RESEARCH ARTICLE

Pharmacotherapy related quality of life in Thai patients with chronic diseases

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Abstract

Background Little was known about patient's pharmacotherapy related quality of life (PTRQoL) and its differences between disease groups. *Objective* First, to assess PTRQoL in Thai patients with chronic diseases using the Patient-Reported Outcomes Measure of Pharmaceutical Therapy for Quality of Life (PROMPT-QoL). Second, to determine the differences in PROMPT-QoL domain scores and total scores between disease groups. *Setting* Three public university hospitals in Bangkok, Thailand. *Method* Eleven hundred and fifty-six adult outpatients continuously taking medicines to treat their diseases for at least 3 months were conveniently sampled. Bonferroni post hoc tests were used to determine the differences in eight PROMPT-QoL domain scores and total scores between 14 disease groups. *Main outcome measure* The descriptive statistics of PROMPT-QoL domains and the total score. *Results* Approximately two-thirds of all patients preferred to use only medicines for treating their diseases. Impacts of Medicines and Side-Effects and Medicine and Disease Information yielded the highest (87.3) and lowest (55.4) mean domain scores, respectively. The other domains and the total score provided the average scores between 65 and 75, which were interpreted as moderate-to-good. Bonferroni post hoc tests showed that there were five domains providing significantly different scores between disease groups. They included Medicine and Disease Information, Satisfaction with Medicine Effectiveness, Impacts of Medicines and Side-effects, Convenience, and Therapeutic Relationships with Healthcare Providers domains. *Conclusion* Pharmacotherapy related quality of life in Thai patients is moderate-to-good. Five of eight pharmacotherapy related quality of life domain scores differed by disease groups.

Keywords Chronic diseases · Drug therapy · Patient-reported outcomes · Quality of life · Thailand

Impact of practice

- This study reports pharmaceutical therapy-specific quality of life which will be useful for healthcare providers to know about the patients' drug-related needs.
- This study also reports the differences in pharmaceutical therapy-specific quality of life between chronic disease groups which will be helpful for healthcare providers to manage patient's medication therapy in each disease group.

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Introduction

Patient-centered medicine (PCM) is one of the six goals of medicine in the twenty-first century [1]. PCM puts more emphasis on patient's psychosocial context which enables healthcare providers to understand more about their perceptions of disease and treatment [2]. Based on the concept of PCM, patient-reported outcomes (PROs) are derived from patient's perspectives rather than provider's points of view which usually focus on traditionally clinical outcomes, such as improved lab tests. Among PROs (i.e., patient satisfaction, symptoms, and adherence to treatment) [3], the health-related quality of life (HRQoL) is the most common one. It refers to the patient's subjective perception of the impact of their disease and treatment on physical, psychological and social functioning [4].

Pharmacotherapy not only improves patients' health from suffering from a disease, but also causes undesirable effects, which can negatively affect their post-treatment

HRQoL [5]. Examples of undesirable effects include misunderstanding of medication use, expectation of effectiveness, fear or worry of adverse drug reactions and inconvenience. In the US, the annual cost of these drug-therapy problems was approximately 177.4 billion US dollars [6]. Therefore, assessment of pharmacotherapy related quality of life (PTRQoL) is important. Since no well-standardised PTRQoL tool has been available, most researchers have used HRQoL measures including generic and disease-specific questionnaires rather than pharmacotherapy related quality of life measures to assess the impact of medicine therapy on a patient's life.

A novel generic questionnaire called "Patient-Reported Outcomes Measure of Pharmaceutical Therapy for Quality of Life (PROMPT-QoL) [7] was developed." It was originally in Thai and was mainly created based on the concept of patient-centered pharmaceutical care [8]. In this concept, a practitioner has to be responsible for patients' drug-related needs (DRNs) including drug indication, effectiveness, safety, and convenience to achieve their positive outcomes. The PROMPT-QoL also applies the theories of PTRQoL [5], QoL and HRQoL [4, 9–11] that pharmacotherapy related quality of life is the impact of medicine therapy on patient's physical, psychological, and social aspects, etcetera, from their perspective. It is expected that this instrument can be used as a humanistic outcome measure of pharmaceutical care interventions and as a screening tool for identifying DRNs or assessing PTRQoL.

The PROMPT-QoL was found to be practical, reliable, valid [12], and responsive [13]. It was applied as a PTRQoL outcome measure of pharmacist-led patient-centered pharmaceutical care interventions [13]. The PROMPT-QoL could also discriminate the PTRQoL of Thai patients with chronic diseases with different levels of socio-demographic and clinical variables [12]. However, little was known about the PTRQoL and its differences between disease groups. Patients with different conditions can have different medication experiences [8] which may affect PTRQoL. This information will be helpful for healthcare providers to manage patient's medication therapy in each disease group. Other PTRQoL tools in different countries also did not report the details of PTRQoL and their differences between disease groups [14–16]. Previous Thai studies assessed medication experiences using open-ended questions and PTRQoL employing an individualised patient-generated index approach in only 25 patients [17, 18]. They also did not examine the differences in PTRQoL between patients with different conditions. Therefore, this study used a standardised PROMPT-QoL questionnaire in a large sample size to study the variations in score between patients with different (chronic) diseases.

Aims of the study

First, to assess pharmacotherapy related quality of life in Thai patients with chronic diseases using the PROMPT-QoL. Second, to determine the differences in PROMPT-QoL scores between disease groups.

Ethics approval

The study was approved by the Ethical Committees of King Chulalongkorn Memorial Hospital (329/2014), Ramathibodi Hosptial (2557/233), and Phramongkutklao Hospital (718/2557). All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and/or national research committees and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Methods

Participants and procedures

This study applied the data from the project "Psychometric properties of the Patient-Reported Outcomes Measure of Pharmaceutical Therapy for Quality of Life [12]." Eleven hundred and fifty-six adult outpatients continuously taking medicines for at least 3 months were conveniently sampled from three public university hospitals in Bangkok, Thailand, between July 2014 and March 2015. If the patients had more than one disease, they were asked to think about a disease that mostly affected their quality of life and the medicines used to treat this disease to answer the PROMPT-QoL. The details of participants and procedures were previously reported [12].

Measure

PROMPT-QoL

The PROMPT-QoL has 43 items including nine domains: General Attitude toward Medication Use (1 item), Medicine and Disease Information (9 items), Satisfaction with Medicine Effectiveness (3 items), Impacts of Medicines and Side-effects (8 items), Psychological Impacts of Medication Use (9 items), Convenience (3 items), Availability and Accessibility (4 items), Therapeutic Relationships with Healthcare Providers (3 items), and Overall Quality of Life (3 items). Each item has 5-point Likert scale from "not at

all" to "very much" except only one item of General Attitude toward Medication Use domain which provides respondents with four treatment types [medicines, alternative medicines (e.g. herbs, supplementary food, massage, acupuncture, mind–body interventions), both, or others than mentioned], and asks them to indicate their preferred type of treatment. Thus, only 42 items are summed to calculate the other eight PROMPT-QoL domain scores. A total score is also a summation of the 42 items.

Item scores range from 1 to 5, with higher scores indicating better QoL. Observed domain and total scores are then converted to percentages (0–100) using the following formula: Domain and total scores = 100*(observed score − minimum domain score)/(maximum domain score − minimum domain score). Domain and total scores range between 0–25, 25–50, 50–75 and 75–100 which are interpreted as low, fair-to-moderate, moderate-to-good and good-to-excellent quality of life, respectively.

Data analysis

Descriptive statistics of the PROMPT-QoL were presented with means, standard deviations, median and quartiles of its items and domains. The General Attitude toward Medication Use item was presented with percentages. Bonferroni post hoc tests were applied to determine the differences in eight PROMPT-QoL domain scores and total scores between disease groups. P-values < 0.05 were considered significant. All analyses were performed using IBM SPSS version 22 (IBM Corp., Bangkok, Thailand).

Results

Of 1381 eligible patients, 225 patients were not willing to join in the study, so there were 1156 patients left. Of these 1156 patients, the average age was 50.4 ± 14.4 years and 48% were male. Other patients' characteristics are presented in Table 1.

The descriptive statistics of the items and domains of the PROMPT-QoL are shown in Table 2. For the General Attitude toward Medication Use domain, approximately 62% of the sample wanted only medicine treatment, while 36% preferred both medicine and alternative treatments (data not shown in Table 2). For the Medicine and Disease Information domain, the items with median scores lower than or equal to 3 (moderate) comprised "drug name (3)", "strength (3)", "what to do if medicine doses are missed (2 = a little)" and "side-effects and management (3)." For the Satisfaction with Medicine Effectiveness domain, "onset of medicine action" provided the lowest median score of 3. For the Impacts of Medicines and Side-effects domain, all items yielded the median scores of 5 (very

Table 1 Patient characteristics (N = 1156)

Characteristics	Value
Age (year)	
Mean ± SD	50.4 ± 14.4
Median (interquartile)	52 (40–61)
Gender; N (%)	
Male	555 (48%)
Female	601 (52%)
Highest education level; N (%)	
< College	561 (48.5%)
≥ College	595 (51.5%)
Disease groups; N (%)	
Cardiovascular disorders	111 (9.6%)
Respiratory disorders	65 (5.6%)
Gastrointestinal disorders	79 (6.8%)
Renal disorders	96 (8.3%)
Neurologic disorders	94 (8.1%)
Sleep and emotional disorders	64 (5.5%)
Endocrinologic disorders	100 (8.7%)
Gynecologic and urologic disorders	68 (5.9%)
Bone and joint disorders	101 (8.7%)
Ophthalmic nose and throat disorders	78 (6.7%)
Dermatologic disorders	75 (6.5%)
Hematologic disorders	57 (4.9%)
Infectious diseases	86 (7.4%)
Oncologic disorders	82 (7.1%)
Number of diseases	
Mean ± SD	2.3 ± 1.4
Median (interquartile)	2 (1–3)
Number of medicines	
Mean ± SD	5.2 ± 3.2
Median (interquartile)	5 (3–7)
Patient perception of disease control; N (%)	
Poor-to-fair	261 (22.6%)
Moderate	336 (29.1%)
Good-to-excellent	559 (48.3%)
Having an adverse drug reaction; N (%)	
Yes	591 (51.1%)
No	565 (48.9%)

much). Regarding the Psychological Impacts of Medication Use domain, all items had the median scores of 4 (much). Similar to the Psychological Impacts of Medication Use, all items of the Convenience domain yielded the median scores of 4. For the Availability and Accessibility domain, "service process and waiting time" yielded the lowest median score of 3. For the Therapeutic Relationships with Healthcare Providers domain, all items provided the median scores of 4. For the Overall Quality of Life domain, "happiness" had the lowest median score of 3.

Table 2 Descriptive statistics of items, domains, and total scores of the PROMPT-QoL (N = 1156)

Domain	Mean ± SD	Median	Interquartile
Receiving drug and disease information	55.4 ± 20.3	55.6	41.7–69.4
Drug name	3.2 ± 1.2	3	2–4
Strength	2.7 ± 1.3	3	1–4
Indication	3.8 ± 0.9	4	3–4
How to use medicines	3.8 ± 0.9	4	3–4
Reason for using medicines regularly	3.5 ± 1.1	4	3–4
What to do if medicine doses are missed	2.5 ± 1.3	2	1–4
Side-effects and management	2.8 ± 1.3	3	2–4
Causes and prevention	3.4 ± 1.1	4	3–4
Symptoms, severity, and treatment	3.4 ± 1.1	4	3–4
Satisfaction with medication effectiveness	64.6 ± 20.6	64.6	50.0–70.0
Symptom relief	3.7 ± 0.9	4	3–4
Cure at first time	3.6 ± 1.0	4	3–4
Onset of medicine action	3.4 ± 0.9	3	3–4
Impacts of medicines and side-effects on	87.3 ± 14.8	90.6	81.3–100.0
Mobility, energy, pain, and discomfort	4.3 ± 0.9	5	4–5
Sleep	4.3 ± 0.9	5	4–5
Memory and cognition	4.6 ± 0.8	5	4–5
Appearance or body skin	4.4 ± 1.0	5	4–5
Eating, digestion, or stool passing	4.4 ± 0.9	5	4–5
Vision, hearing, and speech	4.7 ± 0.7	5	5–5
Intercourse and sexual desire	4.7 ± 0.7	5	5–5
Daily activities or socializing with others	4.5 ± 0.9	5	4–5
Psychological impacts of medicine use	70.2 ± 22.0	73.6	55.6–88.9
Medicine side effect	3.6 ± 1.2	4	3–5
Feeling bored with taking medicine every day	3.7 ± 1.2	4	3–5
Medicine resistance or ineffectiveness	3.8 ± 1.2	4	3–5
Medicine dependence	3.4 ± 1.4	4	2–5
Changing type/strength of medicine	3.8 ± 1.2	4	3–5
Taking many medicines	3.6 ± 1.3	4	3–5
Taking medicine in front of others	4.5 ± 0.9	4	4–5
Medicine interaction	3.9 ± 1.2	4	3–5
Taking medicine makes you less healthy than person with the same age	3.8 ± 1.2	4	3–5
Convenience	66.7 ± 19.3	66.7	50.0–75.0
Appropriate dosage forms	3.6 ± 0.9	4	3–4
Convenience of use	3.6 ± 0.9	4	3–4
Ease of carrying medicines around	3.8 ± 0.9	4	3–4
Availability/accessibility	73.4 ± 17.3	75.0	62.5–87.5
Medicine availability in a setting	4.5 ± 0.9	5	4–5
Medication and travel expenses	4.3 ± 1.0	5	4–5
Service process and waiting time	3.3 ± 1.0	3	3–5
Travel or self-support to hospital	3.7 ± 1.2	4	3–5
Therapeutic relationship with health care providers	73.8 ± 17.1	75.0	66.7–83.3
Trust doctor's decision on medicine treatment	4.2 ± 0.7	4	4–5
Friendly manners and willingness to answer medicine queries	3.9 ± 0.8	4	3–4
Getting help to sort out medicine-related problems or concerns	3.8 ± 0.9	4	3–4
Overall quality of life	63.0 ± 18.5	66.7	50.0–75.0
Satisfaction with medication use	3.7 ± 0.8	4	3–4
Happiness	3.3 ± 0.9	3	3–4
Improvement in daily life	3.5 ± 0.9	4	3–4

Table 2 (continued)

Domain	Mean ± SD	Median	Interquartile
Total score	66.7 ± 11.3	70.2	62.5–78.0

As for domain scores, the Impacts of Medicines and Side-effects and Medicine and Disease Information yielded the highest (87.3) and lowest (55.4) mean scores, respectively. The other domains provided average scores between 65 and 75. The average total score was 66.7.

Table 3 shows PROMPT-QoL domain scores by disease groups. Bonferroni post hoc tests found that there were five domains providing significantly different scores between disease groups as follows. For the Medicine and Disease Information, infectious disorders provided higher domain scores than sleep and emotional disorders ($p < 0.01$), endocrinologic disorders ($p < 0.05$), and ophthalmic nose and throat disorders ($p < 0.05$). For the Satisfaction with Medicine Effectiveness, infectious disorders had higher domain scores than sleep and emotional disorders and endocrinologic disorders (both $p < 0.05$). For the Impacts of Medicines and Side-effects, oncologic disorders yielded lower domain scores than the other disorders (all $p < 0.01$). In addition, renal and neurologic disorders provided lower Impacts of Medicines and Side-effects domain scores than cardiovascular disorders (both $p < 0.05$). For the Convenience, renal disorders had lower domain scores than cardiovascular disorders ($p < 0.05$), gynecologic and urologic disorders ($p < 0.05$), and oncologic disorders ($p < 0.01$). For the Therapeutic Relationships with Healthcare Providers, sleep and emotional disorders yielded lower domain scores than oncologic disorders ($p < 0.05$) and infectious disorders ($p < 0.01$).

The other three domain scores including Psychological Impacts of Medication Use, Availability & Accessibility and Overall Quality of Life scores, and total scores were not significantly different between disease groups.

Discussion

This is the first study to specifically assess pharmacotherapy related quality of life using the newly-developed PROMPT-QoL questionnaire in Thai patients with chronic

Table 3 Pharmacotherapy related quality of life using the PROMPT-QoL by disease groups

Disease groups	MDI* Mean ± SD	SME* Mean ± SD	IMS* Mean ± SD	PIMU Mean ± SD	CON* Mean ± SD	AA Mean ± SD	TRHC* Mean ± SD	OQoL Mean ± SD	Total Mean ± SD
CD (N = 111)	55.0 ± 21.9	67.1 ± 17.7	*92.1 ± 10.8*	74.9 ± 21.4	*69.6 ± 17.5*	77.0 ± 13.8	71.9 ± 17.4	64.3 ± 16.8	71.9 ± 10.2
Res D (N = 65)	64.9 ± 16.9	69.4 ± 17.8	88.4 ± 15.2	68.5 ± 22.3	60.3 ± 20.7	73.2 ± 16.3	73.6 ± 15.2	62.2 ± 18.3	68.5 ± 11.5
GD (N = 78)	61.9 ± 19.7	68.0 ± 17.4	88.6 ± 14.4	72.1 ± 21.6	68.8 ± 18.4	72.5 ± 18.8	74.8 ± 16.4	66.1 ± 16.2	71.7 ± 11.4
Ren D (N = 95)	57.9 ± 17.8	63.0 ± 16.6	*84.8 ± 16.5*	68.1 ± 22.5	*59.4 ± 19.8*	69.2 ± 18.8	74.9 ± 14.8	62.9 ± 18.3	68.2 ± 11.6
ND (N = 94)	58.3 ± 19.6	61.7 ± 17.5	*84.7 ± 15.8*	65.2 ± 23.9	63.7 ± 20.5	71.9 ± 19.4	70.7 ± 17.9	61.2 ± 17.2	67.1 ± 11.9
SED (N = 64)	*51.8 ± 22.3*	*64.5 ± 18.9*	86.3 ± 14.8	68.5 ± 22.0	65.2 ± 19.6	72.4 ± 21.0	*67.7 ± 19.8*	60.2 ± 20.3	66.8 ± 13.7
ED (N = 100)	*54.6 ± 19.2*	*64.3 ± 17.0*	88.3 ± 14.3	69.5 ± 20.4	63.9 ± 19.4	74.9 ± 17.0	72.8 ± 15.7	60.3 ± 18.4	68.9 ± 10.7
GUD (N = 67)	52.6 ± 24.1	65.6 ± 18.8	*91.1 ± 10.8*	75.7 ± 19.9	*71.0 ± 17.2*	75.1 ± 15.4	74.8 ± 17.7	64.6 ± 18.2	71.6 ± 9.2
BJD (N = 101)	55.1 ± 21.6	62.6 ± 17.6	*87.6 ± 14.3*	70.6 ± 20.5	68.9 ± 17.7	72.6 ± 16.5	72.9 ± 16.9	62.2 ± 15.7	69.4 ± 10.0
ONTD (N = 78)	*57.8 ± 16.5*	66.8 ± 20.7	*91.4 ± 11.3*	72.5 ± 21.4	67.3 ± 18.9	74.9 ± 15.7	73.3 ± 17.2	62.8 ± 17.4	70.6 ± 11.8
DS (N = 75)	58.5 ± 21.0	66.0 ± 17.8	*91.1 ± 13.4*	74.9 ± 20.0	69.7 ± 21.0	75.2 ± 16.8	73.0 ± 17.6	63.4 ± 20.4	71.7 ± 11.8
HD (N = 57)	59.8 ± 21.2	62.9 ± 17.7	87.0 ± 14.6	69.2 ± 26.1	69.4 ± 16.4	74.0 ± 17.7	74.8 ± 19.8	62.4 ± 18.6	69.3 ± 11.5
ID (N = 86)	*64.5 ± 20.9*	*70.9 ± 16.8*	85.1 ± 14.5	64.9 ± 22.6	66.7 ± 20.6	74.1 ± 16.9	*78.8 ± 15.5*	65.8 ± 21.1	71.0 ± 11.6
OD (N = 82)	63.8 ± 17.8	71.8 ± 17.7	*75.5 ± 18.4*	68.7 ± 22.2	*70.9 ± 18.2*	71.1 ± 18.3	*78.6 ± 16.7*	63.7 ± 22.6	69.1 ± 11.4

Italic values mean that domains scores were significantly different

CD, Cardiovascular disorders; *Res D*, Respiratory disorders; *GD*, Gastrointestinal disorders; *Ren D*, Renal disorders; *ND*, Neurologic disorders; *SED*, Sleep and emotional disorders; *ED*, Endocrinologic disorders; *GUD*, Gynecologic and urologic disorders; *BJD*, Bone and joint disorders; *ONTD*, Ophthalmic nose and throat disorders; *DS*, Dermatologic disorders; *HD*, Hematologic disorders; *ID*, Infectious diseases; *OD*, Oncologic disorders *MDI*, Medicine and Disease Information; *SME*, Satisfaction of Medicine Effectiveness; *IMS*, Impacts of Medicines and Side-effects; *PIMU*, Psychological Impacts of Medication Use; *CON*, Convenience; *AA*, Availability and Accessibility; *TRHC*, Therapeutic Relationships with Healthcare Providers; *OQoL*, Overall QoL

*Bonferroni post hoc tests found that there were significant differences in domain scores between disease groups

diseases. The differences in PROMPT-QoL domain scores and the total scores between disease groups were also determined.

Pharmacotherapy related quality of life

For the General Attitude toward Medication Use, unsurprisingly, approximately two-thirds of all patients preferred to use only medicines for treating their diseases, while one-third wanted the combination between medicine and alternative treatments. The reason is that most patients came to the hospitals because they wanted to receive medicine treatments. This is in line with a study reporting that 26.3–48.1% of Thai patients with chronic diseases used various types of traditional, complementary and alternative medicines [19]. The previous study found that patients with combined medicine and alternative medicine preferences had significantly lower scores of the Medicine and Disease Information, Satisfaction with Medicine Effectiveness, Psychological Impacts of Medication Use, Availability & Accessibility, and Therapeutic Relationships with Healthcare Providers than those with only medicine preference [12]. Thus, healthcare providers should take more care of these domains for the patients who preferred to use both medicine and alternative treatments.

For the other eight domains, Thai patients with chronic diseases provided the lowest domain score for the Medicine and Disease Information with the average score of 55.4. This could be considered as a moderate quality of life. The items that the patients reported that were less explained from healthcare providers were "drug name", "strength", "what to do if medicine doses are missed", and "side-effects and management." The result implies that health care professionals should give more information about them to patients. This result is consistent with other studies which found that Thai patients were not given much medication information from healthcare providers [17, 18, 20–22].

Although 51% of the patients had adverse drug reactions, most of them had no or little impact of medicines' side-effects on their physical and social health. Having an adverse drug reaction and its impacts on patient' health are related concepts, but not exactly the same thing. Therefore, the Impacts of Medicines and Side-effects domain score was the highest (87.3), considered as good-to-excellent. The other six domains and the total score yielding the average scores between 65 and 75 were interpreted as moderate-to-good.

In addition to the Medicine and Disease Information items above, the items with the lowest scores of their domains that Thai healthcare providers should pay more attention to included "onset of medicine action", "medicine dependence", "service process and waiting time", and "happiness".

Pharmacotherapy related quality of life between disease groups

Patients with infectious diseases (86% were HIV-infected) had high drug and disease information, satisfaction with medicine effectiveness, and therapeutic relationships. According to the Thai guideline for antiretroviral therapy in HIV-infected patients [23], they have to understand the benefit and side-effects of treatment as well as adhering to the regimens. Hence, they might be well informed about drug and disease information from healthcare providers, thus also leading to good therapeutic relationships. In contrast, patients with sleep and emotional disorders had low scores of these three domains. An explanation is that some Thai health care providers avoided telling the indications of antianxiety drugs, antidepressants, and psychotropic drugs to patients since they could be social stigma for them. A study conducted in 147 Kuwaiti depressed patients found that more than 90% of the sample preferred to get detailed explanation about the prescribed medications and agreed that clinicians should not withhold any information about prescribed medications [24]. Therefore, healthcare providers should give more drug and disease information and therapeutic relationship to this patient group to improve their PTRQoL.

Unsurprisingly, cancer patients had significantly lower Impacts of Medicines and Side-effects domain scores than the other disease groups. The reason is that as we know, chemotherapy has a lot of severe side-effects [25] which can negatively affect patient's quality of life [26–28]. In addition to oncologic disorders, renal and neurologic disorders had lower Impacts of Medicines and Side-effects domain scores than cardiovascular disorders. Patients with renal disorders take a lot of medicines to treat their abnormal functions [29] so they are more likely to develop many side-effects [30–32]. In this study, among 14 disease groups, patients with renal diseases had the highest average number of medicines (7.5 ± 3.0; data not shown). Patients with neurologic disorders such as epilepsy and Parkinson's disease could also have a lot of serious side-effects from their medicine therapies [33, 34]. Moreover, a recent study found that medicines for neurological conditions were associated with a higher burden [35]. Thus, routine PTRQoL assessment may help alleviate these patients' impacts of medicine side-effects since their physicians may use the data to adjust their medicine treatments.

The patients with renal diseases had low Convenience domain scores. A possible reason is that chronic renal disease patients daily had to take a number of phosphate binders whose tastes were very bad and sizes were big. This is in line with other studies that reported phosphate binders created inconvenience to dialysis patients due to their pill burden, bad taste and big sizes [36, 37].

It is a little bit surprising that Psychological Impacts of Medication Use domain scores did not significantly differ between conditions although patients with infectious disorders yielded 10 domain scores lower than those with cardiovascular and dermatological disorders. In this study, patients with HIV provided lower item score of worry or fear about taking medicines in front of others than the other disease groups (all $p < 0.001$, data not shown). This is consistent with other studies reporting that fear to take antiretroviral drugs in front of others was one of the most distinctive psychological barriers of taking medicines in HIV-infected patients [38, 39]. An explanation for the insignificant results of the domain scores may be due to low power of the tests or insufficient sample size of each disease group.

Availability & Accessibility and Overall Quality of Life domain scores and the total score were not significantly different between disease groups. A possible explanation is that this study was conducted in only public university hospitals in the capital city of Thailand, so their quality of care might be already good, thus making no differences in these domain scores and the total score between conditions.

According to the results, it is recommended that in routine clinical practice healthcare providers should assess PTRQoL to identify patients' drug-related needs to prevent or solve them to achieve their positive outcomes. Future research can also be conducted to evaluate the impact of use of a PTRQoL measure in routine clinical practice.

Strengths and limitations

This study assessed the pharmacotherapy related quality of life and its differences between disease groups which were little known. However, this study had some limitations. This study might lack generalizability to other nations since it was conducted in Thai society where most patients had high respect for healthcare providers, especially physicians. Also, the study was conducted in public university hospitals where specialists are well educated and the quality of medication treatment might be relatively good. Thus, the patients might give more positive answers. That probably explains why most domain scores and the total score were quite high. Hence, further research should be done in various kinds of healthcare settings such as primary or secondary care settings, and private hospitals.

Conclusion

This study showed the pharmacotherapy related quality of life of Thai patients with chronic diseases using the PROMPT-QoL instrument. Most domain scores and the total score were moderate-to-good. Five of eight pharmacotherapy related quality of life domain scores differed by disease groups.

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