Spring 2012

Pharmacists and Pharmacogenomics: An Evaluation of Knowledge, Beliefs, Attitudes and Practices

Laressa Bethishou
Chapman University, bethisho@chapman.edu

Angela Chen
Arizona State University

Chrissie Chew

Richard Dang
University of California - Irvine

Courtney Greenber

See next page for additional authors

Pharmacists and Pharmacogenomics: An Evaluation of Knowledge, Beliefs, Attitudes and Practices

Authors
Laressa Bethishou, Angela Chen, Chrissie Chew, Richard Dang, Courtney Greenber, Rebecca Ashlee Klevens, Vlada Treynker, Andrew Warnock, Melissa Durham, Jeffery A. Goad, and Edith Mirzaian

Pharmacists and Pharmacogenomics: An evaluation of knowledge, beliefs, attitudes and practices

By Laressa Bethishou, Angela Chen, Chrissie Chew, Richard Dang, Courtney Greenberg, Rebecca Ashlee Klevens, Vlada Treynker, Andrew Warnock, Melissa Durham Pharm.D., Jeffery Goad Pharm.D., MPH, and Edith Mirzaian Pharm.D., BCACP

Pharmacogenomics is the term used to describe the rapidly advancing study on how genetic makeup can impact drug therapy. In specialized clinical situations, such as the use of irinotecan in colon cancer[1] or abacavir in HIV infections,[2] it is now possible to identify specific genotypes that correlate strongly with a patient's therapeutic outcome, with implications on both efficacy and side effects. On a broader scale, a systematic review published by the Journal of the American Medical Association on the top 27 adverse reaction-causing drugs found that a majority of the adverse effects have a genetic component, suggesting that an analysis of an individual's genetic profile may help in the management of these adverse drug reactions.[3] Additionally, the FDA has included genetic information on more than 100 drug labels.4 The more that is understood about the association between genotype and drug response, the greater the opportunity and responsibility will be for pharmacists in this realm.

Market pressure may soon demand the placement of professionals with expertise in interpreting these results and providing recommendations based on pharmacogenomics testing. Commercial availability of genetic tests has been available since 2007[5], and over-the-counter mail-in kits came on to the market in 2010[6]. This raised many ethical and moral issues regarding whether the expansion of available information is worth the potential misuse, misinterpretation, or unreliability of the data being collected.[7-10] This is of concern to both patients, who may receive information without context, and providers responsible for the care of that patient.

Despite the increasing awareness of this field, there is scant data assessing how cognizant pharmacists are of regarding either the interpretation or the clinical use of pharmacogenomics. In order to gain some insight, this study was conducted with the following objectives: 1) to evaluate the baseline level of knowledge of pharmacists regarding pharmacogenomics, 2) to assess the attitudes of pharmacists towards pharmacogenomics, and 3) the level of pharmacogenomics information use into clinical practice.

Methods

An email invitation to participate in an anonymous electronic questionnaire was emailed to pharmacists using a commercial software system between September and October of 2011. The survey consisted of 14 demographic and Likert scale questions. Only pharmacists were invited to participate, regardless of setting, location, or actively practicing. Local hospitals, local chapters for the California Pharmacists Association and the California Society of Health-Systems Pharmacists, retail and independent pharmacies, as well as the faculty and staff of selected pharmacy schools were all included. Results were analyzed using descriptive statistics. IRB approval was obtained prior to initiating the survey.

Results

The survey returned 120 responses. Respondents were primarily from California (83 percent). A summary of the demographics can be seen in Table 1. Of note, 46 percent of respondents received their degree since 2000. Fifty-three percent of respondents currently practice in a hospital setting, whereas others practice in academia, community, ambulatory care, and government settings.

Table 1:

Basic Demographics		
State in which you received your pharmacy degree. (N=92)		
CA	75	83%
Other	16	17%
Did you attend a residency program? (N=118)		
Yes	52	44%
No	66	56%
When did you receive your pharmacy degree? (N=118)		
2000-Present	54	46%
1990-1999	23	10%
1980-1989	26	22%
1970-1979	22	19%
Before 1970	4	4%
What is your field of practice? (N=118)		
Hospital	62	53%
Community	15	13%
Ambulatory Care	10	8%
Academia	8	7%
Government	7	6%
Industry	5	4%
Research	1	1%
Other	10	8%

In evaluating knowledge, respondents were first asked to categorize their own personal knowledge of pharmacogenomics. Two percent of respondents were "extremely" knowledgeable, 22 percent were "moderately," 61 percent stated "slightly" knowledgeable, and 15 percent said they had no knowledge of pharmacogenomics. Participants were then asked about currently available medications for which a physician can use a genetic test to make a decision regarding treatment. Of the 90 pharmacists who said yes, 46 were able to correctly identify trastuzumab as a medication that has an FDA-required pharmacogenomic test prior to use.

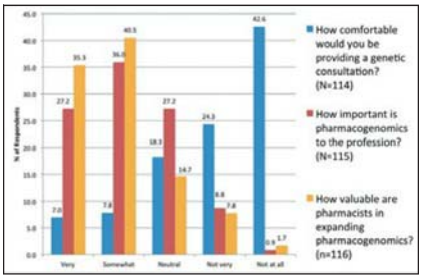
Pharmacists were also asked three questions to assess their current attitudes toward pharmacogenomics. A summary of the results can be seen in Chart 1. The first question assessed pharmacists' about their comfort level in providing a genetic consultation to a patient regarding a genetic test. The second question asked pharmacists how important pharmacogenomics is to our profession, and the third inquired about how valuable pharmacists would be in expanding pharmacogenomics.

In order to gauge how often pharmacogenomics appears in the workplace, pharmacists were asked to state how many times they were approached in the past year for a genetic consultation. Ninety-four percent reported no consultations. Finally, we surveyed whether or not pharmacists would be willing to receive additional training on pharmacogenomics in order to better counsel their patients, and whether reimbursement would increase their willingness to receive additional training. The results were almost identical, with 86 percent of 120 respondents expressing a willingness to receive training and 14 percent saying that they would do so if they were compensated for genetic consultations.

Discussion

The results suggest that there may be a general lack of knowledge regarding pharmacogenomics among survey

Chart 1



respondents. Eighty-five percent of the pharmacists surveyed are not confident in their ability to counsel a patient on a pharmacogenomics test, despite the fact that 63 percent of pharmacists believe that pharmacogenomics is important to the profession. Of the 85 percent of pharmacists that were aware of the value of applying genetic information to treatment decisions, only 44 percent were able to identify trastuzumab as a drug requiring a genetic test prior to use. Despite the vast majority of respondents who do not see pharmacogenomics in their daily practice, it is not immediately clear if this is reflective of the level of penetration of pharmacogenomics into practice or if unfamiliarity is a contributing factor to the lack of usage of pharmacogenomics.

It is difficult to identify specific reasons as to why this gap may exist from our survey, but there is reason to believe that it may actually be over-representing the level of knowledge. First of all, the demographics of the response pool may not be generally representative of pharmacists in California. The demographics of the respondents are in contrast with the national pool of pharmacists, which includes 50 percent of pharmacists practicing in the community setting.[11] Since California respondents disproportionately practice in clinical settings and are more likely to be residency trained (44 percent in our survey), they are more likely to be exposed to pharmacogenomics. Additionally, 46 percent of respondents graduated since the year 2000. Recent graduates may have been taught more pharmacogenomics as it became integrated into the curriculum at the schools of pharmacy. The impact of both of these factors would be to overestimate the level of knowledge about pharmacogenomics among practicing pharmacists.

Nonetheless, a large majority of participating pharmacists recognize that genetic testing is important to the profession, and also agree that pharmacists can be valuable assets to this emerging field. Pharmacists indicate that they are very willing to pursue additional training in order to more adequately prepare themselves for consultation and use in practice, with or without reimbursement. This would require specialized continuing education courses for pharmacists in California, and greater incorporation of pharmacogenomics into the curricula at the schools of pharmacy.

Limitations

The first limitation of this study is the relatively small sample size. In addition, respondents may not accurately reflect the demographics of the profession as a whole, since the majority practice in a hospital setting, are relatively recent graduates, and are residency trained. Therefore, the knowledge of pharmacogenomics among pharmacists surveyed may actually be over-representing the level of knowledge present overall.

Lastly, only descriptive statistics were used, thus no inferences can be made.

Conclusion

Based on the expressed willingness and interest amongst pharmacists to expand their role, pharmacists may be a valuable asset in providing genetic consultations, to both patients and other health care providers. The results suggest that training is necessary in order to prepare the profession for this expanded responsibility. Reimbursement for genetic consultations would likely provide a greater incentive for pharmacists to gain additional education in pharmacogenomics and seek out opportunities to provide such consultations.

Scan QR Code with your SMART phone to view the references to this article or visit www.cpha.com.