



Original Article

Implementation and outcomes of an antimicrobial stewardship program: Effectiveness of education

Yea-Yuan Chang^{a,b,c}, Hsin-Pai Chen^c, Chia-Wei Lin^d, Jen-Jen Tang^d, Ti-Ying Hsu^e, Yueh-Chun Weng^f, Yuan-Ming Lee^f, Wei-Shu Wang^{a,b,*}, Su-Shun Lo^{b,g}

^a Department of Internal Medicine, National Yang-Ming University Hospital, Yilan, Taiwan, ROC

^b School of Medicine, National Yang-Ming University, Taipei, Taiwan, ROC

^c Division of Infectious Diseases, Department of Internal Medicine, Taipei Veterans General Hospital, Taipei, Taiwan, ROC

^d Department of Pharmacy, National Yang-Ming University Hospital, Yilan, Taiwan, ROC

^e Infection Control Office, National Yang-Ming University Hospital, Yilan, Taiwan, ROC

^f Department of Laboratory Medicine, National Yang-Ming University Hospital, Yilan, Taiwan, ROC

^g Department of Surgery, National Yang-Ming University Hospital, Yilan, Taiwan, ROC

Received January 13, 2016; accepted September 23, 2016

Abstract

Background: Unnecessary use of antibiotics is a common occurrence in hospitals. Implementation of antibiotic stewardship programs (ASPs) has been shown to reduce both unnecessary antibiotic use and drug-resistant bacteria. Education is a fundamental component of an ASP. However, the effectiveness of proper uses of antibiotics education has not been clearly analyzed.

Methods: In a 520-bed university hospital located in northeastern Taiwan, a significantly increasing prescription of carbapenems, specifically imipenem and meropenem, was observed. An educational program highlighting the judicious use of carbapenems was started, beginning in October 2013. A multidisciplinary ASP was implemented starting in January 2014. The consumption of antibiotics, measured by defined daily dose per 1000 occupied bed-days, was compared among the pre-educational, posteducational, and post-ASP periods.

Results: Compared with the pre-educational period, there was a significant reduction in antibiotics consumption of 13% total inpatient antibiotics ($p = 0.008$), 29.8% carbapenems ($p = 0.001$), 34.9% imipenem and meropenem ($p < 0.001$), and 27% glycopeptides ($p = 0.015$), in the posteducational and post-ASP periods. The major reduction emerged during the posteducational period and was sustained after the ASP. The percentage of inpatients prescribed with antibiotics was significantly decreased (16.2%; $p < 0.001$). The rate of carbapenem-resistant *Acinetobacter baumannii* decreased from 70.8% to 29.6% within 7 months.

Conclusion: A focused educational program is effective in controlling the prescription of specific antibiotic classes in the early phase of a multidisciplinary ASP.

Copyright © 2017, the Chinese Medical Association. Published by Elsevier Taiwan LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Keywords: antimicrobial stewardship program; carbapenems; education

1. Introduction

Misuse of antibiotics is a common occurrence in hospitals. It was estimated that up to 40–50% of antibiotic use did not abide by local and national antibiotic guidelines or was discordant with microbiological results.^{1,2} Patients are placed at additional risk for adverse effects when exposed to unnecessary antibiotics, including *Clostridium difficile* infection, a

Conflicts of interest: The authors declare that they have no conflicts of interest related to the subject matter or materials discussed in this article.

* Corresponding author. Dr. Wei-Shu Wang, Department of Internal Medicine, National Yang-Ming University Hospital, 169, Siao-she Road, Yilan 260, Taiwan, ROC.

E-mail address: 11313@ymuh.ym.edu.tw (W.-S. Wang).

<http://dx.doi.org/10.1016/j.jcma.2016.09.012>

1726-4901/Copyright © 2017, the Chinese Medical Association. Published by Elsevier Taiwan LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

potentially life-threatening infection associated with antibiotic therapy.³ Another major problem of antibiotic use is the selection of drug-resistant bacteria, particularly multidrug-resistant organisms.^{4,5} Overuse of antimicrobial agents exerts excessive selection pressures on the targeted as well as the bystander microbes that are exposed to the drugs.⁶ Alteration of the expression of genes regulating drug resistance is observed when microbes are exposed to antibiotics,⁷ and antimicrobial agents play complex roles in that they inhibit microbes while inducing resistance, and even help in dissemination of resistance at the same time.⁸ Multidrug-resistant organisms are increasingly being recognized as a global public health issue.⁹ Healthcare-associated infection and antimicrobial resistance that significantly increase morbidity, mortality, and medical costs are current challenges to the treatment of infectious diseases in Taiwan.¹

Implementation of antibiotic stewardship programs (ASPs) has been shown to effectively reduce unnecessary antibiotic use and optimize the treatment of infectious diseases.⁵ The World Health Organization strongly recommends that governments implement ASPs for the containment of antimicrobial resistance.¹⁰ Following the reduction of antibiotic consumption, a decrease in the rate of drug-resistant bacteria is expected.^{11,12} To be successful, multiple aspects should be considered in an ASP. Several “core elements” have been suggested by the Center of Disease Control of the United States, including leadership commitment to dedicate necessary resources, appointing an accountable leader responsible for program outcomes, drug expertise to improve antibiotic use, actions to support optimal antibiotic use, tracking and monitoring antibiotic use and resistance, and reporting information to staff on improving antibiotic use and resistance.¹³ A systemic education program is one of the essential components that comprise an ASP,^{14,15} although education alone is only marginally effective unless it is incorporated with other control measures.¹⁶ Regular education and training furnish prescribers with fundamental knowledge on drug resistance bacteria, principles of antibiotic use, and infectious disease management, whereas a theme-based educational program provides a platform for stressing facility-specific issues and influencing prescribers’ behavior. Recently, implementation of an education-based ASP was shown to improve antimicrobial prescriptions and consumption, even when restrictive measures were not implemented.¹⁷ Here, we demonstrate the effectiveness of an educational program targeting primary prescribers to control the consumption of specific antibiotic classes in the early phase of a multidisciplinary ASP.

2. Methods

2.1. Setting, surveillance, and antibiotic control measures prior to multidisciplinary ASP

National Yang-Ming University Hospital (YMUH) is a 520-bed university hospital located in northeastern Taiwan. Antimicrobial agents are classified as “restricted” or “non-restricted” at YMUH. Restricted agents include third- and

fourth-generation cephalosporins, extended-spectrum penicillins, carbapenems, glycopeptides, fluoroquinolones, oxazolidinones (linezolid), colistin, daptomycin, and glycolcyclines (tigecycline). On a hospital-wide basis, prescription of restricted antimicrobial agents requires approval from an infectious diseases (ID) physician. An online antimicrobial control system was deployed since July 2012. Through the Health Information System, the ID physician reviews the clinical and laboratory presentation, reports of cultures, and images of each patient to whom the restricted antibiotics are prescribed. Should a decision of disapproval be made, the antimicrobial will be discontinued by the unit-dose delivery system after 48 hours. The prescribers will be notified immediately to modify the prescription. Nonrestricted antimicrobial agents do not require approval from an ID physician.

The ID pharmacists in YMUH started surveillance of antimicrobial consumption in 2008 and have reported their analysis to the Infection Control Committee of YMUH at its quarterly meeting. Since 2012, a gradual increase in the consumption of carbapenems, mainly imipenem and meropenem, has been observed. In May 2013, decreasing the use of imipenem and meropenem was advocated in a hospital-wide meeting with all attending physicians participating. However, the effect was marginal, and the trend of increasing consumption of carbapenems continued. The study was approved exempt review of research by the authors’ institutional review board (IRB No. 2014A030).

2.2. Education on the antibiotic stewardship concept prior to ASP

Systemic education has been provided in YMUH to ensure good quality of antibiotic therapy. All physicians were asked to attend at least one of the semiannual speeches on the rationale and principles of antibiotic therapy. The control policy for both restricted and nonrestricted antibiotics was described.

In YMUH, the primary prescribers of antimicrobial agents of the admitted patient are usually the in-charge or on-duty residents, whose prescriptions are reviewed by the attending physicians. The monthly rotating intern and resident physicians are requested to attend an educational program directed by the ID physicians. Since October 2013, an educational program on the concept of antibiotic stewardship highlighting judicious use of imipenem and meropenem were introduced to the monthly lesson for interns and resident physicians. The attendees were presented with cases of appropriate and inappropriate use of both antibiotics, and were encouraged to telephone-consult the ID physicians prior to the prescription of carbapenems.

2.3. Implementation of multidisciplinary ASP

As part of the nationwide ASP conducted by the Centers for Disease Control of Taiwan, the multidisciplinary ASP of YMUH, began on since January 17, 2014 and has been

Download English Version:

<https://daneshyari.com/en/article/5679781>

Download Persian Version:

<https://daneshyari.com/article/5679781>

[Daneshyari.com](https://daneshyari.com)