Opportunities and challenges in implementing precision medicine into pharmacy practice

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Introduction/Purpose
In this review article, we aim to describe the precision medicine practice models implemented in healthcare institutions in USA, summarize the workflow and roles of pharmacists in these models, and evaluate the opportunities, challenges and resources for institutions who are interested in implementing precision medicine into pharmacy practice.

Methods
In the Pubmed database, we searched English articles about pharmacists’ roles in precision medicine/pharmacogenetics/personalized medicine practice models implemented in healthcare institutions in USA published between January 1st, 2013 and December 31st, 2017. Thirty pertinent articles were found, in which twelve articles were included for further evaluation based on the following inclusion criteria: 1) the article described the workflow of the practice model implemented in a particular institution or particular institutions; 2) the article described the roles of pharmacists in the practice model. The opportunities, challenges and resources for clinical pharmacists or institutions were also analyzed and summarized at the end of the review.

Results
In the 12 articles included for further evaluation, 15 practice models were described. These practice models include molecular tumor board (4 models), behind-the-scene electronic health record (EHR) decision support (2 models), EHR-driven consultation service (2 models), ambulatory pharmacogenomics clinic (fee-for-service or insurance billable service, 2 models), community pharmacy service (1 model), medication therapy management specializes in pharmacogenomic counseling (3 models), and pre-emptive pharmacogenetics clinical decision support and consultation (1 model). Pharmacists are playing prominent roles such as explanation of the pharmacogenetic results, genotype-guided medication selection and dosing adjustment, medication acquisition, medication efficacy and safety monitoring and patient education. Institutions who are interested in implementing similar models should overcome the challenges such as reimbursement issues, informatics, and educational knowledge gap.

Conclusions
Some institutions in US have successfully implemented precision medicine/personalized medicine/pharmacogenetics into pharmacy practice and pharmacists are playing leading roles in them. According to the successful models, a strong institutional support, well-defined goals, standardized procedures and a strategy to educate clinicians and patients are the prerequisites to integrate, interpret, deliver, and apply the full range of genetic data to medication-related therapy.