Opportunistic Risk Screening for Type 2 Diabetes: Exploring of Application of Diabetes Risk Assessment Tool in Community Pharmacy in Australia and Thailand

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ABSTRACT

Objective: To evaluate the feasibility of providing diabetes risk assessment at community pharmacy level in Australia and Thailand from organizational aspects. Methods: The intervention study was conducted in eight community pharmacies in New South Wales, Australia, and six community pharmacies in Central Thailand. Diabetes risk assessment tools were applied to determine the risk of developing type 2 diabetes. An open-ended question was asked to solicit the willingness-to-pay value for the service. A semi-structured interview was conducted with participating pharmacists to solicit the perceived facilitators and barriers in providing the service. Results: There were a total of 132 and 185 participants, with the ratio of participants in the three risk categories of low, intermediate, and high being 1:4:11 and 2:1:1.5 for Australia and Thailand, respectively. More Thai participants were willing to pay for the service (72.4% vs. 18.9%; P = 0.0001). Pharmacists from both countries agreed that providing risk assessment would increase health awareness and assist in dampening the burden of disease. A major barrier is time and staff shortage. Support from the government and collaboration among health care providers were major facilitators from Thai pharmacists’ perspective, whereas remuneration was a major facilitator from Australian pharmacists’ perspective. Conclusions: Pharmacists in both countries agreed that this intervention would contribute to produce positive health benefits. Differences in advantages and barriers as well as in the proportion of consumers willing to pay for the service demonstrated that it is essential for pharmacists (particularly in developing countries) to be aware of the pitfalls of copying practice initiatives in developed countries without any consideration of the local health care environment.

Keywords: community pharmacy, health promotion, pharmacy practice, prevention, risk assessment, type 2 diabetes.

Introduction

The prevalence of type 2 diabetes is increasing rapidly, with the global number of patients estimated to increase to 439 million by 2030 [3]. In Australia, data from the Australian Bureau of Statistics showed that the estimated prevalence rate for diabetes was 5.7% in 2010, which was double the rate from the last decade [2]. Similarly, the Thai National Health Examination Survey IV, 2009, revealed the prevalence of diabetes in the Thai population is 7.5% [3]. With the rapidly rising prevalence, diabetes is exerting a heavy burden on health care systems worldwide. In 2007, an estimated US $215 billion to US $375 billion were spent on diabetes care globally, and this is likely to escalate to US $490 billion by 2030 [4]. Consequently, diabetes is listed as a national health priority in many countries including Australia and Thailand [5,6].

Because type 2 diabetes is a preventable disease, early identification of individuals at risk of developing type 2 diabetes is an important approach in diabetes prevention [7]. Fasting blood glucose test is currently used as a standard diagnosis tool for diabetes. Its invasive nature and relatively high cost, however, hamper its adoption as the first choice for screening individuals with risk factors only or for population-based screening [8]. Hence, many attempts have been made to develop simple and noninvasive scoring systems to identify individuals at high risk of developing type 2 diabetes [9].

In Australia, the Australia Diabetes Risk Assessment tool (AUSDRISK) has been developed and has been recommended as...
an assistant tool to evaluate the risk of developing type 2 diabetes in the Australian population by general practitioners since 2008 [10]. In Thailand, a diabetes risk score was developed to predict the risk of developing type 2 diabetes in the Thai population older than 35 years [11]. This tool was also recommended by the Thai Diabetes Management Guideline for the primary prevention of type 2 diabetes in 2008 [12]. The application of these tools in the clinical setting, however, is still limited [13,14]. This raises the question whether community pharmacists as the most accessible among first-line primary health care professionals can contribute to the screening of diabetes risk in the general population.

In fact, the involvement of community pharmacists in the management of diabetes and other chronic diseases is growing internationally [15,16]. Organizational theory-based studies on the impact of pharmacy practice, however, are still limited [17]. One of the definitions of organization is the interaction of components including participants, social structure, goals, technology, and environment; each of the components affects and is affected by the others [18]. Hence, based on this theory, cultural and health system differences may affect attitudes and the implementation of health care delivery, and ultimately its feasibility and effectiveness. Nevertheless, little attempt was made to determine the difference in practices in delivering diabetes risk assessment between developed and developing countries. Thus, it is important to explore the factors that may influence pharmacists’ practices regarding diabetes risk assessment intervention in countries with different health care system and pharmacy practice.

Another issue in providing cognitive services (cognitive services can be defined as services provided by professionals who use their skills and knowledge to play an active role in patient health) at community pharmacies that has not been resolved adequately is how to quantify meaningfully the perceived value of such services by the consumers. If the perceived values were elicited as the consumer’s willingness to pay (WTP) and compared in different countries, then it would be possible for the pharmacy profession to evaluate whether this is a true or a perceived barrier. Knowing the WTP and the influencing factors would also help to lessen the financial uncertainties preventing pharmacists from moving toward providing more patient-oriented activities at the community pharmacy setting.

Therefore, Australia, with well-established pharmacy regulations and health coverage systems, was chosen as an example of a developed country [19], and Thailand, being in the transitional stage of establishing universal health care coverage policy wherein the practice of community pharmacy is less strictly regulated, was chosen as an example of a developing country in this study [20]. The aims of this study were to 1) explore the feasibility, facilitators, and barriers of community pharmacies in Australia and Thailand in relation to providing opportunistic diabetes risk assessment, and 2) predict the influence of demographic, perception, and other related factors based on the organization theory on the WTP for the service.

Methods

Settings
A convenience sample of six community pharmacies in Central Thailand and eight community pharmacies in the Hunter region of New South Wales, Australia, participated in this study. The 3-month intervention period was August to October 2012 and September to November 2012 in Thailand and Australia, respectively. The concept of opportunistic risk assessment (the intervention occurring sporadically in a primary setting, including primary care, pharmacy chains, occupational health departments, or small businesses) was applied in this study [21]. The study was approved by the Human Research Ethics Committee, University of Newcastle, Australia, and the Institutional Review Board at Silpakorn University, Thailand.

Recruitment of Participants
Invitation letters, study information, and consent forms were distributed to pharmacies in the Hunter region, New South Wales, Australia, and to pharmacies in Central Thailand. Eight Australian community pharmacists and six Thai community pharmacists consented to participate in the study. Based on the validity of the risk assessment tool, in Australia, inclusion criteria were adult participants (aged at least 25 years) who were interested in receiving diabetes risk assessment service and able to read or understand English. In Thailand, adult participants (aged at least 35 years) who were interested in receiving diabetes risk assessment service and able to read or understand Thai were recruited. Participants with a previous diagnosis of diabetes or current use of antidiabetic medications or currently pregnant were excluded. Participants were recruited by either pharmacist’s invitation or by self-selection. All participants were provided the study information sheet and signed a consent form before undertaking the risk assessment.

Instrument and Data Collection
The risk assessment tools AUSDRISK and Thai diabetes risk scores were used to determine the risks of developing type 2 diabetes in Australia and Thailand, respectively. The characteristics of risk assessment tools are described in Appendix A in Supplemental Materials found at: http://dx.doi.org/10.1016/j.vhri.2015.03.022.

A generic health-related quality-of-life instrument, namely, the five-level EuroQol five-dimensional questionnaire (EQ-5D-5L), was used to measure participants’ health-related quality of life and utility values. The self-reported EQ-5D-5L includes the EQ-5D descriptive system, which comprises five dimensions of health: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension has five levels reflecting “no problems,” “slight problems,” “moderate problems,” “severe problems,” and “unable or extreme health problems.” The visual analogue scale, which provides a direct valuation of the respondent’s current status state of health, is also included in the EQ-5D-5L [22]. At the same time, a five-point, Likert scale, self-reported questionnaire was used to determine the client’s perception of risk assessment, level of concern, level of need for information about the disease, and level of understanding of the content of risk assessment. The questionnaire was developed from previous validated questionnaires that have interests similar to this study’s objectives. The draft questionnaire was reviewed by expert pharmacists in an academic institute who were not involved in this study. The final questionnaire was then formulated according to comments received from expert pharmacists. The questionnaire also contained an open-ended question —“Assuming the risk assessment service can improve your quality of life and delay or prevent type 2 diabetes, how much would you be willing to pay (WTP) for the service to gain this benefit?”—to solicit the values that participants were willing to pay for diabetes risk assessment service. Participants were given a range of WTP amounts (0–300 baht for Thai participants and Au $0–10 for Australian participants) and asked to indicate their maximum WTP for the risk assessment service provided at the pharmacy.

A semistructured interview was used to interview participating pharmacists after the intervention period to solicit the perceived facilitators and barriers in providing diabetes risk
assessment intervention at the community pharmacy. The face-to-face interview time ranged from 15 to 30 minutes. Three questions were used as a guide for the interview (see Appendix B in Supplemental Materials found at: http://dx.doi.org/10.1016/j.vhri.2015.03.022). The interview session was audio recorded. The same procedure was used in both countries, with the Thai language used when interviewing Thai pharmacists. To avoid interpersonal variation, all interviews, transcriptions, and translations were conducted by the first author, who is a bilingual pharmacist. A back translation was conducted by an expert pharmacist in an academic institute who was not involved in this study.

Data Analysis

Descriptive statistics were used to analyze frequencies and percentages. The chi-square test was used to determine differences between demographic characteristics and the number of individuals willing to pay for the service. Logistic regression analyses were performed to test the hypothesized relationship between demographic variables (including age, sex, education level, risk category, visual analogue scale, utility scores, level of worrying, level of need of information about the disease, and level of understanding of the content of risk assessment tools) and the WTP for the service. The dependent variable, WTP, was categorized with a dichotomous yes/no, where the individual who stated “WTP = 0” or “I don’t know” was considered as not willing to pay. The demographic variables were also used as dichotomous variables (Table 1). All statistical analyses were performed using IBM SPSS statistic v.19, and the level of significance for all statistical tests was set at 0.05.

Results

Background Characteristics of Client Participants

A total of 132 and 185 participants with a mean age of 56 ± 16 years and 49 ± 11 years in Australia and Thailand, respectively, participated. There were more female than male participants (58% in both countries), but more participants in Australia finished high school or higher education than did the Thai cohort (82% vs. 46%; P < 0.001).

The ratio of participants in the three risk categories of low, intermediate, and high was 1:4:11 and 2:1:1.5 for Australia and Thailand, respectively (Table 2). The percentage of overweight participants and the utility index values of participants were similar in both countries (55% in Australia vs. 50% in Thailand, P = 0.30, and 0.81 in Australia vs. 0.82 in Thailand, P = 0.6, respectively). Details of the characteristics of participants from the two countries are given in Table 1.

WTP for the Service

The results showed that more Thai participants were willing to pay for the service (72.4% vs. 18.9%; P = 0.0001) (Table 2). The mean value of WTP for Thai and Australia participants was US $1.5 and US $4.2, respectively. Relationships between the determinants and the WTP were tested using a logistic regression. A nonsignificant Hosmer and Lemeshow test showed that the model fitted the data for both countries. The determinants explained 14% and 26% of the variance of WTP for the service for Australia and Thailand, respectively (Table 3).

Three significant predictors (level of worry of developing type 2 diabetes, further information is needed, and level of agreement that the content of the risk assessment tool is easy to understand) were found for the model for Thailand. Subjects are more likely to pay for the service when they feel more worried about developing the disease, need more information about the disease, and understand the content of the diabetes risk assessment tool. In contrast, no significant predictor was found for the model for Australia.

Advantages and the importance of providing risk assessment service in community pharmacy

The interviewed pharmacists from both countries stated that providing risk assessment service in a community pharmacy would increase health awareness and lead to an improvement in healthy behavior in the population. Two interviewed Thai pharmacists stated that providing risk assessment service in a community pharmacy would improve the image of community pharmacists in the role of health care professionals rather than drug sellers (TH1 and TH3). Likewise, an Australian pharmacist also stated that providing such a service would enhance the professional role of pharmacy and make the pharmacy a community health destination (AUS6). The interviewed Thai pharmacists (TH2 and TH3) also mentioned that this intervention could produce long-term benefits by increasing the number of regular customers and create customer loyalty.

Facilitators

Most of the interviewed Thai pharmacists stated that increased clients’ awareness in risk assessment service; support from the government, such as provision of simple and user-friendly risk assessment tools, education material, and other facilities that are

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Australia (N = 132)</th>
<th>Thailand (N = 185)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>55 (41.7)</td>
<td>77 (41.6)</td>
<td>0.54*</td>
</tr>
<tr>
<td>Female</td>
<td>77 (58.3)</td>
<td>108 (58.4)</td>
<td></td>
</tr>
<tr>
<td>Age (y), mean ± SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56 ± 16</td>
<td>49 ± 11</td>
<td>&lt;0.0001†</td>
<td></td>
</tr>
<tr>
<td>Education level,‡ n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>16 (18)</td>
<td>92 (54.4)</td>
<td>&lt;0.0001†</td>
</tr>
<tr>
<td>High school or higher</td>
<td>73 (82)</td>
<td>77 (45.6)</td>
<td></td>
</tr>
<tr>
<td>Overweight,§ n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>72 (54.5)</td>
<td>92 (49.7)</td>
<td>0.30*</td>
</tr>
<tr>
<td>No</td>
<td>60 (45.5)</td>
<td>93 (50.3)</td>
<td></td>
</tr>
<tr>
<td>VAS score, mean ± SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>74.4 ± 15.3</td>
<td>78.9 ± 12.4</td>
<td>0.005†</td>
<td></td>
</tr>
<tr>
<td>Utility index, mean ± SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.807 ± 0.164</td>
<td>0.816 ± 0.166</td>
<td>0.644‡</td>
<td></td>
</tr>
<tr>
<td>Pharmacist participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>6 (75)</td>
<td>3 (50)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>2 (25)</td>
<td>3 (50)</td>
<td></td>
</tr>
<tr>
<td>Age (y), mean ± SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41.88 ± 11.29</td>
<td>39.17 ± 3.71</td>
<td>0.59‡</td>
<td></td>
</tr>
<tr>
<td>Years of work experience, mean ± SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.25 ± 8.48</td>
<td>9.33 ± 2.07</td>
<td>0.29‡</td>
<td></td>
</tr>
</tbody>
</table>

* Chi-square test, significance level 0.05.
† Independent-samples t test, significance level 0.05.
‡ Percentage calculated from n = 132 (Australia) and n = 185 (Thailand).
§ Waist circumference ≥88 cm (women) and ≥102 cm (men) for Australia and ≥80 cm (women) and ≥90 cm (men) for Thailand.
In this study, we explored the pharmacy practice in providing diabetes risk assessment by the application of noninvasive risk assessment tools in community pharmacies in Australia and Thailand. A higher ratio of Australian participants was identified being at high risk of developing type 2 diabetes, whereas the Thai participants were more willing to pay for the service. Major barriers in providing risk assessment services in both countries were similar, with time and staff shortage being the most common.

The results showed that the mean age of Australian participants was significantly higher than that of Thai participants. This may contribute to the higher ratio of individuals identified as high risk in Australia because age is contributes 6 to 8 points to the total risk score. Although the AUSDRISK is recommended to assess individuals older than 25 years [10], the difference in pharmacy services between the two countries may somewhat affect recruiting the target participants. Dispensing and filling prescriptions are the major sources of income for Australian pharmacies because Australian patients can obtain their prescriptions only from the pharmacy by law. In contrast, Thai pharmacies rarely fill prescriptions and more than 80% of Thai people go to the pharmacy to buy medications and other medicinal products when they feel sick [20]. As such, clients visiting Australian pharmacies are more likely to be in the elderly age group with medical condition(s) requiring prescription medicines. With a downward drift in the age for diabetes, inclusion of younger age groups into any diabetes risk assessment program would be the preferred strategy. Thus, if community pharmacists in Australia were to perform diabetes risk assessment, special efforts to increase awareness of pharmacists’ role in health prevention in the younger age groups would be required. Similarly, the only available diabetes risk assessment tool for the Thai population is validated in the population older than 35 years. Thus, there is a need to develop a risk assessment tool to cover the younger age groups.

Thai individuals were more willing to pay for the service than their Australian counterparts. Although universal health coverage has been established in Thailand, pharmaceutical subsidy at the community pharmacy is not covered under this scheme [23]. Hence, the Thai general public would still perceive that pharmacy is the place they visit to purchase health care products and have to pay for the provided services. In contrast, beside the government-subsidized pharmaceutical scheme, a wide range of health services have been conducted in Australian pharmacies, usually provided free of charge [19]. Thus, Australians may not think that they have to pay for this type of service. Because of the limitation of published works regarding Thais’ perception of the roles of community pharmacists [24], further study to obtain details regarding factors such as lifestyles and behaviors that might contribute to differences in the WTP are recommended to confirm this finding.

When considering the quantum of payment from the WTP, Australian consumers were willing to pay a higher amount in comparison with Thai consumers when values were assessed according to purchasing power in the two countries. In Australia, the mean value was nearly identical to the patient’s maximum co-payment for a prescription for persons who have a concession card [25], whereas in Thailand, it was a similar amount required from the patients who are supported by the government funding to pay for the received treatment in public hospital.

Table 2 - Respondents’ outcomes on risk category, willingness to pay, and perception of risk assessment.

<table>
<thead>
<tr>
<th>Risk category</th>
<th>Australia (N = 132)</th>
<th>Thailand (N = 185)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>9 (6.8)</td>
<td>80 (43.2)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Intermediate</td>
<td>32 (24.2)</td>
<td>42 (22.7)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>91 (69)</td>
<td>63 (34.1)</td>
<td></td>
</tr>
<tr>
<td>Number of participants willing to pay for the service†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>25 (18.9)</td>
<td>134 (72.4)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>No</td>
<td>107 (81.1)</td>
<td>51 (27.6)</td>
<td></td>
</tr>
<tr>
<td>Level of worrying of developing type 2 diabetes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>3 (2.3)</td>
<td>19 (10.3)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Disagree</td>
<td>25 (18.9)</td>
<td>30 (16.2)</td>
<td></td>
</tr>
<tr>
<td>Uncertain</td>
<td>30 (22.7)</td>
<td>25 (13.5)</td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>65 (49.2)</td>
<td>72 (38.9)</td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>9 (6.8)</td>
<td>39 (21.1)</td>
<td></td>
</tr>
<tr>
<td>Would like to have more information about type 2 diabetes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>2 (1.5)</td>
<td>1 (0.5)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Disagree</td>
<td>14 (10.6)</td>
<td>6 (3.2)</td>
<td></td>
</tr>
<tr>
<td>Uncertain</td>
<td>32 (24.2)</td>
<td>11 (5.9)</td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>62 (47.0)</td>
<td>101 (54.6)</td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>22 (16.7)</td>
<td>66 (35.7)</td>
<td></td>
</tr>
<tr>
<td>Level of agreement of content in the risk assessment tool is easy to understand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>0</td>
<td>0</td>
<td>0.005*</td>
</tr>
<tr>
<td>Disagree</td>
<td>6 (4.5)</td>
<td>1 (0.5)</td>
<td></td>
</tr>
<tr>
<td>Uncertain</td>
<td>12 (9.1)</td>
<td>20 (10.8)</td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>68 (51.5)</td>
<td>121 (65.4)</td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>46 (34.8)</td>
<td>43 (23.2)</td>
<td></td>
</tr>
</tbody>
</table>

Note. Values are n (%).
† Chi-square test, significance level 0.05.
* All answer state “I don’t know” or “AUD $0.00” or “Baht 0.00” considered as not willing to pay for the service.

Discussion

In general, pharmacists from both countries stated that time and staff shortage were major barriers in providing the risk assessment service. Lack of knowledge and client interest were also identified as barriers by the Thai pharmacists (TH1, TH3, and TH6). The interviewed Australian pharmacists further stated that it would be difficult to add another free service in addition to their existing responsibilities (AUS1, AUS2, AUS3, AUS5, AUS6, and AUS7). Similarly, other suggestions from Thai pharmacists include suitable compensation (pharmacist fee) (TH3), or an acknowledgment from the national health organization (such as a certificate) to encourage the pharmacists to perform this intervention (TH1).

Barriers

In general, pharmacists from both countries stated that time and staff shortage were major barriers in providing the risk assessment service. Lack of knowledge and client interest were also identified as barriers by the Thai pharmacists (TH1, TH3, and TH6). The interviewed Australian pharmacists further stated that it would be difficult to add another free service in addition to their existing responsibilities (AUS1, AUS2, AUS3, AUS5, AUS6, and AUS7). Similarly, other suggestions from Thai pharmacists include suitable compensation (pharmacist fee) (TH3), or an acknowledgment from the national health organization (such as a certificate) to encourage the pharmacists to perform this intervention (TH1).

Suggested solutions from the interviewed Thai pharmacists to overcome the identified barriers included 1) utilizing pharmacy students during clinical placement to assist in providing the service; 2) increasing awareness of the health promotion service and the benefit of this service in the population; and 3) establishing a collaboration system among health care providers. For Australian pharmacists, the suggested solutions to overcome barriers included 1) adding the service to the pharmacy practice incentive schemes, and 2) providing the necessary training and resources for such a service.
Table 3 – Logistic regression analysis: Explanation of prediction variables and the willingness to pay for the service (no = 0; yes = 1).

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Australia</th>
<th></th>
<th></th>
<th>Thailand</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ß</td>
<td>Wald χ²</td>
<td>P</td>
<td>Odds ratio</td>
<td>95% CI</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>-0.216</td>
<td>0.140</td>
<td>0.708</td>
<td>0.806</td>
<td>0.261</td>
<td>2.492</td>
</tr>
<tr>
<td>Age</td>
<td>0.308</td>
<td>0.262</td>
<td>0.609</td>
<td>1.361</td>
<td>0.418</td>
<td>4.425</td>
</tr>
<tr>
<td>Risk category (I)</td>
<td>0.995</td>
<td>0.652</td>
<td>0.419</td>
<td>2.706</td>
<td>0.242</td>
<td>1.421</td>
</tr>
<tr>
<td>Risk category (II)</td>
<td>-1.200</td>
<td>1.726</td>
<td>0.189</td>
<td>0.301</td>
<td>0.050</td>
<td>1.805</td>
</tr>
<tr>
<td>Education</td>
<td>-0.379</td>
<td>0.260</td>
<td>0.610</td>
<td>0.684</td>
<td>0.159</td>
<td>2.937</td>
</tr>
<tr>
<td>VAS†</td>
<td>0.088</td>
<td>0.021</td>
<td>0.886</td>
<td>1.092</td>
<td>0.327</td>
<td>3.652</td>
</tr>
<tr>
<td>Utility†</td>
<td>0.019</td>
<td>0.001</td>
<td>0.975</td>
<td>1.020</td>
<td>0.298</td>
<td>3.491</td>
</tr>
<tr>
<td>Worrying‡</td>
<td>-0.840</td>
<td>1.426</td>
<td>0.2372</td>
<td>0.434</td>
<td>0.110</td>
<td>1.708</td>
</tr>
<tr>
<td>Further information is needed†</td>
<td>-0.811</td>
<td>1.338</td>
<td>0.247</td>
<td>0.444</td>
<td>0.112</td>
<td>1.756</td>
</tr>
<tr>
<td>Understanding‡</td>
<td>0.353</td>
<td>0.065</td>
<td>0.799</td>
<td>1.424</td>
<td>0.093</td>
<td>10.475</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.271</td>
<td>0.090</td>
<td>0.764</td>
<td>0.762</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>χ² Log likelihood</td>
<td></td>
<td></td>
<td></td>
<td>83.502</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nagelkerke R²</td>
<td></td>
<td></td>
<td></td>
<td>0.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>χ²</td>
<td></td>
<td></td>
<td></td>
<td>153.134</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hosmer and Lemeshow test</td>
<td>χ² = 12.44, df = 8, P = 0.13</td>
<td></td>
<td></td>
<td>χ² = 9.19, df = 8, P = 0.33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CI, confidence interval; VAS, visual analogue scale.

* Dichotomous category of VAS (0 = < 75; 1 = ≥ 75).
† Dichotomous category of utility (0 = < 0.8; 1 = ≥ 0.8).
‡ Dichotomous category of level of worrying in developing type 2 diabetes, level of further information is needed, and level of agreement of understanding of the content of the diabetes risk assessment tool (0 = strongly disagree, disagree, and uncertain; 1 = agree and strongly agree).
§ Significant level P < 0.05.
In addition, the concern of developing the disease, need for further information about the disease, and understanding of the content of the risk assessment tool can predict WTP in the Thai population. This reflects the impact of pharmacist intervention on risk perception and perceived value for the provided service. In contrast, these variables cannot predict WTP in the Australian population. This observation can be explained by the organizational theory that behavior can be modified by culture and rules [18]. Thus, the strategy to enhance the risk perception and the perceived value for Australian consumers would differ from that used in Thailand because of cultural difference.

Although the provision of pharmaceutical care service in Thai community pharmacy has been initiated, it is not yet widespread and still limited to university pharmacies or accredited pharmacies in which a pharmacist is present at all times [26]. Our results used in Thailand because of cultural difference. [18]. Thus, the strategy to enhance the risk perception and the results in developing countries) to be aware of the differences based on this organizational theory.

Study limitations

The study has at least two limitations. First, results from this study may not be generalized because the findings represent the reality of practice in only six and eight pharmacies from each country, respectively. Further large-scale studies involving more pharmacies with a larger population are recommended to confirm our findings. Second, selection bias may have occurred because those who felt at risk or had health concerns were more likely to participate in the study.

Conclusions

Our study found that providing an opportunistic diabetes risk assessment service at community pharmacies is feasible both in Australia and in Thailand. Pharmacists in both countries agreed that increasing diabetes risk awareness at community pharmacies would contribute to the improvement in public health and produce positive health benefits. This positive attitude shown by Australian and Thai pharmacists indicates the trend that the pharmacy profession worldwide is keen to move toward providing more patient-oriented services when the barriers are managed.

Differences in the health insurance coverage systems and the adequacy in health care access, however, could influence pharmacy practice and hence the implementation of such services in different countries. This is demonstrated by the difference in advantages and barriers for providing the risk assessment service as well as the difference in the proportion of consumers willing to pay for the service. These findings confirmed our hypothesis based on the organizational theory that changing a single component or the difference in a single component will have an impact on the entire organization. Therefore, strategies to encourage and assist pharmacists in providing the risk assessment service in developed and developing countries would be different. Hence, when attempting to emulate pharmacy practice from other countries, it is essential for pharmacists (particularly in developing countries) to be aware of the differences based on this organizational theory.

Acknowledgments

We acknowledge all the participating pharmacists for their valuable time.

Source of financial support: The financial support for this project was provided by the higher research degree student funds, University of Newcastle, Australia.

Supplementary Materials

Supplemental material accompanying this article can be found in the online version as a hyperlink at http://dx.doi.org/10.1016/j.vhri.2015.03.022 or, if a hard copy of article, at www.valueinhealthjournal.com/issues (select volume, issue, and article).

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