Pharmacy Practices and Technologies: Evidence for Effectiveness and Adoption into Canadian Hospital Pharmacy Practice

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INTRODUCTION

Significant progress has been made in the adoption of evidence-based decision-making by clinical pharmacy practitioners. However, in other areas of pharmacy practice, such as drug distribution, evidence-based decision-making appears to be more limited. Eriksson1 recently reinforced the need for pharmacists to identify and use trusted sources of information for decision-making in all areas of pharmacy practice, in order to optimize patient health outcomes. One important area where evidence-based decisions are needed relates to the use of certain practices and technologies in the drug-use process. In particular, it is of interest to know how long it takes the pharmacy profession to implement evidence-based practices and technologies.2

We hypothesized that the adoption of innovations in pharmacy practice has been as slow as the reported adoption of health care innovation more generally,2 in terms of rate of uptake of evidence-based practices, such as unit-dose drug distribution systems, centralized IV admixture systems, and decentralization of pharmacists working in patient care programs. The aim of this exploratory study was to examine the adoption of new pharmacy practices and technologies in Canadian hospitals and the relationship between actual adoption and published evidence supporting adoption.

DESCRIPTION OF THE PRACTICE

Four pharmacy practices and technologies were chosen for this study: obtaining a medication history or performing medication reconciliation, use of smart pumps, bar code medication administration, and computerized prescriber order entry (CPOE). The selection was based on the level of interest and discussion that these practices and technologies have generated, as well as the availability of data to facilitate studying them. For each of the 4 practices and technologies, the literature was searched for published evidence, and an index year was identified, i.e., when the evidence was deemed sufficient to justify widespread adoption by Canadian hospitals.

To capture the published evidence supporting adoption of these practices and technologies, a research assistant (A.G.) performed a literature search using PubMed, Google Scholar, and Google. Studies eligible for consideration were meta-analyses, systematic reviews, and literature reviews covering one or more of the specified pharmacy practices and technologies, published between 1990 and 2014. For each publication, the number of positive outcomes and the total number of outcomes measured were documented. The outcome indicators were based on the lists proposed by Bond and Raehl,3 Chisholm-Burns and others,4 and Pitterle and others5 (i.e., mortality, morbidity, adverse drug reactions, medication errors, health care costs, length of stay, and adherence with guidelines). The index year was defined as the year when there was sufficient published evidence to support the practice or technology as being effective. The year of proven effectiveness was defined as the median year of meta-analyses, systematic reviews, and literature reviews showing positive outcomes for at least 3 of the 7 indicators.

To determine the extent of adoption of the 4 selected pharmacy practices and technologies, the 19 editions of the Hospital Pharmacy in Canada Report (HPC Report) published between 1985/1986 and 2011/2012 were reviewed.4 The HPC Reports are based on biennial surveys that have collected information on the adoption of practice innovations and technologies in Canadian hospitals since 1985/1986. For each of the 4 specified pharmacy practices and technologies, the extent of adoption was determined at the time the item was first included in the HPC Survey and at the time of the 2011/2012 HPC Survey. We also identified the year when at least 50% of the hospitals that responded to the HPC Survey reported implementation of the pharmacy practice or technology. Then, the time between the index year and the year of 50% implementation was calculated.
when 50% of respondents had adopted the practice or technology was calculated.

Both the literature review and the extraction of relevant data were audited by a pharmacist member of the research team (J-FB). No inferential statistical analysis was conducted.

Table 1 summarizes the published evidence and the extent of adoption of the 4 pharmacy practices and technologies in the drug-use process in Canada. Three meta-analyses and 15 system...
atic reviews about CPOE were found. No meta-analyses were found for the 3 other practices. There were 11 systematic reviews of medication history/reconciliation, 2 related to smart pumps, and 2 related to bedside bar code medication administration. The proportion of studies with positive results on the specified outcome measures was variable. According to the HPC Report, medication history/reconciliation and use of smart pumps were the most widely adopted practices in 2011/2012.

IMPLICATIONS AND SIGNIFICANCE FOR PRACTICE

On the basis of this review, there was sufficient evidence for adoption of 2 of the 4 pharmacy practices and technologies (medication history/reconciliation and CPOE), but evidence for the positive impacts of the other technologies (smart pumps and bar code medication administration) was more limited. Interestingly, more than 50% of hospitals had adopted the practice of carrying out medication history/reconciliation before clear evidence of its effectiveness had been established (1999/2000 v. 2012). We believe that adoption of this practice was driven by the Accreditation Canada process, which has included medication reconciliation as a Required Organizational Practice since 2008. At the other end of the spectrum, CPOE has not been widely implemented in Canada, and as of 2011/2012 its adoption by Canadian hospitals was still below 10%, despite a substantial amount of positive evidence. Although the count of positive outcomes measured by our approach favours the CPOE technology, we recognize the challenges associated with electronic prescribing in hospitals, including financial costs of the technologies themselves and the extensive training required to support transition to the use of CPOE.

For 2 technologies—smart pumps and bar code medication administration—sufficient evidence to support the practice or technology is still lacking. In the case of smart pumps, adoption of the technology has been driven by the companies supplying the technology. For example, it is no longer possible to buy replacement infusion pumps that do not have “smart” technology. The extent of adoption of smart technology infusion pumps by Canadian hospitals was already above the 50% threshold when data on smart pumps were first captured in the HPC Report (in 2007/2008). Smart pump manufacturers have been able to charge a substantial premium for these devices, even though there is a paucity of evidence demonstrating a positive impact. In the case of bar code medication administration, the limited adoption of this technology appears to be in line with the lack of evidence for its effectiveness.

This study had some limitations. The quality of the meta-analyses, systematic reviews, and literature reviews identified in the literature search was not evaluated. Other methods could be used to establish the “index year”, including more detailed analysis of the included evidence. The data presented in the HPC Reports also have limitations (e.g., based on a self-reported survey with voluntary participation, limited to hospitals with at least 50 acute care beds).

CONCLUSION

On the basis of these data, it is difficult to conclude that pharmacy practice decisions are based on formal evidence. The adoption of these 4 pharmacy practices and technologies appears to be driven, in large part, by factors other than evidence, including the accreditation process and the marketing practices of technology vendors. If the implementation of a particular practice or technology takes time, its adoption will also depend on costs and implementation difficulties. This exploratory study puts into perspective the need for a “dashboard” of evidence about pharmacy practices and technologies. Updated on a regular basis, such a tool would contribute to a more coherent approach to the adoption of new technologies and practices. Our pharmacy practice research unit aims to develop such a dashboard and test its usefulness in the years to come.

References


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