IMPROVING EYE DROP ADMINISTRATION TECHNIQUE AMONG GLAUCOMA PATIENTS IN THE OUTPATIENT PHARMACY DEPARTMENT AT TUANKU AMPUAN NAJIHAH HOSPITAL

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Abstract

Intraocular pressure-lowering eye drop medications are the initial treatment of choice for glaucoma. A correct administration technique is necessary to optimise treatment efficacy, reduce adverse effects and prevent medication wastage. However, studies have shown that glaucoma patients experience various administration problems, such as drops falling onto the cheeks, releasing too many drops and bottle tip touching the eye. Seven steps in the eye drop administration process were identified as critical and clinically relevant. A verification study conducted between March to May 2020 in the Outpatient Pharmacy Department (OPD), Tuanku Ampuan Najihah Hospital (HTAN) revealed that only 4.2% of the glaucoma patients performed all seven critical steps (n=118). Therefore, this study aimed to increase the percentage of glaucoma patients who can correctly perform all seven critical steps in the eye drop administration process during follow-up counselling from 4.2% to 60%. The contributing factors towards poor eye drop administration technique in glaucoma patients were lack of optimal medication counselling by doctors and pharmacists, as well as lack of skill of patients. Hence, a standard workflow was developed to encourage doctor-pharmacist collaboration and improve pharmacists' eye drop medication counselling process. Educational aids and an assessment checklist were developed as counselling tools. A second medication counselling session was scheduled within one month to re-assess and re-enforce the patient's technique. Following the first intervention cycle, the percentage of patients who were able to perform all seven critical steps during the second session increased to 36.4%. Subsequent improvements in the process of care and counselling tools during the second intervention cycle led to a further increase to 72%. In conclusion, this study achieved its aim of improving eye drop administration techniques among glaucoma patients through shared resources and collaboration between the Ophthalmology Department and OPD.

KEYWORDS: Eye drop, Administration technique, Glaucoma, Quality study, Medication counselling

Problem

Glaucoma is a chronic disease with progressive optic neuropathy that can lead to serious vision loss and blindness (1). Surgery, laser treatment, medications or a combination of these treatment modalities are used to lower intraocular pressure (IOP) and prevent disease progression (1–3). Patients prescribed with IOP-lowering eye drop medications must perform proper instillation to optimise treatment outcomes and prevent adverse effects (4). Upon initiation of eye drop medication, patient education by healthcare providers is necessary to ensure proper instillation technique and treatment adherence (1).

Tuanku Ampuan Najihah Hospital (HTAN) is a district specialist hospital in the town of Kuala Pilah in Negeri Sembilan. It is the lead hospital in a cluster system that includes Tampin Hospital and Jempol Hospital. It has 12 specialist departments, including an Ophthalmology Department. The Ophthalmology Department had an average of 1,120 patient visits per month in 2020. On the other hand, the hospital's Pharmacy Department is divided into five divisions: Ward Pharmacy, Inpatient Pharmacy, Logistics Pharmacy, Pharmacy Resource and Information Centre and Ambulatory Pharmacy. The Outpatient Pharmacy Department (OPD) is a part of the Ambulatory Pharmacy. It employs 17 pharmacists and five pharmacy assistants who ensure the safety, quality and efficacy of medication dispensing from specialist clinics through meticulous prescription screening, recommendations of evidence-based interventions and medication counselling.

Due to the high patient load and various physical examinations during each appointment, doctors in the Ophthalmology Department at HTAN often have limited time for proper patient education. Meanwhile, in the OPD, eye drop counselling is often done briefly over the counter during the medication dispensing without proper assessment of patient understanding and counselling outcomes. Improper eye drop administration puts patients at risk of suboptimal therapeutic outcomes and medication side effects. The Pharmacy Practice and Development Division of the Ministry of Health (MOH), Malaysia, had received reports of patients using scissors to pierce the bottle tips of Timolol IOTIM eye drops instead of using the spike at the inner top of the bottle's cover as recommended by the manufacturer (5). Such action could cause contamination, inaccurate dosing and wastage.

This study aimed to increase the percentage of glaucoma patients who can correctly perform all seven critical steps in the eye drop administration process from 4.2% to 60% during the second counselling session within a short period.

Background

Studies showed that glaucoma patients face various challenges in eye drop administration. A one-year cross-sectional study conducted at Raja Permaisuri Bainun Hospital using a Brief Medication Questionnaire among glaucoma patients (n=100) reported that 45% of patients had eye drops falling on their cheeks, while 42% of patients had too many drops released from the eye drop bottle (6). A study conducted in German community pharmacies reported that only 6% of 138 patients observed were administering the eye drops correctly (7). An improper technique can lead to medication waste, poorer efficacy as indicated by worsening IOP, increased cost, decreased patient satisfaction and traumatic ocular surface injuries from touching the bottle tip onto the eye (4,8).

An incorrect eye drop administration is attributed to knowledge-based or skill-based factors. Studies showed that most patients did not receive formal instruction on eye drop administration, leading to poor knowledge and incorrect technique (2,6). In addition, the ability to correctly instil eye drops is affected by physical capabilities, such as manual dexterity to open and squeeze the eye drop bottle and visual acuity to instil the drops into the eye (7). Furthermore, a study conducted by Choy

et al. (2019) in Hong Kong demonstrated that patients with a higher Fatigue, Resistance, Ambulation, Illness and Loss of Weight (FRAIL) score, which indicates functional impairment and frailty due to old age and other co-morbidities, are associated with poor eye drop administration (10).

Most studies utilised patient education as an intervention to improve patients' eye drop administration techniques (4,7,10). Lampert et al. (2019) identified seven critical steps in eye drop administration. They demonstrated that patient education, which includes observation to identify errors, counselling and reinforced training, significantly improved eye drops administration skills from 6% (n=138) at baseline to 35% (n=69) at the one-month follow-up and 64% (n=44) at the six-month follow-up (7). The observation method used in this study was critical because studies had proven that patients often overrate their ability to administer eye drops (2,4,7). For example, a multi-centre evaluation of eye drops administration technique in patients with glaucoma or ocular hypertension in the United States and Canada showed that while only 11.4% of patients self-reported difficulty in administering eye drops, an evaluation through observation revealed up to 42.1% of them facing difficulty in administering eye drops (11). A study in ophthalmology clinics at the University of Minnesota reported that a short educational briefing using a video and illustrated hand-out significantly improved the patients' eye drop administration technique (4). On the other hand, Choy et al. (2019) demonstrated that patient education among elderly glaucoma patients in Hong Kong (n=28, mean age=71.54 years) improved the percentage of patients with satisfactory eye drop administration techniques from 35% to 65% (10).

Measurement

This study aimed to increase the percentage of patients who could perform all seven critical steps in the eye drop administration process, as observed by the pharmacist during the second medication counselling session to 60%. The percentage was calculated as the number of patients who performed all seven critical steps correctly during the second session over the total number of patients who came for the second session. This standard was set based on the study by Lampert et al. (7) and the consensus with the doctors in the Ophthalmology Department, HTAN.

The seven critical steps were essential to optimise treatment efficacy while avoiding local and systemic adverse effects. They were selected based on the Malaysian Clinical Guidelines on Management of Glaucoma 2017 (1), the study by Lampert et al. (7) and a discussion with the Ophthalmology Department of HTAN. The seven steps were hand washing; opening and puncturing the tip of the bottle; instillation into the conjunctival sac; instillation of one drop; closing the eyes with concomitant nasolacrimal occlusion for two minutes; avoiding touching the dropper tip throughout the whole process; and waiting for five minutes in between eye drops.

Initial Assessment of the Problem

A verification study using a validated questionnaire on 118 purposively selected glaucoma outpatients was conducted between March and May 2020. All glaucoma patients above 18 years old, with incorrect eye drop administration techniques and referred by doctors to pharmacists for medication counselling were included. The doctors identified these patients based on clinical evaluations, such as increasing IOP and patient feedback. In cases where a caregiver administers eye drops for the patient, the caregiver was eligible for study participation. Patients with cognitive impairment and patients who stated that they were unable to be present for follow-up counselling were excluded from the study.

The study results were based on assessment during the second counselling session rather than immediately after the first session because Lampert et al. (7) had shown that errors resolved in the first session might recur in the second session and repeated

corrections were needed. Data were collected daily in the OPD through the Medication Counselling Referral Form (refer to Appendix 1) and Counselling Observer Assessment Checklist (refer to Appendix 2). The checklist served as an assessment tool to evaluate the eye drop technique of the patient. It was a concise and simplified version of the checklist published by the Pharmaceutical Services Programme, MOH, Malaysia (12).

The process of care in the Ophthalmology Department (refer to Appendix 3) and eye drop medication counselling in the OPD (refer to Figure 1) were identified to determine the steps in ensuring correct eye drop medication among glaucoma patients. In the Ophthalmology Department, doctors conduct physical examinations and identify patients who do not instil eye drops correctly. The doctors will then counsel the patients on the correct eye drop administration technique and complete relevant documentation. In the OPD, pharmacists identify patients who need eye drop counselling during screening or dispensing. Those needing counselling are usually patients who are newly started on eye drops or have expressed difficulties in administering eye drops. Patients are mostly counselled over the counter. Based on the assessment by the pharmacists, patients who require re-enforcement will be given an appointment date for follow-up counselling.

The critical steps in the process of care include the identification of patients who require eye drop counselling, counselling and assessment of the patient's technique,

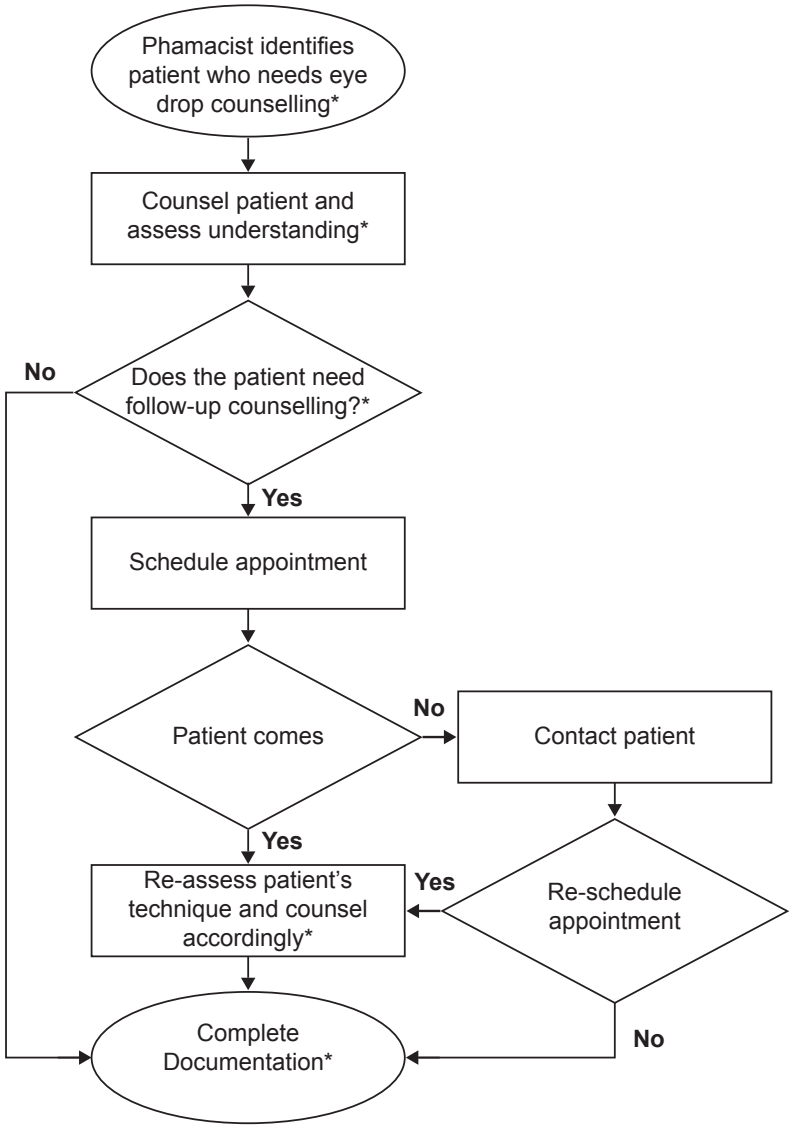


Figure 1: Flowchart of the process of care for eye drop medication counselling in the Outpatient Pharmacy Department (*indicates critical steps)

ensuring follow-up counselling is conducted and documentation. The evaluation of the process of care revealed a lack of process continuity between the Ophthalmology Department and OPD, as well as no standardised assessment of the patient's eye drop administration technique.

Besides that, a cause-effect analysis was conducted to determine the possible factors contributing to improper eye drop administration among glaucoma patients (refer to Figure 2). Three main factors were identified, which were the patient's lack of knowledge, poor dexterity and poor vision.

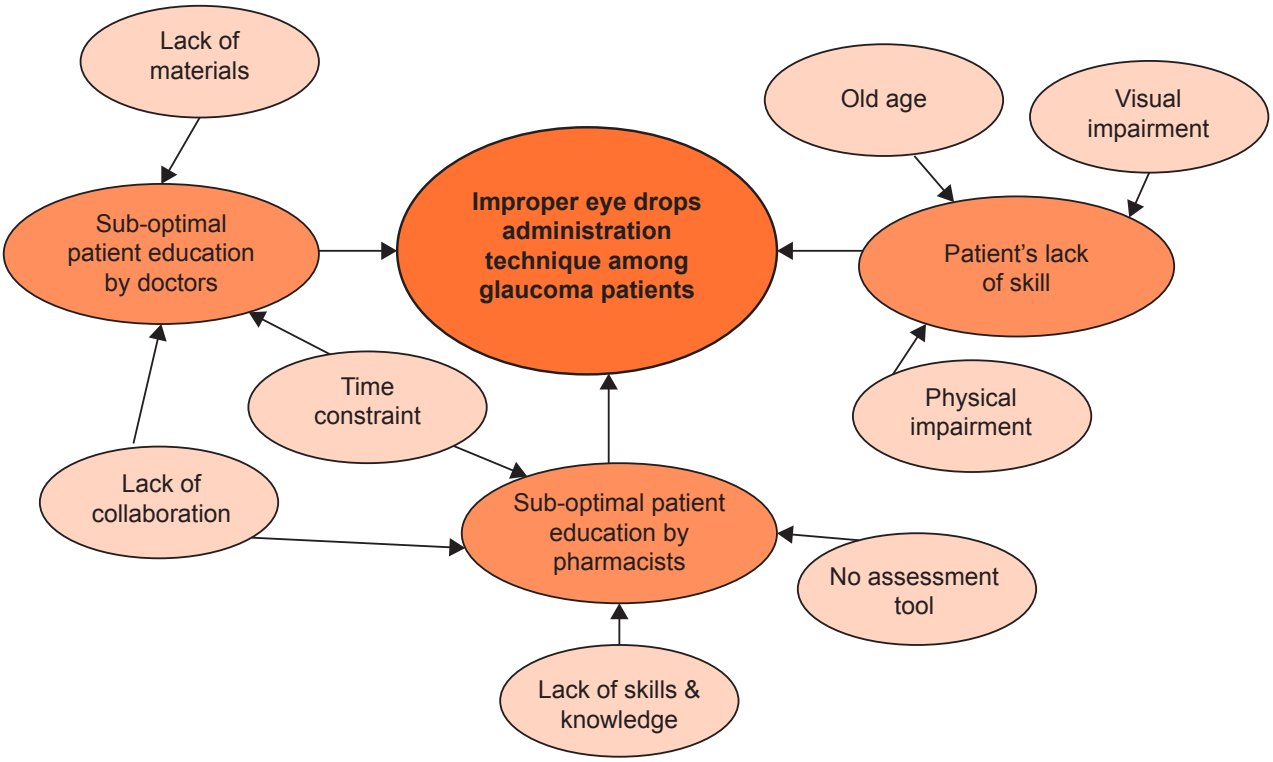


Figure 2: Cause-effect analysis of improper eye drop administration technique among glaucoma patients

Validated questionnaires were distributed to glaucoma patients in the outpatients (n=118), doctors in the Ophthalmology Department (n=13) and pharmacists in the Pharmacy Department (n=58) to verify the contributing factors. Results revealed that only 4.2% of the glaucoma patients surveyed performed all seven critical steps in eye drop administration. The least performed knowledge-based step was closing the eye with nasolacrimal occlusion (42%). The main skill-based challenge faced by patients was eye drops not falling into the eye (27%). Concerning patient education, only 69% of doctors and 21% of pharmacists reported that they always counsel glaucoma patients who are newly started on eye drop medications, while only 55% of doctors and 2% of pharmacists re-assess the administration technique of patients who are already using eye drops. The main barrier to eye drops counselling for doctors was time constraint (100%), whereas the main barriers for pharmacists were lack of doctor referrals (76%) and time constraint (72%). Surprisingly, 62% of doctors in the Ophthalmology Department were unaware of any avenues available to refer patients to pharmacists for medication counselling, even though medication counselling is an established pharmacy service.

Strategy

Two intervention cycles were conducted in this study to improve doctor-pharmacist collaboration and to provide effective and standardised eye drop administration counselling to glaucoma patients. Cycle 1 was conducted between June 2020 and January 2021 with four main strategies implemented, while Cycle 2 was conducted between February 2021 and June 2021 to strengthen the effectiveness of the strategies from Cycle 1.

In Cycle 1, a new process of care was developed for referral by doctors in the Ophthalmology Department and eye drop administration counselling by pharmacists in the OPD (refer to Figure 3). Medication Counselling Referral Forms were distributed to the Ophthalmology Department and the doctors were informed of the referral process and criteria. Following this, the OPD received 30 referrals in Cycle 1. The number of referrals was lower than expected because of the reduction in clinic appointments due to the Movement Control Order during the height of the COVID-19 pandemic. After Cycle 1, feedback was received from the doctors stating that a simplified form would ease the referral process. Subsequently, the referral form was simplified in Cycle 2 by removing unnecessary options and information to be filled.

Moreover, in Cycle 2, the doctor counselling referral and assessment checklist were combined into one form. The checklist was modified to include columns for counselling reference numbers and the signature and stamp of the pharmacist. With this, the pharmacist needed not to fill up a separate counselling form for documentation, hence, decreasing documentation time.

The next strategy aimed to improve and standardise the quality and effectiveness of the eye drop technique counselling by pharmacists in the OPD. A Counselling Observer Assessment Checklist was developed as a tool for pharmacists to evaluate patients' techniques and counselling outcomes (refer to Appendix 2). Based on the new workflow, evaluation was done by observing the patient's technique using normal saline eye drops. This enabled the pharmacist to identify and address the patient's administration errors accordingly.

Pharmacists were required to schedule a follow-up counselling session for all counselled patients. The second session aimed to evaluate whether the patient still practises all seven critical steps correctly and to provide any necessary re-enforcement. However, due to the low turn-up rate for scheduled appointments, reminders were sent via SMS or phone calls two to three days prior to the patient's appointment for Cycle 2. Phone calls were found to be more effective than SMS-based reminders.

Furthermore, educational tools such as videos and charts were produced to standardise counselling points and improve patients' understanding. However, the video and chart were used in only 55% of the counselling sessions conducted during Cycle 1 (n=30). Therefore, the video was modified in Cycle 2 based on the feedback from pharmacists and doctors, using minimal words, larger fonts and clearer graphics. The length of the video was also shortened from 2 minutes 40 seconds to approximately 1 minute. Besides English, the video was also produced in Bahasa Malaysia, Mandarin and Tamil. In addition, education charts were removed and replaced with pamphlets that can be brought home.

Results

After two cycles of remedial actions, the percentage of patients performing all seven critical steps of eye drop administration during the second counselling session increased from 4.2% to 36.4% and subsequently to 72% (refer to Figure 4). The Achievable Benefit Not Achieved (ABNA) decreased from 55.8% to 23.6% and finally to -12%.

Further analysis showed an increase in percentage for each critical step in Cycle 2 compared to Cycle 1. Four steps did not achieve 100% performance in Cycle 2, namely handwashing (83.3%), closing the eye and

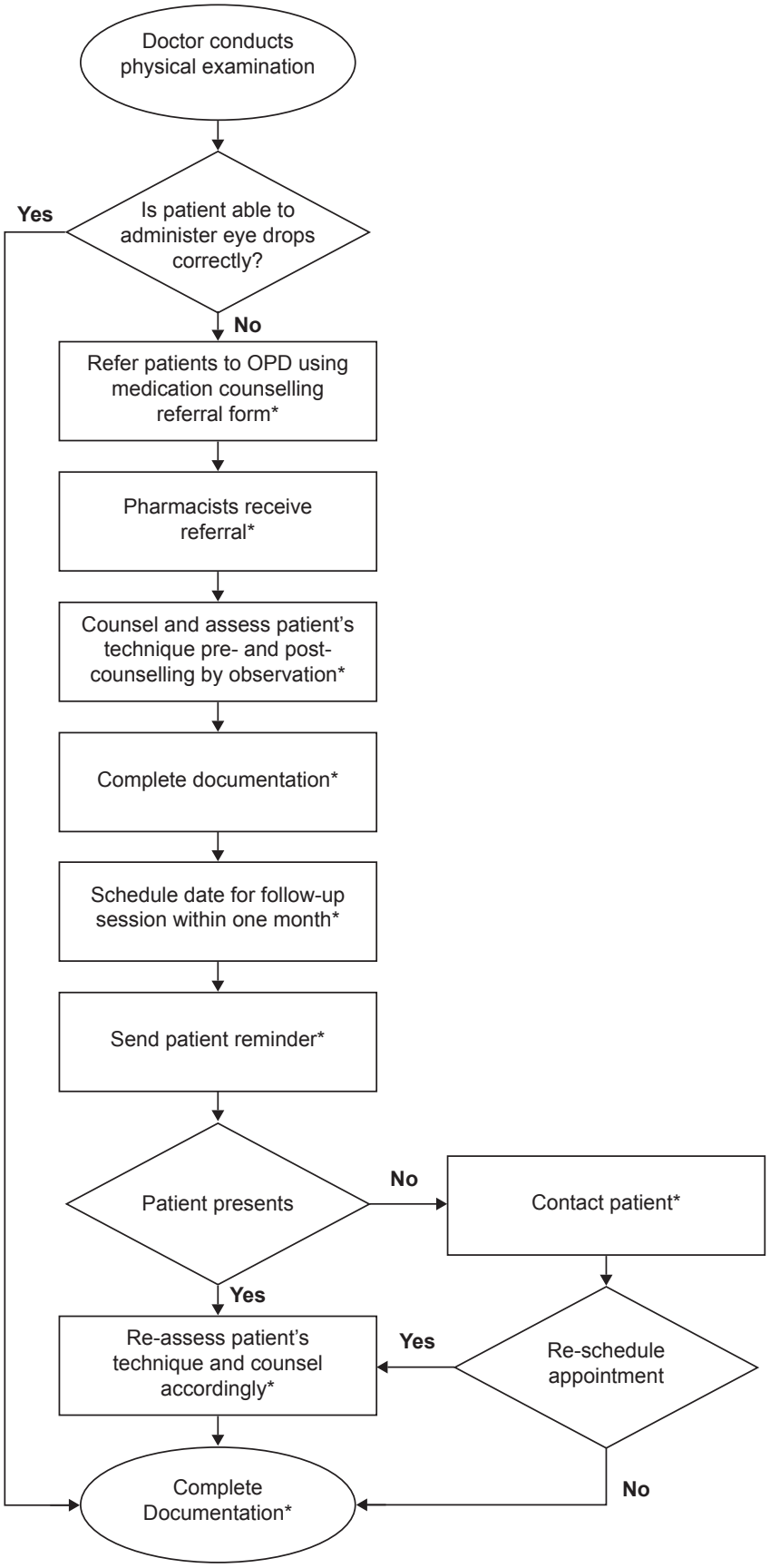


Figure 3: New process of care for eye drop administration technique referral and counselling in the Ophthalmology Department and Outpatient Pharmacy Department (* indicates critical steps)

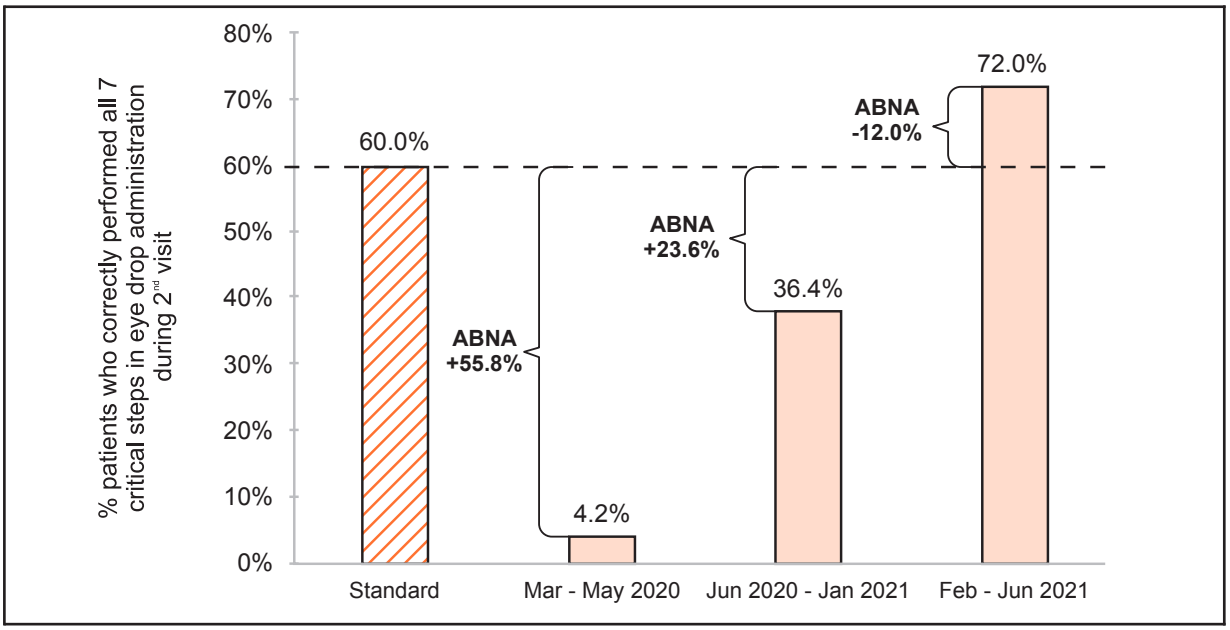


Figure 4: Trend in the percentage of patients who correctly performed all seven critical steps in eye drop administration during the second medication counselling session (ABNA analysis)

nasolacrimal occlusion for 2 minutes (77.7%), avoiding touching the tip of the eye drop bottle throughout the whole process (94.4%) and waiting for 5 minutes in between eye drops (88.8%).

Collaboration between doctors and pharmacists addressed the time barrier of patient counselling and education. Pharmacists increasingly utilised the modified video and pamphlet to provide standardised counselling and improve patient understanding. Moreover, improvement in pharmacists' counselling skills over the study's duration may have contributed to better outcomes in Cycle 2.

This study evaluated the IOP of patients before and after counselling to determine the clinical impact. A total of 42.9% of patients who correctly performed all seven critical steps one month after counselling in Cycle 1 and 2 showed a reduction in IOP, whereas 19% showed no changes and another 19% showed an increase in IOP. In this study, the files and IOP results of 14.3% of the patients were untraceable. The reason was that these patients could have been referred to other facilities. Other than the eye drops administration technique, IOP could be affected by other factors, such as treatment adherence, disease progression and treatment efficacy (3,8).

All criteria in the Model of Good Care (MOGC) showed improvement after intervention (refer to Table 1). For example, the use of counselling aids increased from 55% in Cycle 1 to 62% in Cycle 2. Although utilisation of the counselling aids was highly encouraged, there were situations where the counselling aids were not viable, such as in patients with visual or hearing impairment. In these cases, pharmacists would need to counsel by demonstration and guidance. Besides, the scheduling of follow-up counselling increased from 82.1% to 100%. It is to be noted that completing the documentation for OPD Counselling Form is not applicable in Cycle 2 because the form was abolished and incorporated into the Assessment Checklist Form.

Table 1: Model of Good Care to improve eye drop administration technique among glaucoma patients in Outpatient Pharmacy Department

No	Procedure	Criteria	Standard	Verification (n=58)	Cycle 1 (n=31)	Cycle 2 (n=21)
1.	Refer patient to OPD using medication counselling referral form	Refer patients with incorrect eye drop administration to a pharmacist using the medication counselling referral form	100%	0%	100%	100%
2.	Pharmacists receive referral	Receive all patients referred for counselling by prescribers	100%	0%	100%	100%
3.	Counsel patient and assess patient's technique pre- and post-counselling	• Assess the patient's eye drop administration by observation	100%	0%	100%	100%
		• Use eye drop administration videos or counselling charts (Cycle 1) or pamphlets (Cycle 2) as counselling aid	100%	0%	55%	62%
		• Counsel and re-assess the patient's eye drop administration by observation	100%	0%	100%	100%
		• Assess the patient's understanding and compliance with medications	100%	100%	100%	100%
4.	Schedule a date for follow-up counselling within one month	Schedule a date for follow-up counselling within one month	100%	0%	82%	100%

5.	Complete documentation	• Outpatient Pharmacy Department Counselling Form	100%	100%	100%	N/A (Note: This form was combined with the assessment checklist form)
		• Follow-up counselling registration form	100%	0%	100%	100%
		• Assessment checklist form	100%	0%	100%	100%
6.	Send patient reminder	Remind the patient by calling 2-3 days prior to the appointment date	100%	0%	N/A	100%
7.	Re-assess the patient's technique and counsel accordingly	• Re-assess the patient's eye drop administration by observation	100%	0%	100%	100%
		• Assess the patient's understanding and compliance with medications	100%	100%	100%	100%
8.	Complete documentation	• Outpatient Pharmacy Department Counselling Form	100%	100%	100%	N/A (Note: This form was combined with the assessment checklist form)
		• Follow-up counselling registration form	100%	0%	100%	100%
		• Assessment checklist form	100%	0%	100%	100%

Lessons and Limitations

This study highlighted that poor eye drop administration techniques were prevalent among glaucoma patients at HTAN and improvement measures were necessary. The results showed that doctor-pharmacists collaboration could improve patient care by leveraging and sharing resources. Ophthalmology doctors can identify patients who need medication counselling based on the patient's clinical results and initial assessment of the administration technique. On the other hand, pharmacists are trained to provide medication counselling and access the resources needed. Also, support from the Head of Departments and cooperation from colleagues are necessary to achieve the aim of this study. Finally, periodical discussions are required in order to streamline and improve the process of care.

The main challenges encountered were the small sample size of patients referred by doctors and the low patient turn-up rate for follow-up counselling. However, the number of referrals received increased in Cycle 2 after the positive results from Cycle 1 were presented to the doctors in the Ophthalmology Department. Additionally, the number of patients visiting the Ophthalmology Department increased in Cycle 2 when Negeri Sembilan entered the Recovery Movement Control Order and Conditional Movement Control Order phases during the COVID-19 pandemic.

Conclusion and the Next Steps

In conclusion, this study enforces the need for patient education and counselling in improving glaucoma patients' eye drop administration techniques. Similar to other chronic medical conditions, such as diabetes and chronic obstructive pulmonary disease, glaucoma patients require periodic evaluation and re-enforcement of proper technique and adherence. Following this study, pharmacists in the OPD at HTAN have become more aware of the need to provide effective eye drop administration counselling to glaucoma patients. The importance of evaluation by patient observation is also demonstrated as it enables the pharmacist to assess the patient's technique and provide targeted counselling should the need arise. Discussion with the Ophthalmology Department has also led to standardised counselling points to minimise patient confusion.

Nevertheless, continuous cooperation between doctors and pharmacists is necessary to sustain the process of care and interventions. Periodical continuing medical education and briefing should also be conducted, especially for the new ophthalmology doctors and pharmacists.

The collaboration initiated in this study could lead to further projects in improving patient care. This study can be applied to hospitals with Ophthalmology Departments and OPD to improve eye drop administration techniques among glaucoma patients. The Counselling Observer Assessment Checklist Form can be used and adapted to suit the facility's setting. In addition, the facility can also use the Medication Counselling Referral Form or its own facility referral form. The workflow can be easily adopted since medication counselling is an established pharmacy service. This study could potentially be expanded to include medication adherence and storage aspects of eye drop medications.

Acknowledgement

The authors would like to thank the Director-General of Health, Malaysia for his approval to publish this work. The authors also like to extend our appreciation and gratitude to the Head of our Ophthalmology Department and the Head of the Pharmacy Department in HTAN for supporting this work. Besides, the authors are grateful to the Pharmacy Research and Development / Quality Initiative Committee, HTAN for their guidance. Last but not least, the authors would like to thank the Pharmacy Department and Ophthalmology Department staff for their involvement and support.

Conflict of Interest

The authors declare that there was no conflict of interest.

Funding

This study received no specific grants from any funding agencies from the public, commercial or non-profit sectors.

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Appendix 1

Medication Counselling Referral Form

LAMPIRAN 1

BORANG PERMOHONAN KAUNSELING
FARMASI KLINIK PAKAR
JABATAN FARMASI HOSPITAL TUANKU AMPUAN NAJIHAH

Nota: Diisi oleh Pegawai Perubatan dan lampirkan bersama preskripsi ubat

1) Data Pesakit

Nama Pesakit _____

IC _____ Umur (tahun) _____

Jantina Lelaki ☐ Perempuan ☐

Bangsa Melayu ☐ Cina ☐ India ☐ Lain-lain ☐

Tujuan kaunseling
1. Kaunseling ubat ☐
2. Penilaian kepatuhan ubat ☐

Diagnosis _____

Alergi ubat Tidak ☐ Ya ☐ Nyatakan _____

Kad alergi Tidak ☐ Ya ☐ No kad _____

Senarai ubat terkini	Sejarah Pengubatan (Jika ada)
Nama ubat, Dos & Frekuensi	***Nama ubat, Dos & Frekuensi***

2) Jenis Kaunseling yang Dirujuk

Cara mengguna ubat titis mata ☐
Lain-lain: _____ ☐

Catatan (Diisi oleh Pegawai Perubatan jika ada):

IOP:

RVA: LVA:

_____
Tandatangan
Nama & Cop Pegawai Perubatan

Tarikh:

1 A collaborative quality assurance study between Outpatient and Ophthalmology Department, HTAN (Updated: 6.7.21)

Appendix 2

Counselling Observer Assessment Checklist

Counselling Ref No.
1st visit:
2nd visit:

FOR PHARMACY USE

Pre- and post-counselling observer assessment checklist

(Tick √ for each correct step)

1. Phone No : .....
2. Dr's TCA date : .....
3. Referred to pharmacist for eye drops counselling before: Y / N
4. Request for SPUB: Y / N

No	**Assessment criteria** (for patient to demonstrate using normal saline eye drops)	**1st session**		**2nd session**
		Pre-counselling	Post-counselling	Pre-counselling
*1	Hand-washing (mentioning this step is sufficient)			
2	Shake eye drop bottle			
*3	Able to open (for all eye drops) and/or PUNCTURE eye drop bottle (for Timolol IOTIM / Dorzolamide OCUDOR) correctly			
4	Tilt head backwards			
5	Look up when administering eyedrops			
6	Pull down lower eyelid to form a pocket			
*7	Instillation into conjunctival sac			
*8	Instillation of ONE (1) drop			
*9	Close eye with concomitant nasolacrimal occlusion for approximately TWO (2) minutes			
*10	Avoid touching dropper tip throughout process			
11	Replace bottle cap			
*12	Wait for FIVE (5) minutes between eye drops			
13	Wipe away excess tears/eye drops with tissue			
	Total score (1 point for each correct step)	/13	/13	/13
	Total score for critical steps (marked as *)	/7	/7	/7

Notes : Kindly write any specific problem faced and advice given to patient.

_____

_____

(1st SESSION)
Tick √ if used: ☐ Video ☐ Pamphlet

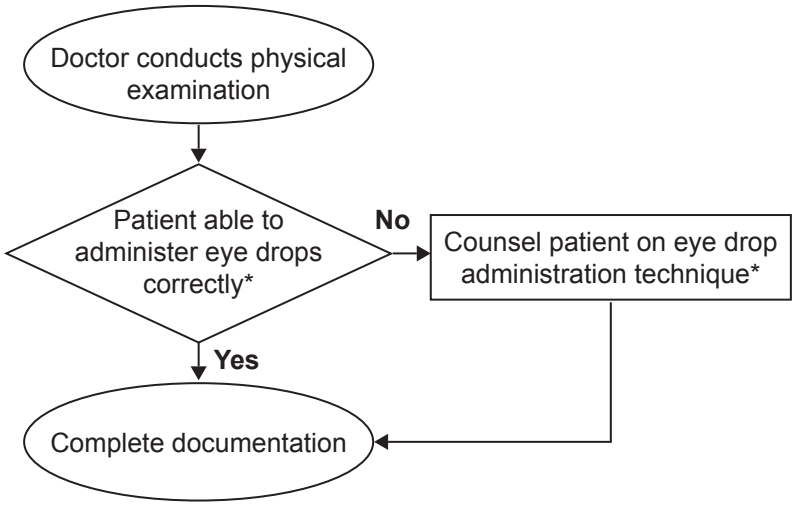
_____
Tandatangan
Nama & Cop Pegawai Farmasi
Tarikh:

(2nd SESSION)
Tick √ if used: ☐ Video ☐ Pamphlet

_____
Tandatangan
Nama & Cop Pegawai Farmasi
Tarikh:

Appendix 3

Flowchart of the process of care in the Ophthalmology Department



** indicates critical steps*