International Journal of Medical Informatics 86 (2016) 54–61

Contents lists available at ScienceDirect

International Journal of Medical Informatics

journal homepage: www.ijmijournal.com

Bringing clinical pharmacogenomics information to pharmacists: A qualitative study of information needs and resource requirements

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ARTICLE INFO

Article history:
Received 11 May 2015
Received in revised form
25 November 2015
Accepted 26 November 2015

Keywords:
Pharmacogenomics
Genomics
Needs assessment
Information needs
Qualitative inquiry
Pharmacists

ABSTRACT

Introduction: As key experts in supporting medication-decision making, pharmacists are well-positioned to support the incorporation of pharmacogenomics into clinical care. However, there has been little study to date of pharmacists' information needs regarding pharmacogenomics. Understanding those needs is critical to design information resources that help pharmacists effectively apply pharmacogenomics information.
Objectives: We sought to understand the pharmacogenomics information needs and resource requirements of pharmacists.
Methods: We conducted qualitative inquiries with 14 pharmacists representing 6 clinical environments, and used the results of those inquiries to develop a model of pharmacists' pharmacogenomics information needs and resource requirements.
Results: The inquiries identified 36 pharmacogenomics-specific and pharmacogenomics-related information needs that fit into four information needs themes: background information, patient information, medication information, and guidance information. The results of the inquiries informed a model of pharmacists' pharmacogenomics resource requirements, with 3 themes: structure of the resource, perceptions of the resource, and perceptions of the information.
Conclusion: Responses suggest that pharmacists anticipate an imminently growing role for pharmacogenomics in their practice. Participants value information from trust-worthy resources like FDA product labels, but struggle to find relevant information quickly in labels. Specific information needs include clinically relevant guidance about genotypes, phenotypes, and how to care for their patients with known genotypes. Information resources supporting the goal of incorporating complicated genetic information into medication decision-making goals should be well-designed and trustworthy.

1. Introduction

Pharmacogenomics research has identified over 130 gene variants that can alter the safety and/or effectiveness of drug treatments [1]. Some hospitals have begun using genotype information to inform drug and dose selection for several drugs including warfarin [2,3] and clopidogrel [4,5]. As genotyping becomes more common, pharmacists and physicians will encounter more pharmacogenomic information. To use this information to reduce the risks of adverse events and improve treatment effectiveness, clinicians will need information that will help them interpret complex interactions between patient genotypes, resulting phenotypes, and medications [6,7]. Despite the critical role that pharmacists play in medication decision making, relatively little attention has been paid to date regarding their pharmacogenomics-related information needs and preferences. We present a study of pharmacists' information needs and resource requirements for pharmacogenomics-based decision making. This work will inform the development of information resources designed to help pharmacists meet the information challenges presented by pharmacogenomics.

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http://dx.doi.org/10.1016/j.ijmedinf.2015.11.015
1386-5056/

1.1. Pharmacists' role in pharmacogenomics information

As knowledgeable experts who apply their extensive training in drug therapy to provide medication advice, pharmacists play a critical role in providing pharmacogenomics information to prescribing clinicians [8]. Several model pharmacist-led interdisciplinary clinical implementations exist [3,8]. While pharmacists hold positive views of the clinical utility of pharmacogenomics, they do not feel confident in their ability to make recommendations without further education [9,10]. However, little is known about pharmacists' information needs with respect to pharmacogenomics Although some studies have examined pharmacists' general drug information needs [11–17] and education requirements regarding pharmacogenomics [18], no studies to date have focused explicitly on pharmacists' information needs related to pharmacogenomics.

Physicians also lack pharmacogenomics knowledge. They desire information about recommendations, interpretations of genetic test results, testing information, and information about populations most at risk [6], and they value trustworthy, clinically-relevant information about phenotypes and dosage recommendations [7,19,20]. Information resources that address pharmacogenomics information needs can help pharmacists provide the guidance necessary for safe and effective prescribing of drugs with pharmacogenomic implications.

1.2. Pharmacogenomics information challenges

Pharmacogenomics involves complex interactions between genes, medication exposure, and patient factors to produce phenotypes [21]. Variations in genes can impact drug response, efficacy, and risk of adverse effects [22]. Each combination presents a unique set of considerations [23,24]. Interpreting this information presents multiple challenges, including potentially confusing descriptions of gene variants, phenotypes, and implications of the interactions. Given a patient with a pharmacogenomic genotype relevant to a medication under consideration, the prescriber must integrate all of this information with patient clinical variables like age and weight to determine the best course of action.

1.3. Pharmacogenomics information resources

In the United States, the Food and Drug Administration (FDA) requires manufacturers to provide relevant pharmacogenomics information in drug product labels of all drugs that have known pharmacogenomic impacts [25]. That information is scattered throughout the label, appearing for different drugs in many different sections. A variety of the widely-used electronic information resources include pharmacogenomic information [26]. However, the information is often incomplete, with resources containing between 50% and 90% of the pharmacogenomics information that is available in FDA approved product labels [26].

As a shared project between the Pharmacogenomics Research Network (PGRN) and the Pharmacogenomics Knowledgebase (PharmGKB), the Clinical Pharmacogenetics Implementation Consortium (CPIC) [27,28] develops guidelines to translate pharmacogenomics knowledge into clinical care [29]. The PharmGKB [30–36] website provides CPIC and Dutch Pharmacogenetics Working Group (DPWG) guidelines, relevant citations to primary literature, and some product label information [30]. While the research and guideline information are critical, PharmGKB provides only brief excerpts of pharmacogenomics information found in structured product labels, not the exact text of every pharmacogenomics-related statement or the section from which it originated. Consistent with earlier work indicating that pharmacists rely heavily on the information provided by the FDA-mandated labels [37], our informal observations suggest that comprehensive product label information is critical for pharmacists, which raises the concern that they will not trust PharmGKB because they might not perceive that it is communicating authoritative information, despite the FDA statements available on the resource.

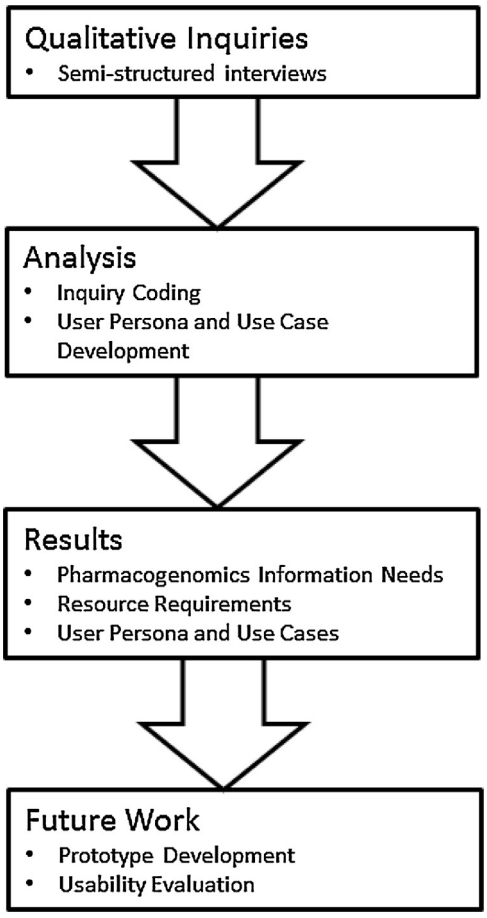

Fig. 1. Project Workflow.

1.4. Pharmacogenomics information needs and resource requirements

We aim to develop information resources that provide pharmacists with comprehensive, usable, actionable, and trustworthy pharmacogenomic information. We report on a qualitative inquiry of pharmacists' pharmacogenomics information needs and resource requirements to inform the development of such resources. Fig. 1 describes the research project plan.

2. Materials and methods

2.1. Qualitative inquiries

We conducted qualitative inquiries, consisting of semi-structured interviews and observations of pharmacists in their work environment. We coded the interview transcripts and used the results of the interviews to identify pharmacogenomic information needs.

We used a semi-structured approach to elicit a wide range of pharmacist perceptions about information seeking both for general prescribing and specifically with respect to pharmacogenomics. Two authors (KMR and HH) developed an interview guide (supplement) based on information needs research strategies [38,39].