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Personal digital assistant with a barcode reader—A medical decision support system for nurses in home care

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ABSTRACT

Introduction: Inappropriate medication among elderly people increases the risk of adverse drug–drug interactions, drug-related falls and hospital admissions. In order to prevent these effects it is necessary to obtain a profile of the patients' medication. A personal digital assistant (PDA) can be used as a medical decision support system (MDSS) to obtain a profile of the patients' medication and to check for inappropriate drugs and drug combinations, and to reduce medication errors.

Aim: The aim of the present study was to evaluate nurses' experiences of using a MDSS in a PDA with a barcode reader, in order to obtain profiles of the patients' medication, regarding drug–drug interactions, therapeutic duplications, and warnings for drugs unsuitable for elderly in home care.

Methods: The LIFe-reader[®] is a MDSS in a PDA with a barcode reader. By scanning the drug packages in the patients' home, the LIFe-reader[®] obtained profiles of the patients' medication and checked for drug–drug interactions, therapeutic duplications and warnings for drugs unsuitable for elderly people. The LIFe-reader[®] also contained, e.g. drug information and medical reference works. Nurses ($n = 15$) used the LIFe-reader[®] for five weeks during their nursing home care practice assignment. The nurses answered questionnaires about the content and functions of the LIFe-reader[®] before, during and after the nursing home care practice assignment, and were interviewed in focus groups. Descriptive statistics were used and content analysis was applied for qualitative data.

Results: By using the LIFe-reader[®], the majority of the nurses found it easy to obtain profiles of the patients' medication and check for drug–drug interactions, therapeutic duplications and warnings for drugs unsuitable for elderly people. Most nurses regarded the LIFe-reader[®] to reduce drug-related risks of falling, and some thought it could reduce the drug-related admissions to hospitals. The scanning function was described as easy and time saving, although not always possible to use. The LIFe-reader[®] was regarded as a useful and user-friendly MDSS, but more content and functions were requested.

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We found that the LIFe-reader[®] has the potential to be a useful and user-friendly MDSS for nurses in home care when obtaining profiles of the patients' medication regarding drug–drug interactions, therapeutic duplications and warnings for drugs unsuitable for elderly. A regular scanning of the patients' drugs in their home might support nurses and general practitioners (GPs) in reducing the inappropriate use of drugs. If the LIFe-reader[®] should be used in a larger scale among nurses, more content and functions are necessary.

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1. Introduction

Today, most elderly people are using drugs and some of them are using up to ten and sometimes even more drugs concurrently [1–4]. In addition, the elderly are also using non-prescription drugs [3,4]. This polypharmacy, i.e. concurrent consumption of several drugs, increases the risk of drug–drug interactions [1,2,5–7], therapeutic duplications [2], adverse drug reactions [5,8–11], risk of falling [9], and drug-related hospital admissions [1,5,8,11,12]. These unintended effects will cause suffering for the patients and large costs for the society [1,11]. To prevent these effects it is necessary to get an overview of the patients' medication.

Health care professionals handle a large amount of information and require access to updated information about drugs in general and overviews of the individual drugs specifically. To accomplish this and make routines of everyday work more easy, useful Information and Communication Technology (ICT) systems are needed [13]. Supportive information for medical decisions are available in paper format, in personal computers (PC), on the Internet [14], and in Personal Digital Assistants (PDA) [15]. For quick data management, a PDA is a convenient tool [16–19] which can provide immediate access to all kinds of necessary data [18–20]. The information in a PDA can be synchronized with the information in a PC [16,17,20] and with a wireless network, necessary information can be downloaded from the Internet [17,18,20].

The use of PDAs in health care is reported to improve decision-making, reduce medication errors, and to improve patient care [15,19,20], which indicates that a PDA might be a useful medical decision support system (MDSS). There are numerous documents and medical software applications available for PDAs [15,18] but of varying quality [15,20].

In hospitals, a PDA with a barcode reader, linked to the hospital's computer system has been used to ensure patients' safety [20]. When scanning the patients' identification bracelets, drugs [21,22], or blood products [23,24], the system compared the information with the patients' computerised medical or administrative data, and treatment errors could be reduced [20–24]. In home care, a PDA with a barcode reader might be useful to obtain a profile of patients medication and prevent medication errors [25,26].

The aim of the present study was to evaluate nurses' experiences of using a MDSS in a PDA with a barcode reader, in order to obtain profiles of the patients' medication, regarding drug–drug interactions, therapeutic duplications, and warnings for drugs unsuitable for elderly in home care.

2. Method

2.1. Study design

Initially, 22 registered nurses (RNs), undergoing the district nurse academic programme at the University of Kalmar, were invited to participate in the study. The study was conducted during the winter of 2007/2008 and was a part of the activities in the nurses' clinical practice. The inclusion criterion was that the nurses should attend their nursing home care practice assignment during this period. Fifteen nurses met this criterion, and they tested a PDA with a barcode reader for five weeks. The nurses answered a questionnaire before, during, and after the nursing home care practice assignment, and they were interviewed in focus groups after the post-questionnaire.

2.2. Materials

The LIFe-reader[®] (The Swedish Association of the Pharmaceutical Industry (LIF), Sweden), is a PDA with a mobile MDSS for safer medication, especially suitable for nurses in home care. The LIFe-reader[®] (Fig. 1) has a built-in barcode reader and the SafeMed[®] Pocket software (Pharmtech AB, Sweden) [25,26].

By scanning the European Article Number (EAN) codes on the drug packages, it is possible to obtain a profile of a patients' medication. After scanning the EAN-codes, the users can check for inappropriate drugs and drug combinations: drug–drug interactions, therapeutic duplications and warnings for drugs unsuitable for elderly people (according to the indications of the Swedish National Board of Health and Welfare). The SafeMed[®] Pocket software (Fig. 2) in the LIFe-reader[®] holds drug listings from the FASS (the Swedish equivalent of the American Physicians' Desk Reference, an encyclopedia with detailed information about the medicines that are permitted for sale in Sweden. The FASS in book format is pub-



Fig. 1 – The scanning process with the LIFe-reader[®] [25,26].

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