IMPROVING THE APPROPRIATE PRESCRIBING OF PROTON PUMP INHIBITORS (PPI) AMONG REFERRED PATIENTS IN HEALTHCARE CLINICS UNDER THE HEALTH OFFICE OF KLANG DISTRICT

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Abstract

Proton pump inhibitors (PPIs) are prescribed for acid-related gastrointestinal disorders. However, inappropriate prescribing of PPIs may cause serious side effects, such as community-acquired pneumonia, bone fracture and *Clostridium difficile* infection. Additionally, it results in unnecessary healthcare costs. This study aimed to improve the appropriateness of PPI prescriptions to at least 66% within a four-month intervention period. A quality improvement study was conducted in 12 health clinics with resident pharmacists under the Health Office of Klang District (HOKD) in March 2018. All prescriptions of PPIs were assessed except for *Sistem Pendispensan Ubat Bersepadu* (SPUB) prescriptions from external facilities. A pre-interventional data review of 284 PPI prescriptions received in March 2018 showed that only 1.76% (n=5) was deemed appropriate. The contributing factors identified included lack of interventions by clinicians and pharmacists, incomplete indications of PPIs on prescriptions, insufficient PPI information on discharge letters and lack of assessment guidelines. In this study, the pharmacist review form (PRF) on PPIs was designed as the intervention tool for the screening process; PPI educational training sessions were conducted for clinicians and pharmacists; counselling checklists and patient education leaflets were developed to improve the effectiveness of the counselling sessions; and algorithm of PPI deprescribing was developed for practice by clinicians. Moreover, project findings were shared with Tengku Ampuan Rahimah Hospital to increase awareness of issues related to incomplete documentation of PPI prescriptions in discharge summaries and referral letters. In July 2018, the percentage of appropriate PPI prescriptions had increased from 1.8% (n=5/284) to 69.8% (n=487/698), and subsequently to 91.9% (n=124/135) by 28th February 2019. In conclusion, continuous intervention implementation and regular monitoring of outcomes prevent potential PPI side effects and unnecessary healthcare costs.

KEYWORDS: Proton pump inhibitor, Primary care, Appropriate use, Quality improvement study

Problem

Proton pump inhibitors (PPIs) are used to treat gastro-oesophageal reflux disease, peptic ulcer disease, Helicobacter pylori infection, and Zollinger-Ellison Syndrome, as well as to prevent nonsteroidal anti-inflammatory drug (NSAID) induced ulcers for 4 to 12 weeks or longer depending on diagnosis (1). Although PPIs are considered safe in general, inappropriate prescribing of PPIs, including improper indication, dose, frequency and duration, may lead to severe side effects like community-acquired pneumonia, bone fracture, Clostridium difficile infection and renal dysfunction (2). Besides, inappropriate prescribing of PPIs may result in increased and unnecessary healthcare costs (3). In 2017, there were a total of 1,407 inappropriate PPI prescriptions from all healthcare clinics under the Health Office of Klang District (HOKD). As a result, an unnecessary expense of approximately MYR390,333.22 (USD92,737.79) was wasted on PPIs that year.

Klang district is one of the largest districts in Selangor, Malaysia and serves a high-density population estimated at 842,146 people. There are 12 healthcare clinics in the Klang district providing outpatient services. These health clinics are operated by 1,209 healthcare workers, including six family medicine specialists (FMS), 202 medical officers, 60 pharmacists and paramedics respectively, as well as other supporting staff (refer to Appendix 1).

Multiple ambulatory care services are delivered to the community through healthcare clinics for walk-in and hospital-referred patients. Three clinics under the HOKD provide extended-hour (EH) services after working hours, where patients with acute illnesses may walk in to seek treatment. Patients may also get their prescriptions refilled at the pharmacy. The pharmacy department plays a vital role in healthcare clinics where all prescriptions are screened, medication errors are intervened, medicines are dispensed, drug inventories are managed and counselling is given to patients.

The PPIs are categorised under "group A prescriber drugs", which are drugs that cannot be started by FMS and only can be initiated by physicians with specialities in hospitals. Patients needing PPIs will be referred to healthcare clinics for further clinical management once their conditions are stable. In healthcare clinics, FMS and medical officers may continue to prescribe PPIs for hospital-referred patients after clinical assessments only if the medicines are recorded on the patients' referral letters or discharge summaries, which will be brought along by patients during their first clinic visit.

The process of care in prescribing PPIs involves both clinicians and pharmacists. Therefore, an FMS with pharmacists from different healthcare clinics under the HOKD formed this Quality Assurance (QA) team to construct practical interventions for reducing inappropriate PPI prescriptions.

In March 2018, a pre-intervention study conducted in 12 health clinics under the Klang district showed that 98.2% (n=279/284) of the PPI prescriptions received at the pharmacy departments were inappropriate (without definitive indications, durations, doses and frequencies of PPI therapies). This QA project was designed to improve the percentage of prescriptions with appropriate prescribing of PPIs in all health clinics under the HOKD from 1.8% to at least 66% within a four-month intervention period.

Background

PPIs are commonly used at higher doses and more prolonged than necessary. Such misuse leads to overprescribing in both primary and tertiary care centres. In the United States, the number of visits with documented PPI use increased from 30 million in 2002 to 84 million in 2009, of which 62.9% had inappropriate medical indications (4). In Germany, 54.5% (n=371) of discharge letters from 35 hospitals showed inappropriate indications for continuous PPIs treatment and the indications in 12.7% (n=47) of their discharge letters were uncertain (16). Additionally, Lodato et al. (21) compared the initiation and continuation of PPIs in Italy at three different points: hospital admission,

hospitalisation and discharge. The study found that one-third of the patients had an inappropriate prescription of PPIs.

Another study conducted at a tertiary teaching hospital in Singapore showed that 81.2% (n=65) of 150 consecutive patients aged ≥65 years who had been admitted had no valid documented indications of PPI neither in case notes or physician discharge summary (5). In Malaysia, a local study conducted in a tertiary hospital in Pahang stated that 49% (n=323) of patients were inappropriately prescribed with PPIs in the ward and continued with PPI treatment during discharge. Among the patients, 51% (n=165) continued receiving PPIs at discharge without a documented indication. On the other hand, 55% (n=363) of patients were prescribed with PPIs appropriately during hospitalisation but were discharged with PPIs unnecessarily (6). Likewise, another local study conducted in Serdang Hospital by Rufah et al. (7) showed that 46% (n=343/746) of patients were inappropriately prescribed with PPIs.

Looking into the duration of PPI treatment, Giannini et al. (8) found that more than half of the patients in the study were on PPIs for at least two years, of which 25% (n=63) among them were treated for more than five years with PPIs and 35.4% (n=88) of them needed deprescribing of PPIs. Another study conducted at Irish Regional Hospital showed similar findings, in which 45% (n=112) of their patients were on PPI treatment for at least two years and 27.3% (n=68) of them continued their PPI treatment for more than sixty months (9). A quality improvement project conducted at a few university hospitals in New York reported that 30% (n=54) of patients had inappropriate use of PPIs for an average of four to five years, of which 51.1% (n=92) needed to be discontinued from PPIs (11).

Inappropriate use of PPIs will lead to unnecessary high expenditure under the health care system. A study in the United States found an unnecessary cost of up to USD3,013,069 for PPIs prescribed inappropriately during hospital discharge (18). Another study by Nallapeta et al. (11) showed a direct cost savings of USD13,992 annually from PPI discontinuations. On the other hand, the total utilisation of medicines for acid-related disorders in Malaysia had increased from 2.9550DDD per 1,000 population per day in 2007 (19) to 6.5802DDD per 1,000 population per day in 2009, and to 6.7124DDD per 1,000 population per day in 2010 (20). Reducing inappropriate prescribing patterns of PPIs in outpatient settings can minimise potential adverse events and avoid unnecessary costs.

Regarding the side effects, the United States Food and Drug Administration (FDA) issued safety warnings regarding the long-term use of PPIs in 2010 (12). A systematic review and meta-analysis conducted in 2015 by Cheungpasitporn et al. (13) concluded that approximately 40% (n=43,919) increased risk of hypomagnesemia with PPI use compared with non-PPI use. In 2015, the FDA issued a public safety alert about 74% (n=231,620) increased risk of developing Clostridium difficile infections (14) and 34% (n=106,420) increased rate of pneumonia (15) in long-term use of PPI. A study conducted by Ahrens et al. mentioned that 50% (n=341) of patients in primary care with inappropriate use of PPIs could cause a range of side effects, such as the increased risk of enteric infections (including Clostridium difficile-associated diarrhoea), community-acquired pneumonia, bone fracture, nutritional deficiencies and interference with the metabolism of antiplatelet agents (16).

In regard to the inappropriate use of PPIs, intervention by pharmacists plays a role in reducing the inappropriateness of PPI prescribing. A study from Bundeff reported that during interventions by clinical pharmacists, 37.6% (n=44) of patients had started the PPIs taper protocol recommended by their primary care providers (10).

In a quality improvement project by Nallapeta et al., the inappropriateness of PPI usage was reduced from 80% (n=144) to 60% (n=108) by creating an electronic patient registry from electronic health records. It was designed for clinicians to assess PPI therapies, including document indications, risk assessments, dose reductions and

discontinuations. Besides, the study also mentioned that weekly educational sessions were carried out for all clinicians to enhance their knowledge and awareness of the appropriateness of PPI prescribing. Furthermore, pamphlets regarding side effects and appropriate risk reductions of PPIs were developed and handed to patients to create awareness of proper PPI use (11).

Measurement

The primary outcome of this study was to increase the percentage of appropriate PPI prescriptions among patients in all 12 health clinics under the HOKD. The indicator for an appropriate PPI prescription was the percentage of prescriptions with correct indications, doses, durations and frequencies of PPIs among patients. The percentage was calculated as the total number of prescriptions with appropriate prescribing of PPIs over the total number of prescriptions with PPIs. All prescriptions of PPIs received during working hours were included in the study except for *Sistem Pendispensan Ubat Bersepadu* (SPUB) prescriptions from other facilities because the clinical management of these patients was still under the referred facilities. The SPUB is a follow-up medication supply service through prescription referrals, in which patients can obtain a supply of their medications from the Ministry of Health facilities (22). Furthermore, prescriptions received during EH were excluded as well because there were no in-house pharmacists and doctors during EH on certain days.

All PPI prescriptions collected at the screening counters in the pharmacy departments were evaluated based on the indicator of this study. The status of PPI indication, duration, dose and frequency in each prescription received were documented in an audit checklist. A pre-intervention study in March 2018 showed that only a tiny fraction of PPI prescriptions at 1.8% (n=5) out of 284 PPI prescriptions received were appropriate. Based on published literature from Lodato et al. (21), the QA team in this study proposed a standard that required a minimum of 66% of PPI prescriptions received at pharmacy counters in healthcare clinics to be appropriately prescribed.

Initial Assessment of the Problem

The process of care associated with assessing hospital-referred patients who walked into healthcare clinics under the HOKD is shown in Figure 1. The critical steps that may play a part in reducing the inappropriateness of PPI prescribing were highlighted with asterisks. The said processes were issuing the prescription, screening the prescription, referring to the clinician or requesting for patient's referral letter by pharmacists during interventions, as well as dispensing and counselling. These four processes were marked as critical steps because potential intervention strategies could be implemented to increase the appropriateness of PPI prescribing.

A problem analysis diagram was developed to identify the contributing factors to the inappropriate prescribing of PPIs (refer to Figure 2). According to the analysis, a few factors were detected, including an incomplete prescription indication by clinicians, a lack of clinicians' and pharmacists' intervention and incomplete PPI information in referral letters. A verification study was conducted in March 2018 to assess all PPI prescriptions (n=284) received at all pharmacy departments in healthcare clinics under the HOKD. The result revealed that 76.7% of prescriptions received were without indications for PPIs. Besides, the patients' referral letters were traced when they handed their prescriptions to the pharmacy screening counters. The result showed that 75% of the referral letters were incomplete with either the indication or the duration of PPIs. Moreover, 81.7% of the PPI prescriptions were not intervened by pharmacists.

A self-administered questionnaire to assess the knowledge and awareness amongst doctors and pharmacists on appropriate prescribing of PPIs was developed as such attributes may be the factors contributing to the incompleteness of information on the PPI indications in the treatment and the lack of intervention. The

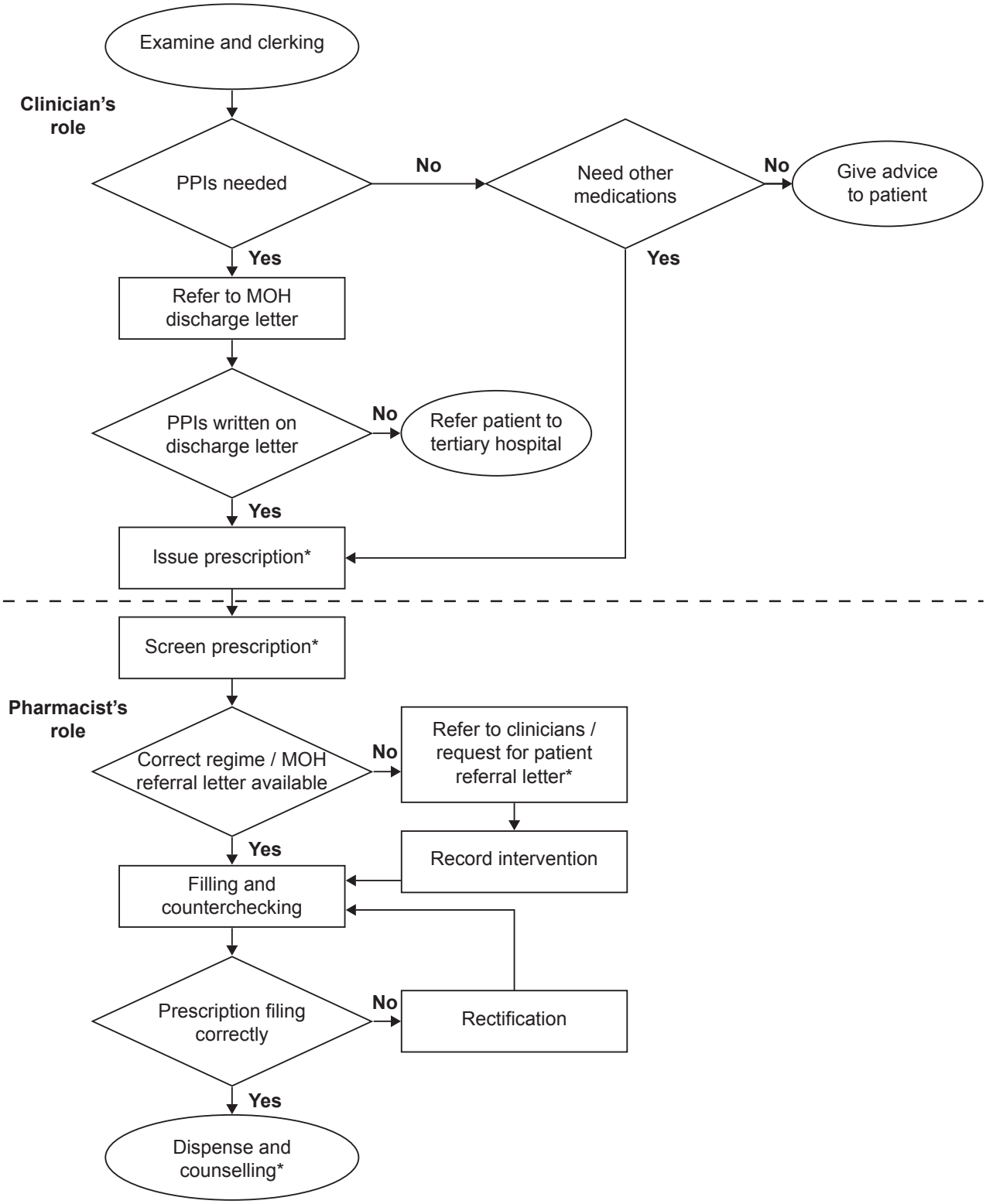


Figure 1: Flowchart of the process of care of prescribing proton pump inhibitors in healthcare clinics during pre-intervention phase (* indicates critical steps)

questionnaire was distributed to a total of 120 respondents during the pre-intervention phase to identify contributing factors leading to the problem and post-interventions to evaluate the effectiveness of the intervention. Only 45% (n=54) of the respondents achieved a passing mark of 80% and above in the pre-intervention phase. Most respondents failed to identify the anticipated PPI treatment duration, possible PPI side effects, and use of concomitant medicines that may cause gastrointestinal symptoms and drug interactions.

Strategy

Two PDSA (plan, do, study, act) test cycles were performed in this study. Three improvement strategies were implemented during Cycle 1 (July until September 2018). In this cycle, the aim was to increase the



Figure 2: Problem Analysis Chart of contributing factors to the low percentage of the appropriate use of PPI among patients in the primary care setting.

appropriateness of PPI prescribing by enhancing interventions and counselling services in pharmacy departments. The contributing factors of inappropriate PPI prescribing were studied and remedial actions were carried out. The lack of pharmacists' interventions and incomplete indications in prescriptions by clinicians were identified as the contributing factors.

Thus, as the first strategy, a Pharmacist Review Form (PRF) (refer to Appendix 2) with 15 questions was developed for pharmacists to interview patients prescribed with PPIs when the prescriptions were handed over to the screening counter. The first part of the PRF (Q1-Q6) was about patients' current PPI regime, which comprised of indication, dose, frequency and duration of PPIs as well as adverse effect profile. The second part (Q7-Q10) was about patients' concurrent medications and compliance issues, while the third part (Q11-Q15) was about interventions and counselling. The PRF served as a guide for pharmacists to initiate interventions on the PPI prescriptions received if any deprescribing of PPIs was needed. As a result, the flowchart of the process of care was updated with an additional intervention step by pharmacists (refer to Figure 3).

Secondly, PPI Training Modules were developed. Three face-to-face educational sessions on PPIs were delivered to 60 pharmacists during Cycle 1 to create awareness of appropriate PPI prescribing and enhance their knowledge of PPIs. The sessions focused mostly on introducing PPIs, their side effects, indications, doses and frequencies, as well as the PRF. The same questionnaire was used to reassess the participants' knowledge after the educational sessions. Besides, a counselling checklist and guide about PPIs were developed for pharmacists to counsel patients regarding the dose, frequency, duration and side effects of PPIs during dispensing.

Thirdly, patient education leaflets about PPIs, including the long-term side effects, were distributed to patients to create awareness of the appropriate use of PPIs and encourage them to be self-responsible for their health conditions.

As a whole, the achievement after Cycle 1 was satisfactory. However, further interventions were carried out to achieve a better outcome. Therefore, the study continued with PDSA Cycle 2 (December 2018 until February 2019), where the clinician group was targeted to improve the prescribing processes and practices. The PPI Training Modules were proposed for FMS to conduct eight educational sessions on PPIs for clinicians from healthcare clinics under the HOKD to address the factor of incomplete indications of PPIs in prescriptions. Besides emphasising the pharmacology of PPIs, a deprescribing algorithm adopted from Farrel et al. (23) (refer to Appendix 3) was introduced to clinicians to guide them on stepping down the PPI therapies or terminating the treatment if the therapies were unnecessary.

Incomplete information about PPIs in referral letters was one of the main contributing factors to inappropriate PPI prescribing practices. However, this factor was beyond the control of this study because the referral letters were written by medical officers from the referred hospitals. In order to create awareness about the seriousness of inappropriate prescribing of PPIs in healthcare clinics, the results of Cycle 1 were presented on 16th November 2018 in one of the drug committee meetings at Tengku Ampuan Rahimah Hospital, Klang which was the main tertiary hospital with the most PPI referral cases to healthcare clinics under the HOKD. Additionally, to further create awareness of the inappropriate prescribing of PPIs to other hospitals in Selangor, the Cycle 1 results were shared during a creativity and innovation meeting at the Selangor State Pharmacy Department on 8th November 2018. All the Heads of Pharmacy Departments from Selangor attended the meeting. Besides that, the results were also shared at a mini-QA convention organised by Selayang Hospital on 19th July 2019. The event involved 75 participants, including medical officers, pharmacists, paramedics, nurses, lab technicians and nutritionists from different units within the hospital.

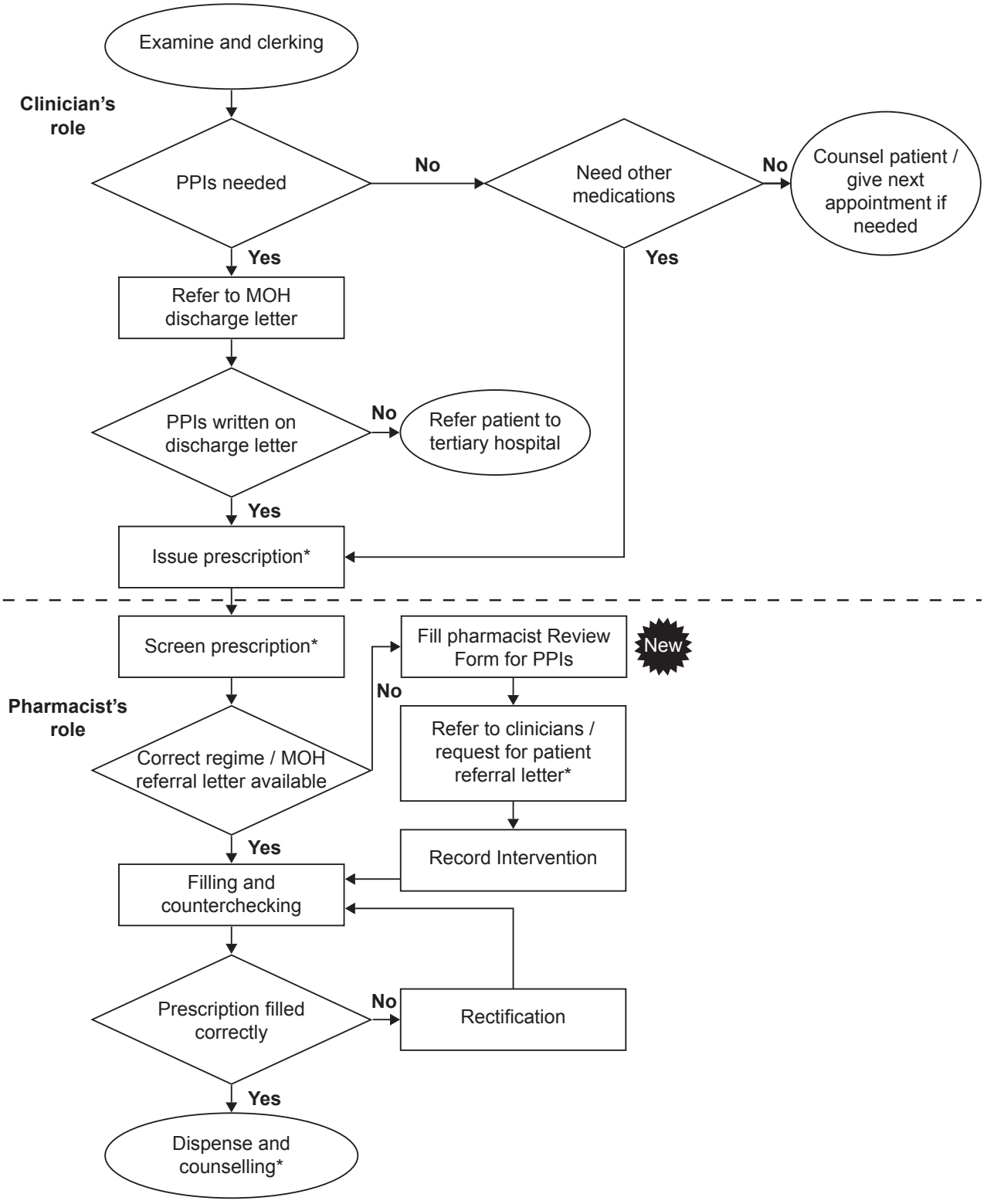


Figure 3: Flowchart of the process of care of prescribing proton pump inhibitors in healthcare clinics during the post-intervention phase (* indicates critical steps)

Results

Following several strategies, the percentage of prescriptions with appropriate prescribing of PPIs in the 12 health clinics increased sharply from 2% (n=5/284) to 70% (n=487/698) in Cycle 1 and further up to 92% (n=124/135) in Cycle 2. The achievable benefits not achieved (ABNA) reduced from 64% to -4% in Cycle 1 and further down to -26% in Cycle 2 (refer to Figure 4).

All standards set in the model of good care showed improvements from the verification study to Cycle 2 (refer to Table 1). The percentage of the criteria "to ensure indication of PPIs is written" increased from 24% to 30%, then further up to 90% throughout the cycles, while the percentages of the two criteria indicating the appropriateness of prescribing PPIs both increased drastically to 70% in Cycle 1 and further up to 92% in Cycle 2. Besides that, the percentage of patients' discharge letters complete with either the indication or duration of PPIs increased from 40% in Cycle 1 to 94% in Cycle 2. Last but not least, pharmacists' intervention rate on the inappropriateness of PPI treatment improved in both cycles.

The level of awareness among healthcare practitioners on the appropriate prescribing of PPIs improved after the interventions were implemented. A re-assessment of awareness among healthcare practitioners following the intervention showed an increase in passing marks to 94% (n=113). The cost saving was also calculated in 2017, whereby the initial unnecessary cost of PPIs was reduced from MYR390,333.22 (USD92,737.79) to MYR39,420.00 (USD9,362.31) in the following year.

Lessons and Limitations

In this study, it is learnt that engaging a multi-disciplined team is imperative to initiate and sustain a successful change. Both clinicians and pharmacists play an essential role in ensuring patients on PPIs receive optimal treatment with the lowest risk of unwanted side effects. Besides, healthcare professionals have started to be aware of the significance of reviewing all PPI cases referred from hospitals. Full commitment among healthcare professionals in this study

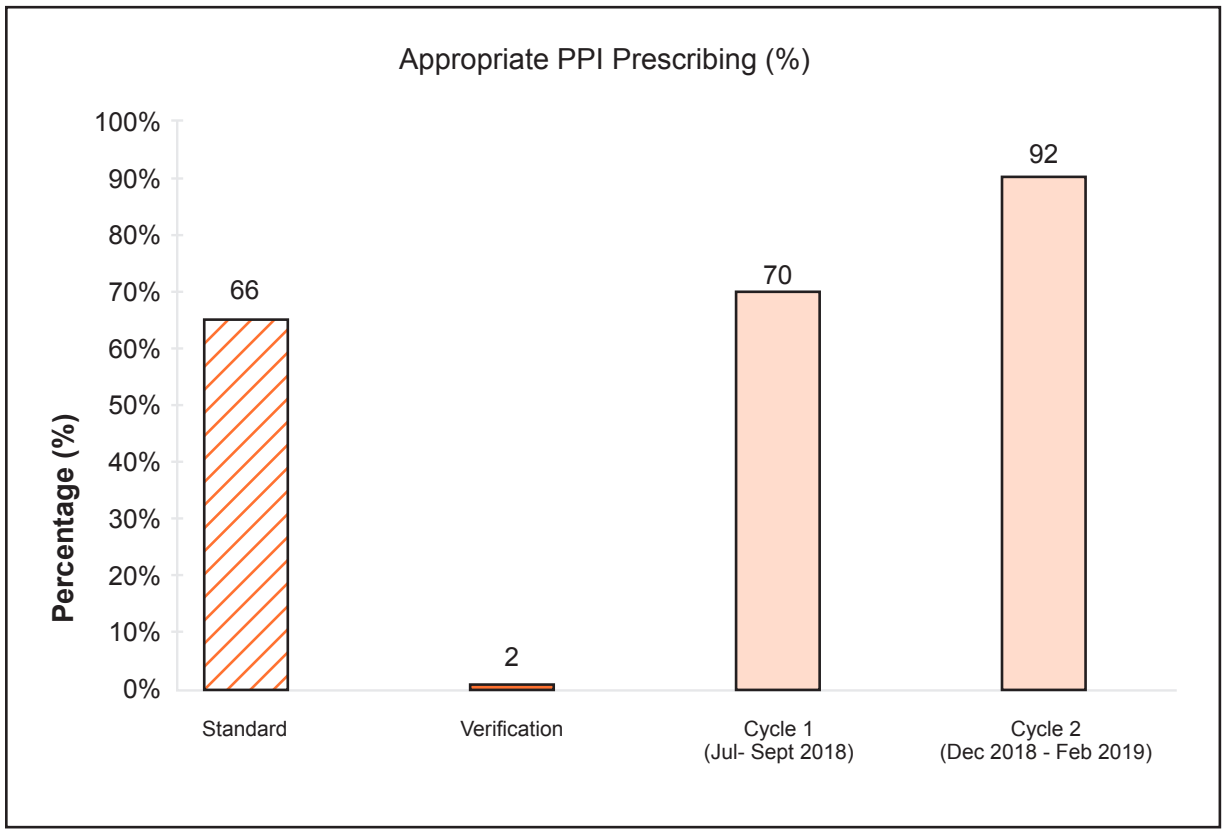


Figure 4: Percentage of appropriate proton pump inhibitors prescribed in healthcare clinics pre- and post-interventions

Table 1: Model of good care

Process	Criteria	Standard	Verification Study	Cycle 1	Cycle 2
1. Assessment	Assess the patient on the appropriateness of PPIs.	100%	4%	20%	95%
2. Issue Prescription	• To ensure the indication of PPIs is written.	100%	23%	30%	90%
	• To ensure the dose, frequency and duration of PPIs are written.	100%	96%	100%	100%
3. Screen Prescription	• To ensure the indication of PPIs is appropriate.	66%	2%	70%	92%
	• To ensure the dose, frequency and duration of PPIs are appropriate.	66%	2%	70%	92%
	• To ensure the patient has a complete MOH discharge letter with either indication or duration of PPIs.	100%	25%	40%	94%
4. Refer to the Clinician	Call the clinician for intervention if PPI treatment is not appropriate.	100%	18%	71%	98%
5. Dispense & Counselling	• Correct medications are dispensed.	100%	100%	100%	100%
	• Counseling is given to the patient.	100%	20%	100%	100%
	• Drug information leaflet is handed to the patient.	100%	0%	100%	100%

has resulted in the improvement of appropriate prescribing of PPIs. It helped patients achieve a better quality of life and reduce unnecessary healthcare costs.

Incomplete information in referral letters from tertiary hospitals was a challenge for this study because it involved third parties. However, the study achieved its purpose by highlighting the seriousness of inappropriate prescribing of PPIs and sharing the study outcomes.

Moreover, the limitation in this study, where patients' clinical data was not synchronised through information technology between healthcare clinics under the HOKD and hospitals, is acknowledged. For instance, a small group of walk-in patients came into the healthcare clinics with incomplete referral letters needed to continue their PPI therapies. In these cases, the medical officers could not trace back the history of the patients from the hospitals because the diagnoses were not documented in the referral letters. As a result, the patients had to be referred to hospitals because interventions could not be carried out under such circumstances.

Conclusion and The Next Step

In conclusion, the appropriateness of PPI prescribing must be assessed by clinicians to prevent serious side effects and avoid unnecessary costs. This study had achieved a standard with at least 66% appropriate prescribing of PPIs. This showed a sustainable improvement that exceeded the

target in subsequent cycles.

In the near future, the authors would like to empower the sustainability of the appropriate use of PPIs in primary care by ensuring adherence to deprescribing algorithms and guidelines across all disciplines, including doctors and pharmacists. Besides that, educational sessions will be carried out annually to include all new and existing staff. Furthermore, the improvement strategies in this study can also be shared and served as a reference for other facilities nationwide to adopt and adapt in their healthcare settings.

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Conflict of Interest

The authors declare that there was no conflict of interest.

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Appendix 1

Types of Clinics and Workload

Health Clinic	Number of FMS	Number of Medical Officer	Number of Pharmacist	Type of Clinic*	Average number of patients visit/day	Average number of prescription /days
Bandar Botanic Health Clinic	2	25	11	Type 1	760 - 800	850 - 900
Pandamaran Health Clinic	2	25	8	Type 2	600 - 700	650 - 700
Bukit Kuda Health Clinic	2	16	7	Type 2	420 - 450	500 - 600
Anika Health Clinic	0	12	6	Type 3	300 - 440	500 - 600
Pelabuhan Klang Health Clinic	1	11	3	Type 4	250 - 270	350 - 400
Kapar Health Clinic	1	15	5	Type 4	260 - 300	350 - 400
Meru Health Clinic	1	14	5	Type 4	300 - 350	350 - 400
Rantau Panjang Health Clinic	0	8	2	Type 5	140 - 150	170 - 230
Pulau Indah Health Clinic	0	5	2	Type 5	70 - 120	80 - 100
Pulau Ketam Health Clinic	0	2	1	Type 7	35 - 50	30 - 50
Bukit Naga Health Clinic	0	8	1	Type 6	50 - 90	70 - 100
Sungai Bertek Health Clinic	0	8	1	Type 4	150 - 200	150 - 200

*Type of clinic based on the average total number of patients visit per day; type 1 ; >800; type 2: 500-800; type 3: 300-500; type 4: 150-300; type 5: 100-150; type 6: 50-100; type 7: <50

Appendix 2

Pharmacist Review Form

PHARMACISTS REVIEW FORM
INTERVENTIONS ON APPROPRIATE USE OF PROTON PUMP INHIBITORS (PPIs)
PHARMACY DEPARTMENT PEJABAT KESIHATAN DAERAH KLANG

Ref No. *(filled by data compiler)*

1. Current Management

Which PPI is the patient using? Active ingredient (Brand name)	What is the current DAILY dose of PPI? e.g. omeprazole 20 mg twice a day = 40 mg/day								What is the dosing schedule of PPI?		
									OD / BD	prn	Not known
☐ Esomeprazole (Nexium)	☐		☐	20 mg/daily	☐	40 mg/daily	☐	Other	☐	☐	☐
☐ Lansoprazole (Zoton)	☐	15 mg/daily	☐	30 mg/daily	☐	60 mg/daily	☐	Other	☐	☐	☐
☐ Omeprazole (Acimax, Losec, Meprazol, Omepral, Probitor)	☐	10 mg/daily	☐	20 mg/daily	☐	40 mg/daily	☐	Other	☐	☐	☐
☐ Pantoprazole (Somac)	☐	20 mg/daily	☐	40 mg/daily	☐	80 mg/daily	☐	Other	☐	☐	☐

2. Indication and episode of care

Was the current PPI prescription?
☐ An initial prescription for PPI therapy
☐ Ongoing therapy (unchanged)
☐ A change to current therapy (e.g. increase/decrease dose, change to a different PPI)
☐ Not determined/not known

3. Was the indication of PPI written on prescription?

☐ Yes. If Yes, go to Q4
☐ No. Please intervene.

4. What was the clinical indication(s) for treatment with a PPI? (Mark all that apply)

☐ GORD/reflux/dyspepsia/heartburn	☐ Prophylaxis of drug–induced dyspepsia/ulceration. Please specify: ☐ Aspirin ☐ Conventional NSAID ☐ COX-2 selective NSAID ☐ Other
☐ Mild to moderate oesophagitis	
☐ Peptic ulcers (including NSAID or H. pylori–induced ulcers)	
☐ H. pylori eradication	
☐ Not known	
☐ Other _____	☐ Zollinger–Ellison syndrome ☐ Severe oesophagitis ☐ Barrett's oesophagus ☐ Strictures, scleroderma

5. How long has the patient been using a PPI?
☐ Not applicable (initial prescription)
☐ < 4 weeks
☐ 4–8 weeks
☐ > 8 weeks
☐ Not determined
☐ Not known

6. Are alarm symptoms present?
☐ Yes
☐ No
☐ Not determined
☐ Not known

Alarm symptoms
☐ Dysphagia (difficulty swallowing)
☐ Odynophagia (painful swallowing
☐ Nocturnal choking
☐ Melaena (tar/black stools)
☐ Unexplained weight loss
☐ Haematemesis (vomiting of bright red blood)
☐ Abdominal mass
☐ Anaemia

7. Was the patient using their PPI therapy as prescribed?
☐ Not applicable (initial prescription
☐ Yes, takes every day or as prescribed
☐ No, has not been using PPI as prescribed
☐ Not determined
☐ Not known

8. Was the patient using any medication that may induce/exacerbate dyspepsia/ulceration?
☐ Yes
☐ No
☐ Not determined
☐ Not known

9. Was the patient currently using any concomitant medication that alter gastric pH (e.g.: antacids, H2 antagonists)?
☐ Yes
☐ No
☐ Not determined
☐ Not known

10. Was the patient using any medication that may interact with a PPI?
☐ Yes
☐ No
☐ Not determined
☐ Not known

11. Did you determine if there are any factors (e.g. certain foods) that exacerbate the patient's symptoms?
☐ Yes
☐ No
☐ Nothing identified

12. Outcome
Mark any further actions to be implemented/have been implemented for this patient:
☐ refer patient to prescriber for review
☐ contact prescriber directly to discuss managem
☐ check adherence at next episode of care
☐ contact carer/relative/support person
☐ advice on specific lifestyle issues
☐ provide specific counselling (REFER COUNSELING CRITERIA)

☐ alarm symptoms present
☐ patient may be suitable for review/step-down in therapy
☐ use of medicine that may induce/ exacerbate GI symptoms
☐ potential drug interactions
☐ refractory symptoms

13. Pharmacist's recommendation
_____
_____
_____

14. Next step (Yes / No)
☐ Counseling given to the patient
☐ Patient's information leaflet (PIL) given

Completed by,

Recommendation accepted?
☐ Yes
☐ No

(Pharmacist signature)
Date:

15 ☐ Intervention not done for new Rx
Reason ☐ No therapeutic issue
☐ Too busy
☐ Cannot contact any
☐ Step down of PPI already don
☐ Others _____

Appendix 3

Algorithm of Deprescribing

