

Implementing strategic bundles for infection prevention and management

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Abstract Healthcare-associated infections (HAI) are considered to be the most frequent adverse event in healthcare delivery. Active efforts to curb HAI have increased across Europe thanks to the growing emphasis on patient safety and quality of care. Recently, there has been dramatic success in improving the quality of patient care by focusing on the implementation of a group or “bundle” of evidenced-based preventive practices to achieve a better

outcome than when implemented individually. The project entitled IMPLEMENT is designed to spread and test knowledge on how to implement strategic bundles for infection prevention and management in a diverse sample of European hospitals. The general goal of this project is to provide evidence on how to decrease the incidence of HAI and to improve antibiotic use under routine conditions.

Keywords Healthcare-associated infections · Antibiotic resistance · Bundle · Implementation · Europe

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Background

Healthcare-associated infections (HAI) are considered to be the most frequent adverse event in healthcare delivery [1]. Due to growing awareness in recent years of the importance of the problem, the burden caused by these infections, which are often complicated by antimicrobial resistance (AMR), has become a top priority on the European public health agenda [2, 3]. It has been estimated that, in the European Union (EU) alone, approximately 37,000 lives are lost to HAI each year, with an associated monetary cost of roughly 7 billion Euros, which is mainly attributable to increased length of hospital stay [1]. Medical devices, such as intravenous and urinary catheters, as well as ventilators, are important factors in the epidemiology of HAI [4]. Device-associated HAI may pose additional challenges from AMR of the micro-organisms causing them [5].

Intensive care units (ICU) are invariably associated with the highest infection rates in healthcare settings, especially catheter-associated bloodstream infections (CRBSI) and ventilator-associated pneumonia (VAP). Evidence for the effectiveness of numerous single- and multi-module

interventions in the prevention and control of these two types of HAI is well-documented [6, 7]. One multimodal intervention that has shown evidence of dramatic success in improving the quality of patient care is the implementation of a group or “bundle” of evidence-based preventive practices to achieve a better outcome than when implemented individually [8, 9].

Despite the success of utilizing “bundled” interventions, the literature abundantly shows that innovations—like these bundles—do not implement themselves [10–12]. The scientific literature is full of examples from which it would appear that patients are not given the care that, according to recent scientific or professional insights, is desirable [13]. In general, healthcare delivery is too dependent on individual clinicians’ knowledge, motivation, and skills, with the unfavorable result that only about 50% of patients receive the recommended care [13, 14]. Many different features might explain why innovations like “bundles” do not easily find their way into daily practice [15–18]:

- Features of the bundles themselves: are the bundles evidence-based, clearly formulated, do they meet the needs, norms, and values of the target group?
- Features of the target group of professionals who should use the bundles: do they have the optimal knowledge, skills, opinions, attitudes, values, routines, or personalities?
- Features of the patients: are patients’ attitude, knowledge, coping skills, needs, and preferences in line with bundle performance?
- Features of the social setting: are colleagues, the social network and culture, opinion leaders, and leadership in the organization in favor of bundle performance?
- Features of the organizational context: do organizational characteristics (e.g., facilities, teamwork, protocols) support and facilitate bundle performance?

These specific features will determine whether implementation will succeed or fail. Insight into these features is of major importance in order to ascertain how implementation strategies should be designed and to understand what kind of activities should be developed. Specific, well-planned programs are required to implement bundles into daily clinical practice by addressing the features that hamper (barriers) or stimulate (facilitators) performance [19].

Active efforts to curb HAI have increased across Europe thanks to growing alertness about patient safety and quality. Various strategies exist to implement bundles, including educational meetings, feedback, reminders, financial incentives, and revision of professional roles. Unfortunately, there is no superior strategy or so-called magic bullet that works for all innovations in all circumstances. The challenge lies in building a strategy on the careful

assessment of barriers and facilitators, and on a coherent theoretical base.

To evaluate and quantify the effect of well-developed strategies to implement bundled preventive practices, a prospective clinical effectiveness trial is urgently needed. Furthermore, an appropriate design and a close cooperation between several European countries and hospitals is necessary in order to collect data in a suitable multi-center trial and to be as sure as possible that the findings can be used in different healthcare settings.

General objectives of the IMPLEMENT project

The project entitled IMPLEMENT is designed to spread and test knowledge on how to implement strategic bundles for infection prevention and management in a diverse sample of pilot European hospitals. The objectives of this project are threefold: (1) to analyze and identify gaps in the implementation of current infection management policies at a national level in order to share these experiences and build partnerships; (2) to identify strategic interventions and provide by endorsement detailed implementation methods to decrease the incidence of HAI, specifically, CRBSI and VAP, hospital-wide and in ICU; and (3) to identify the most effective interventions to improve the appropriate use of antibiotics in European hospitals.

Key points of IMPLEMENT are to identify whether: (1) sustainable intervention bundles (once developed) require additional resources for implementation at a local level, or, alternatively, can be achieved, even in limited resource settings, by the improved use of available resources; (2) impact indicators can be collected as part of the routine standardized surveillance systems (for general hospital wards and ICU); and (3) what surveillance systems are needed wherever such infrastructure is currently non-existent.

Study design

Development and testing of implementation strategies for existing CVL and VAP bundles

In order to steer the implementation process in the right direction, implementation activities require a systematic approach. To develop potentially effective strategies to implement the central venous line (CVL) and the VAP bundle, three consecutive steps will be performed [17]. The first step aims at gaining insight into already known effective strategies to implement bundles. A literature search will be performed to find evidence-based implementation strategies that have succeeded in implementing

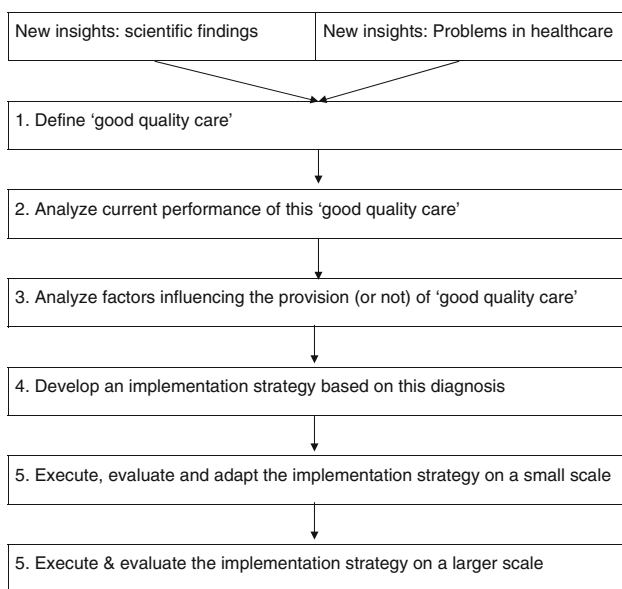
bundles. To add to these evidence-based strategies, practice-based strategies (or “best practices”) to implement these interventions will be sought. Visits will be paid (by participants in the work packages) to some best performing ICU, and interviews will be performed with representatives.

In a second step, both for the IMPLEMENT CVL and the VAP bundle, barriers and facilitators will be explored to enhance the development of an implementation strategy tailored to the specific influencing features. To achieve this, in-depth interviews, focus groups, or questionnaire studies among ICU professionals (doctors and nurses) will be performed to gather information on factors hindering the performance of bundled care interventions.

In a third step, again for both the IMPLEMENT CVL and the VAP bundle, all of the information gathered in the previous steps will be used to develop and pilot test an implementation strategy. Measures that correspond as closely as possible to the results of the diagnostic analysis (step 2) will be chosen as implementation activities, e.g., if a lack of knowledge hampers bundle implementation, education should be developed and provided. Both implementation strategies—for CVL and VAP—will be pilot tested on feasibility to improve care. Experiences of the participating ICU professionals will be measured to, if necessary, adapt the strategies to make them more acceptable and effective. A model for effective implementation is shown in Fig. 1.

Development and testing of a novel antibiotic bundle

The main goal of this part of the project will be to test and improve the quality of antibiotic use in ICU patients. To



Source: [17]

Fig. 1 A model for effective implementation

achieve this aim, quality process indicators for antibiotic management in ICU will be developed and their applicability tested. An antibiotic care bundle, focused on the prescription of antibiotics in the ICU, will subsequently be developed based on the result of a pilot study.

A systematic review of the literature of published high-level-of-evidence studies on recommendations and tested tools to drive and improve antibiotic use in ICU will be performed. The results of the systematic review will be elaborated in order to develop several key recommendations. A group of experts from different European countries will discuss the level of evidence and potential inclusion of those recommendations as quality indicators of antibiotic usage in ICU. The final step in devising the set of indicators will consist of operationalizing them by defining numerators and denominators.

The frequency of adherence of the selected quality indicators and assessment of applicability through feasibility of data collection, reliability, opportunity for improvement, and case-mix stability will be determined during a 12-month period in one mixed medical and surgical Italian ICU.

In addition, a questionnaire will be developed to investigate the determinants of antibiotic therapy in a sample of ICU in Europe. The questionnaire will also investigate the application of recommendations in national, international, and local guidelines for antibiotic therapy and diagnostic tests.

Conclusions

IMPLEMENT will bring together physicians, infection control and infectious diseases specialists, clinical microbiologists, hospital epidemiologists, experts in the implementation of complex quality of care intervention, and healthcare staff. It will be supported by high-level statisticians. Identification of the most successful implementation tools for bundled interventions and analyzing the determinants of success will provide important information for policy makers, managers, and healthcare workers on best practices for tackling the healthcare-associated infections (HAI) problem. IMPLEMENT will improve knowledge on how to implement European guidelines, hospital policies, and practices for the prevention and appropriate treatment of HAI. IMPLEMENT will pave the way to investigate the effectiveness of tailored strategies to implement bundled evidence-based preventive interventions on a large scale.

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the progress of the IMPLEMENT Project is available on the project website at <http://www.eu-implement.info>.

Conflict of interest None.

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