 çalışmadan çalışma kriterlerine uygun olan 6 çalışma derlemeye dâhil edilmiştir. Çalışmalarda hastane kaynaklı enfeksiyonların izlenmesi, önlenmesi ve kontrol edilmesi ile ilgili tavsiyelerin enfeksiyon oranlarını azaltılmasında ve sağlık bakım kalitesine bağlı olarak hasta güvenliği programlarının geliştirilmesine yardımcı olacağı belirtilmiştir. Sağlık çalışanlarının etkinliği, verilen eğitimlerin uygunluğu, devamlılığı ve kurumsal olarak hazırlanmış kılavuzlar, hastane kaynaklı enfeksiyonları önleyerek, sağlık bakım kalitesinin artırılmasına katkıda bulunan önemli faktörler arasında yer almaktadır. Sağlık yöneticileri hasta güvenliğini artırmak için aktif öğrenme işbirlikleri ile hastane enfeksiyon kontrol uygulamalarını iyileştirmeye odaklanmalıdır. Hastane kaynaklı enfeksiyonları önlemek ve hasta güvenliğini artırmak için kılavuzlar ve kapsamlı bakım kalitesi iyileştirme programları hazırlanmalı ve etkin bir şekilde uygulanmalıdır.*

***Anahtar Kelimeler:*** *Hastane Enfeksiyonları, Sağlık Kalitesi, Hasta Güvenliği, Önleme Metodları, Enfeksiyon Kontrolü.*

## 1. Introduction

Hospital infections are very important in terms of the institutions that provide healthcare services. There are many positive effects on the healthcare quality of effective prevention of hospital infections. The most important of these positive effects is patient safety. Because the most important point in the institutions that provide health services is to provide patient safety by preventing hospital infections (Agency for Healthcare Research and Quality, Mitchell, Shaban, MacBeth, Wood and Russo, 2017:117-128, WHO, 2008).

Hospital infections cause morbidity, mortality and economic loss. Hospital infections reduce patient care quality by threatening patient safety. Because, patient safety is a priority that health care institutions must pay attention to improve quality of care, safety

and outcomes (Amoran and Onwube, 2013:156-163, Mitchell, Hall, MacBeth, Gardner and Halton, 2015:612-616). Hospital infections are especially reported to increase the risk of death by increasing hospitalization period and risk of infections. Health care associated infections are a major patient safety issue in hospitals.

HAI are considered an undesirable result in health care (Halpin, McMenamin, Simon, Jacobsen, Vanneman, Shortell and Milstein, 2013:307-331, Apisarnthanarak, Ratz, Greene, Khawcharoenporn, Weber, & Saint, 2017:805-810). Also, HAI is a significant indicator of quality of care in health services. It is, therefore, crucial to conduct worldwide research on methods on preventing and contolling hospital infections (Torres etc.,2017:784-791, Saint, Gaies, Fowler, Harrod and Krein, 2014:548-550). The Centers for Disease Control and Prevention estimates that % 5 - %10 of hospitalized patients develop a health care associated infection. HAI have been reported to be a serious problem in the health services (Institute of Medicine Report, 1999, Amoran etc. 2013:156-163). The worldwide increasing prevalence of HAI is an extraordinary challenge to health care. HAIs affect almost 1 million patients each year (WHO, 2008).

The major types of HAI are central line associated bloodstream infection (CLABSI), catheter associated urinary tract infection (CAUTI), surgical site infection, methicilin resistant and clostridium difficile infection (CDI) (Apisarnthanarak et.al. 2017, Meddings, Reichert, Greene, Safdar, Krein, Olmsted, Watson, Edson, Lesher and Saint, 2017:226-235). In the hospitals, there are many reasons that lead to hospital infections, which are considered as largely preventable. For example; inadequate hand washing, unnecessary use of medical devices, low organizational culture and HAI prevention practices, and inadequete nurse to patient ratios can be given as the factors that increase the incidence of HAIs (Saint, Fowler, Sermak, Gaies, Harrod, Holland, Bradly, Hancock and Krein, 2015:254-259, Seale, Chughtai, Kaur, Phillipson, Novytska and Travaglia, 2017:263-268). Therefore, using guidances directing care to protect patient safety can be a useful tool for controlling HAIs. Guidance on patient safety provide recommendations based on evidence based practices and consists of brief assesment processes followed by feedback including possible solutions on spesific issues (Deborah and Classen, 2008:3-11, Halpin and etc., 2013).

Patient safety is an important component of health service quality. Health institutions implement quality improvement activities in order to maintain quality of care. These practices include effective prevention strategies for hospital infections, because it negatively affects health care quality and compromise patient safety.

The aim of this study is to evaluate the impact of prevention of HAI on healthcare quality, in terms of patient safety. It also aims to give an insight into the quality improvement interventions, which have the greatest likelihood of success.

## 2. Method

### 1.1. Data Collection

Literature search was carried out by two researchers between 9 April and 16 April based on the inclusion and exclusion criteria. Key words under the search criteria were entered into the search engine of the Pub Med, Medline database to find relevant resources. Keywords used in the literature search included words such as hospital infection, quality of health, patient safety, intervention methods, and infection control. Literature search was conducted by two researchers separately and then the titles and abstracts were screened based on the inclusion and exclusion criteria. The references sections of the articles were also screened for any study meeting the inclusion and exclusion criteria. Researchers compared the articles that they collated after the literature search and all the studies relative to the aim of the study were included in the search.

**Inclusion criteria:**

The headings and abstracts of all studies were evaluated according to inclusion criteria.

- Articles published in English.
- Articles of which full text were accessible.
- Articles published between 2008 and 2018.
- Articles investigating the impact on the effective prevention of Hospital acquired infections were included in the study.

**Exclusion criteria:**

While evaluating the research, the articles which have the following characteristics were not included in the study.

- Articles written as education programmes
- Articles on health workers
- Articles reporting economics or cost effective analysis
- Articles studying specific diseases
- Editorial letters
- Abstract, oral presentations and systematic reviews were not included in the study.
- The papers found as a result of literature search were screened in depth for determining the consistency with inclusion and exclusion criteria and they were evaluated for the quality of methodology followed up in the studies using critical appraisal forms specialized on the type of the method adopted in the studies. Data on the factors affecting patient safety in the control of HAI were collected from the studies that passed from the evaluation process and a qualitative analysis was done on the collected data.

## 2.Results

### 2.1. Characteristics of Studies Included in the Review

The literature searches accounted for 40 articles, then duplicate articles were removed, 39 articles were reviewed and deemed suitable for a full text review. After screening the studies for evaluating them for inclusion and exclusion criteria, it was determined that 33 articles did not comply with the criteria and only 6 articles met the inclusion criteria of this systematic review (Figure 1). A summary of the included articles with an overview of their key characteristics and key findings are provided in Table I.

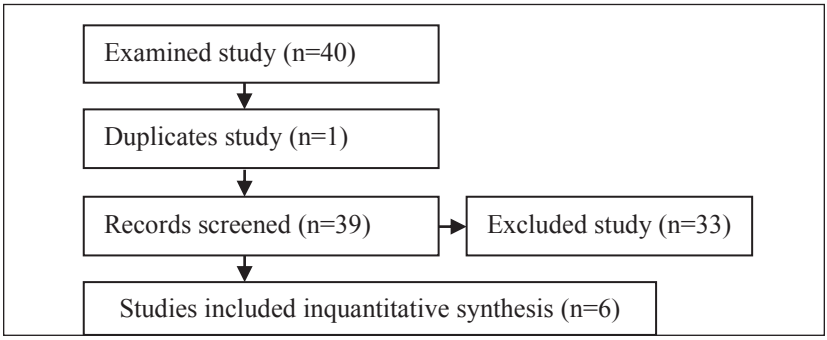


**Figure I.** Flow Diagram for Study Selection

Source: Mitchell, Shaban, Macbeth, Wood, Russo, 2017:117-128

**Table 1.** Overview of Findings from Studies İncluded in the Systematic Review

| № | Name of Study | Year | Methods Process | Key results |
|---|---|---|---|---|
| 1 | The influence of organizational context on quality improvement and patient safety efforts in infection prevention: A multi- center qualitative study. | 2010 | Qualitative study | The results show that, despite using similar implementation strategies the experiences and results of the efforts varied considerably among a number of hospitals working on preventing CLABSI. |
| 2 | Improving Patient Safety Through Infection Control: A New Healthcare Imperative | 2008 | Supplement article | Implementation of the basic infection surveillance, prevention and control suggestions for all US hospitals will help to improve an a variety of issues,<br>• the infection rates<br>• patient safety programs |

| | | | | |
|---|---|---|---|---|
| 3 | Health care worker perspectives of their motivation to reduce health care–associated infections | 2017 | Qualitative | Powerful motivation tools for employees are identified<br>Important motivational resources<br>• patient safety along with improved outcomes<br>• lessen health associated infections |
| 4 | National survey of practices to prevent health care-associated infections in Thailand: The role of prevention bundles | 2017 | Descriptive | • Accordance with practice in prevention of hospital infections was substandard.<br>• Health policies, organized as solutions, can help reduce infection rates for Thai Hospitals. |
| 5 | Evaluation of the association between Hospital Survey on Patient Safety Culture (HSOPS) measures and catheter-associated infections: results of two national collaborates | 2016 | Two prospective cohort | • No associations were found between two catheter associated infections rates and patient safety culture.<br>• When evaluated by HSOPS, both catheter associated infection rates can be improved. |
| 6 | Impact of participation in the California Health care-Associated Infection Prevention Initiative (CHAIPI) on adoption and implementation of evidence-based practices for patient safety and health care associated infection rates in a cohort of acute care general hospitals | 2013 | Prospective | • CHAIPI has significant and positive effects for hospitals.<br>• Improved patient safety with CHAIPI<br>• Reduced HAI rates |

### 2.2. Factors in Effective Management of Hospital Aquired Infections

HAIs are considered as an undesirable outcome, which are mainly preventable. They are reported as an indicator of the quality of patient care, an adverse event, and a patient safety issue. The success of patient safety initiatives related to health care associated infections is very important and correct outcome of health care quality. The result of practices aimed at preventing hospital infections differed in the study of comparing patients' experiences with an aim of ensuring patient safety by preventing hospital infections. It was determined that quality improvement strategies may be different according to the institutions (S.I. & et.al, 2010). The study, which examines the motivations of health workers in reducing

health care related infections, has found effects in improving patient safety and clinicial outcomes, reducing HAI and increasing employee motivation (L. McClung et al, 2017). It was reported that health workers, who have high motivation, high quality of life and job satisfaction in different studies offer higher quality services. The services offered with high performance improve the health care quality and reduce the negative conditions. Meddings et al. (2017) showed that hospital associated infections rates are decreasing and CLABSI and CAUTI rates, which affect patient safety can be improved without significant changes (Meddings J, et al, 2017). In another study, % 86 of the hospital reported positive developments with the CHAIPI collaboratives. Hospitals participating in the study reported increased patient safety and reduced HAI. In addition, CHAIPI participation has been found beneficial to patients. The study suggests that all hospitals should be offered the opportunity to participate in an active learning collaborative to improve patient safety (H.A. Halpin et al, 2013). According to Deborah et al. (2008), implementation of the basic infection surveillance, prevention and control suggestions for all US hospitals will help to improve the infection rates and patient safety programs. Also the study provided a concise, evidence- based resource containing practical recommendations for acute care hospitals. In studies evaluating applications in hospitals to prevent CAUTI, CLABSI and VAP, it was determined that the applications used were inadequate. It was reported that it should be supported by policies and interventions that can help reduce HAI, as a threat to patient safety. It was also stated that health professionals should be involved in HAI reduction efforts (Apisarnthanarak et al, 2017).

## 3. Discussion

Health care quality can be increased by avoiding hospital infections, because primary issues that need to be measured and evaluated in hospitals are patient safety and clinicial outcomes. We identified 6 studies published between 2008-2018. From the studies, the effects of effective prevention on hospital safety were investigated. It was reported that hospital infections can not be controlled only by intervention and by any technique in all examined articles. Hospital infections may be reduced by enhancing motivation of health care workers, control of internal and external factors and by taking appopriate precautions. Although similar strategies have been applied in studies investigating the effect of infection prevention on quality improvement and patient safety, it was determined that the results were varying among the hospitals. It was discussed that if HAI methods were accepted as a health policy, HAI incidence would decrease, patient safety and care quality would be enhanced accordingly. In an attempt to improve patient safety by conducting infection control, it was determined that basic infection prevention and control strategies should be applied. It has been similarly determined in other studies that such practies help reduce infection rates and improve patient safety programs. Studies reported about what should be done to increase patient safety by reducing HAI such as “discovery and dissemination” (SHEA,2010:118-123). Our study showed that education, comparison

methods, necessary analysis and evaluations are required to possibly improve the quality of care and patient safety.

The results of 3 different studies in which the effect of prevention of hospital infections on the quality of care and patient safety were examined showed that despite the use of similar strategies to prevent hospital-acquired infections in the study, the results vary between hospitals. In addition to what strategy is applied to prevent HAI, it is also necessary to know when and how the strategy is implemented (Dougherty, Conway, 2008, 2319-2321).

In the study investigating the improvement of patient safety with infection control method, it has been determined that basic infection prevention and control strategies should be applied. Similar to other studies, it was found that such applications would help to reduce infection rates and improve patient safety programs (Stone, Herzig, Pogorzelsko-Maziarz, 2015:267-272). The guidelines published by the World Health Organization provide a simple and effective several strategies for this purpose (Schweizer, Reisinger, Ohl, 2014:248-259).

In the study, which investigated the effect of hospital-acquired infections on health and safety of patients, it was stated that patient safety and reduced HAIs were important motivation tools. The role of HAI prevention methods, it was determined that each prevention method should be accepted as a health policy. Similar to other studies, health workers were found to be important in understanding strategies that can help in implementing HAI prevention policies and procedures (Shah, Castro, Charani, Drumright, Holmes, 2015:126-134). In many studies, it has been stated that effective communication methods and interdiciplinary leadership were effectice in preventing HAI by increasing motivation among health workers (Aarons, Ehrhart, Farahnak, Hurlburt, 2015; Saint etc., 2010:901-907) Because high motivation of health workers has a positive effect on service quality and patient safety perception (McClung, Obasi, Knobloch, Safdar, 2017:1064-1068).

In our study, two studies show that hospital prevention should be adopted as a health policy by hospitals (Apisarnthanarak, etc 2017:805-810). In these studies, it is argued that if these methods are defined as health policy, the quality of care and patient safety will be improved. It has also been found that patient safety can also be improved by active learning methods.

**4. Conclusıon**

Hospital Acquired Infections do not only negatively affect the health of population, but also increase cost of provided medical care. In order to prevent Hospital Acquired Infection and to improve patient safety, guidelines and comprehensive care quality improvement programs should be prepared. Hospitals have made efforts to diminish HAIs by getting involved in regional and national patient safety learning collaborates. Active patient safety learning collaborations, such as adopted and implemented guidelines and care quality improvement schemes, in hospitals are associated with significant

improvements. Unified implementation of these fundamental infection observation, control and prevention recommendations will guide improvements in hospitals infection rates and patient safety programs.

## References

Aarons G.A., Ehrhart, M.G., Farahnak, L.R., Hurlburt, M.S. (2015). Leadership and Organizational Change for Implemetation (LOCI): a randomized mixed method pilot study of a leadership and organization development intervention for evidence- based practice implementation. *Implementation Science*, 10:11.

Agency for Healthcare Research and Quality (AHRQ). Patient safety culture. https://psnet.ahrq.gov/primers/primer/5, (Erişim: 02.01.2018).

Amoran, O.E., Onwube, O.O., (2013). Infection control and practise of standard precautions among healthcare workers in northern nigeria. *Journal of Global Infectious Disease*, 5(4), 156-163.

Apisarnthanarak, A., Ratz, D., Greene, M. T., Khawcharoenporn, T., Weber, D. J., & Saint, S. (2017). National survey of practices to prevent health care-associated infections in Thailand: The role of prevention bundles. *American Journal of Infection Control,* 45(7), 805–810.

Deborah S. Y., Classen, D., (2008). Improving patient safety through infection control: A new healthcare imperative. *Infection Control Hospital Epidemiology*, 29, 3-11.

Dougherty , D., Conway, P.H.(2008). The "3T's" road map to transform US healthcare: The "how" of high quality care", *JAMA*, 299(19), 2319-2321.

Halpin, H.A., McMenamin, S.B., Simon, L.P., Jacobsen D., Vanneman M., Shortell, S., Milstein, A., (2013). Impact of participation in the California Healthcare-associated infection prevention initiative on adoptoin and implementation of evidence- based practices for patient safety and health care- assocated infection rates in a cohort of acute care general hospitals. *American Journal of Infection Control* 41, 307-311.

Institute of Medicine Report (1999). To err is human: Building a safer health system, https://www.ncbi.nlm.nih. gov/pubmed/25077248 (Erişim 31.05.2017).

Krein, S.L., Damschroder, L.J., Kowalski, C. P., Forman, J., Hofer, T.P., Saint, S.,(2010). The influenze of organizational context on quality improvement and patient safety efforts in infection prevention: A multi- center qualitative study, *Social Science & Medicine,* 71, 1692-1701.

McClung, L., Obasi, C., Knobloch, M., Safdar, N.,( 2017). Health care worker perspectives of their motivation to reduce health care- associated infections. *American Journal of Infection Control* 45, 1064-1068.

Meddings, J., Reichert, H., Greene, T.m., Safdar, N., Krein, S.L., Olmsted, R. N., Watson, S.R., Edson, B., Lesher, M.A., Saint, S. (2017). Evaluation of the association between Hospital Survey on Patient Safety Culture (HSOPS) measures and

catheter- associated infections: results of two national collaboratives. *BJM Quality & Safety,* 26, 226-235.

Mitchell, B. G., Hall, L., MacBeth, D., Gardner, A., Halton, K., (2015). Hospital infection control unit: Staffing, costs and priorities. *American Journal of Infection Control*, 43, 612-616.

Mitchell, B.G., Shaban R.Z., Macbeth, D., Wood, C.J., Russo, P.L. (2017). The burden of healthcare- associated infection in Australian hospitals: A systematic review of the literature, *Infection, Disease & Health,* 22, 117-128.

Research Committee of Society of healthcare Epidemiology of Americe.(2010). Enhancing patient safety by reducing healthcare associated infections:the role of discovery and dissemineti̇on. *Infection Control Hospital Epidemiology*, 31, 118-123.

Saint S., Kowalski, C.P., Banaszak –Holl, J., Forman J., Damschroder, L., Krein, S.L., (2010). The importance of leadership in preventing healthcare associated infections: Results of a multisite qualitative study. *Infection Control Hospital Epidemiology*, 31, 901-907.

Saint, S., Fowler, K.E., Sermak, K., Gaies, E., Harrod, M., Holland, P., Bradly, S.F., Hancock, J.B., Krein, S.L., (2015). Introducing the no preventable harms campaign: Creating the safest health care system in the world, starting with catheter- associated urinary tract infection prevention, *American Journal of Infection Control*. 43, 254-259.

Saint, S., Gaies, E., Fowler, K., Harrod, M., Krein, S..L. (2014). Brief report: Introducing a catheter- associated urinary tract ınfection prevention "guide to patient safet". *American Journal of Infection Control,* 42(5), 548-550.

Schweizer , M.L., Reisinger, H.S., Ohl, M. (2014). Searching for an optimal hand hygiene bundle: A metaanalysis, *Clinical Infection Disease,* 58(2), 248-259.

Seale, H., Chughtai, A.A:, Kaur, R., Phillipson, L., Novytska, Y., Travaglia, J., (2016). Empowering patients in the hospital as a new approach to reducing the burden of health care associated infections:The attitudes of hospital health care workers". *American Journal of Infection Control*. 44, 263-268.

Shah, N., Castro Sanchez, E., Charani, E.,Drumright, L.N., Holmes, A.H. (2015). Towards changing health care workers behavior: a qualitative study exploring non compliance through appraisals of infection prevention and control practies. *Journal Hospital Infections*, 90, 126-134.

Stone, P.W., Herzig, C.T., Pogorzelsko-Maziarz, M. (2015). Understanding infection prevention and control in nursing homes: a qualitative study, *Geriatric Nursing*, 36(4), 267-272.

Torres, A. Et. Al., (2017). Centers for disease control and prevention guideline for the prevention of surgical site ınfection, *JAMA Surgery*, 152(8), 784-791.

WHO. (2008). In A. Jha (Ed.), Summary of the evidence on patient safety: Implications for research. Geneva: World Health Organization.