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Improving patient compliance for intravitreal injections during the COVID-19 pandemic

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Abstract

Purpose: Intravitreal injections (IVT) of anti-vascular endothelial growth factor are standard treatment procedures in ophthalmology for many retinal diseases. We conducted a full-cycle clinical audit to evaluate patient compliance with IVT in Penang Hospital during the COVID-19 pandemic.
Study design: Full cycle audit.
Methods: A 3-month audit was carried out on patients scheduled to receive IVT in the operation theatre between August and October 2019 (COVID-19 pre-pandemic period). Patient compliance rates were calculated. We set a target of 95% patient compliance rate. Interventional steps taken to improve compliance were carried out from April 2020 to September 2021 (during the Movement Control Order period). A 3-month re-audit was conducted between October and December 2021.
Results: A total of 481 patients were scheduled for IVT, and 50 patients (10.4%) did not present to the appointment. The compliance rate was 89.6%. The reasons for defaulting treatment included multiple hospital visits, transportation issues, cost of transportation, loss of daily wages, and fear of COVID-19 infection. Post-intervention, a total of 895 patients were scheduled for IVT in 3 months. Among these patients, 844 patients completed their IVT appointment, while 51 patients missed the scheduled IVT. The patients' compliance rate also rose from 89.6% to 94.3%. There was also an increase of 87.1% in the total number of scheduled IVT as compared to the pre-intervention phase.

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Conclusion: These interventions not only increased the number of patients receiving treatment but also improved patients' compliance with IVT despite the COVID-19 pandemic. Patients benefited from reduced hospital visits, the cost of follow-up, and the risk of hospital infection.

Keywords: anti-vascular endothelial growth factor, COVID-19, intravitreal injection, patient compliance, waiting time

Abstrak Bahasa

Tajuk: Peningkatan pematuhan pesakit terhadap suntikan intravitreal semasa pandemik COVID-19
Latar belakang: Suntikan intravitreal (IVT) faktor pertumbuhan endotelium anti-vaskular adalah prosedur rawatan piawai dalam bidang oftalmologi untuk banyak penyakit retina. Satu audit klinikal lengkap bagi menilai pematuhan pesakit terhadap IVT di Hospital Pulau Pinang semasa pandemik COVID-19 telah dijalankan.
Reka bentuk kajian: Audit klinikal yang lengkap
Kaedah: Audit klinikal telah dijalankan selama tiga bulan melibatkan pesakit yang dijadualkan untuk menerima IVT di bilik bedah di antara Ogos hingga Oktober 2019 (sebelum pandemik COVID-19). Kadar pematuhan pesakit telah dihitung dan sasaran kadar pematuhan ditetapkan pada 95%. Seterusnya langkah-langkah intervensi diambil untuk meningkatkan pematuhan dari April 2020 hingga September 2021 (semasa tempoh perintah kawalan pergerakan). Pengauditan semula selama tiga bulan dijalankan antara Oktober dan Disember 2021.
Keputusan: Seramai 481 pesakit dijadualkan untuk IVT, dan 50 pesakit (10.4%) tidak hadir. Kadar pematuhan pesakit adalah 89.6%. Di antara sebab ketidakpatuhan rawatan adalah kunjungan ke hospital yang kerap, masalah pengangkutan, kos pengangkutan, kerugian upah harian, dan kebimbangan akan dijangkiti COVID-19. Selepas langkah intervensi diambil, seramai 895 pesakit telah dijadualkan untuk IVT dalam tempoh tiga bulan. Daripada jumlah tersebut, 844 pesakit hadir manakala 51 pesakit tidak hadir untuk IVT yang dijadualkan. Kadar pematuhan pesakit juga meningkat kepada 94.3%. Terdapat juga peningkatan sebanyak 87.1% dalam jumlah keseluruhan IVT yang dijadualkan berbanding dengan fasa pra-intervensi.
Kesimpulan: Langkah intervensi ini didapati berkesan dalam meningkatkan bilangan pesakit yang menerima rawatan dan kadar pematuhan pesakit terhadap IVT walaupun semasa pandemik COVID-19. Pesakit mendapat manfaat hasil dari intervensi ini melalui pengurangan kunjungan ulangan ke hospital, kos pemantauan selepas rawatan, dan risiko jangkitan hospital.

Kata kunci: COVID-19, faktor pertumbuhan endotelium anti-vaskular, masa menunggu, suntikan intravitreal, pematuhan pesakit

Introduction

Patient compliance is one of the most under-addressed issues in the healthcare system today. According to the Oxford Learner's Dictionary, the definition of compliance is "the practice of obeying rules or requests made by people in authority".[1] In our clinical setting, it is the extent to which the patient's behaviour matches the doctor's recommendations. While the availability and demand for intravitreal injection (IVT) therapy in treating many retinal diseases have expanded exponentially over recent years, compliance is essential for successful IVT treatment.

IVTs are the first-line treatment for neovascular macular disease:[2] neovascular age-related macular degeneration (nAMD), diabetic macular oedema (DME), and fovea-involving macular oedema resulting from retinal vein occlusion (RVO). Anti-vascular endothelial growth factor (anti-VEGF) drugs comprise the majority of IVT. According to recent literature, frequent IVTs of anti-VEGF agents are necessary to achieve the best functional outcome in treating retinal diseases and are administered as frequently as every 4 weeks, often for an extended period. For example, a patient requiring anti-VEGF IVT for DME will receive a monthly loading dose for 5 consecutive months, with a median of 9–10 injections in the first year and 5 to 6 injections in the second year.[3]

Our audit aimed to determine patient treatment compliance rates and the factors affecting compliance. Thereafter, we carried out interventions to improve the work process.

Methods

The full-cycle audit comprised an audit phase, an intervention phase, and a post-intervention audit phase. Patients listed for IVT in the operating theatre between August and October 2019 in Penang Hospital were audited. This data represented the period prior to the COVID-19 pandemic era. Data were collected from the operating theatre list and patient records. The total number of patients scheduled for IVT and the number of patients who did not present for IVT were recorded. The compliance rates were calculated, and the reasons for non-compliance were analysed. The standard was set at a 95% patient compliance rate.

Three interventional steps were introduced and were carried out from April 2020 to September 2021. The intervention period coincided with the Malaysian Government's Movement Control Order (MCO) from 18 March 2020 to 3 May 2020, Conditional Movement Control Order (CMCO) from 4 May 2020 to 9 June 2020, Recovery Movement Control Order (RMCO) from 10 June 2020 to 31 March 2021 and National Recovery Plan (NRP) from 15 June 2021 to 31 December 2021. The various stages of the MCO comprised a sequence of quarantine actions enforced by the Malaysian federal government. These measures involved limitations on movement,

gatherings, and international travel, as well as directives to shut down businesses, industries, government offices, and educational establishments, all aimed at containing the transmission of COVID-19.

A 3-month post-intervention audit was carried out between October and December 2021 to complete the audit cycle.

Interventions

The pre-existing IVT work process required patients to come twice for every IVT. It consisted of 1 hospital visit for review, which included visual acuity test, dilated fundus examination, and optical coherence tomography (OCT) scan, followed by another hospital visit for IVT in the operating theatre.

The first intervention was reducing the visit to only a single visit. The review appointment was given at 12 pm and the IVT was given after 2 pm. This reduced the burden of multiple appointments and hospital visits. It also reduced the patients' waiting time in the clinic and reduced crowding. Patients were more willing to come for appointments despite the COVID-19 pandemic.

Fig. 1. The clinic operating theatre where intravitreal injection is delivered to patients.

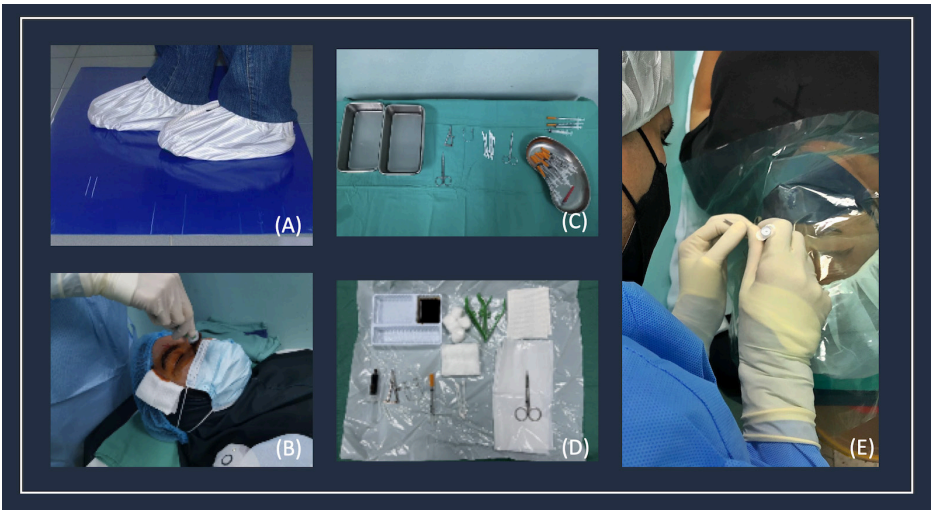

Fig. 2. (*A*) A sterile sticky mat was placed at the clinic's operating theatre entrance. (*B*) The patient had to wear an operating theatre cap and mask. (*C*) Sterile intravitreal instruments. (*D*) A disposable dressing set is used for each intravitreal injection patient. (*E*) Draping method using the plastic within the disposable dressing set.

Secondly, we changed the location of the procedure from the operation theatre to a procedure room in our clinic (Fig. 1). We converted the clinic procedure room into a minor operating theatre to fulfil the purpose and criteria of delivering IVT in a sterile environment. This intervention reduced patient movements within the hospital and relieved the operating theatre for other emergency cases. Hence, instead of accumulating patients in 1 day for IVT in the operating theatre, we can now deliver up to 15–18 IVTs in our clinic from Monday to Friday.

Thirdly, we ensured proper steps were taken to maintain the sterility of our clinic procedure room. IVT procedures warrant a sterile environment to prevent contamination and endophthalmitis. The room was cleaned and sanitised according to strict protocols and sterile sticky mats were placed in front of the room entrance. Doctors delivering IVT must wear a sterile gown, while patients receiving IVT must wear OT caps and slippers when entering the procedure room. A modified draping method using the sterile plastic from the disposable dressing set was implemented (Fig. 2).

Sampling methods

We included all patients within the audit period.

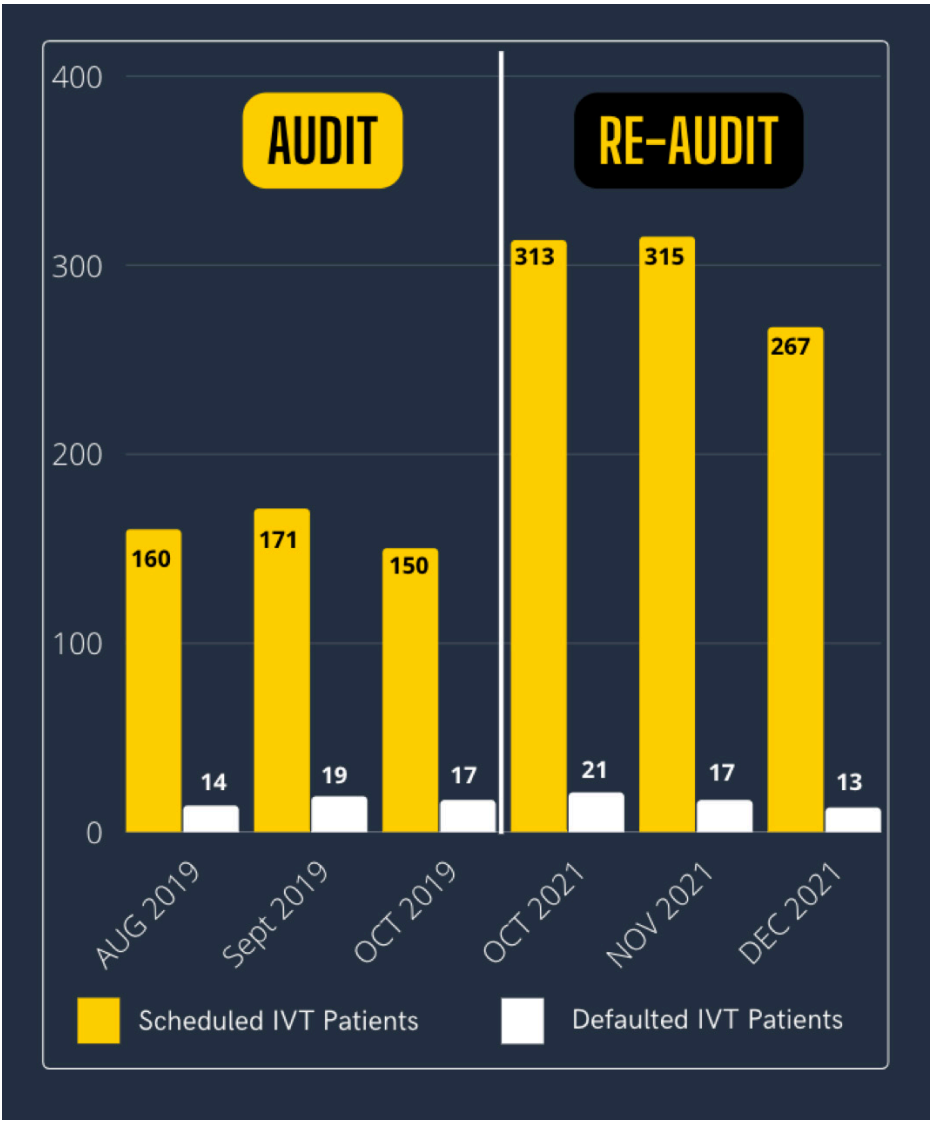

Fig. 3. Bar chart showing comparison of pre- and post-intervention audit results.

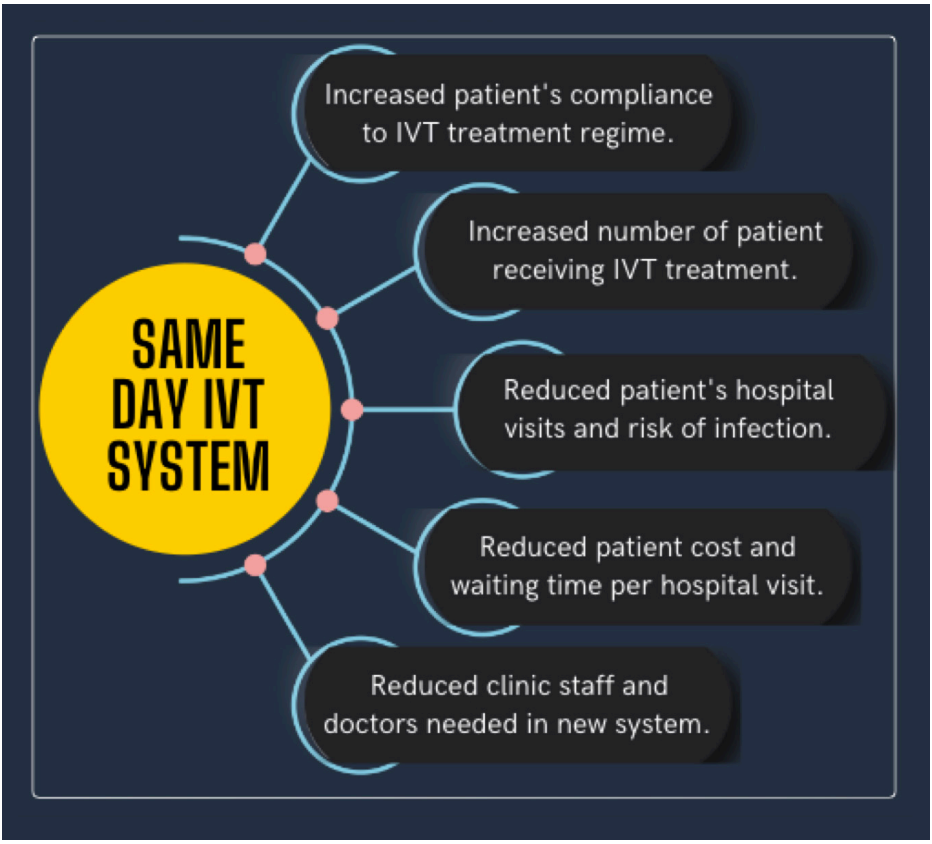

Fig. 4. Summary chart of improvements made by the new interventions.

Results

The pre-intervention audit revealed that 481 patients were scheduled for IVT. A total of 431 patients were present, but 50 patients did not turn up for their scheduled IVT appointment. The compliance rate was 89.6%. The average age of patients who defaulted was 63.7, and 53% were males. The majority of races were Chinese (63.3%), followed by Malay (26.5%), and Indian (10.2%). The average visual acuity was 0.73 logMAR.

The most common indication was DME (60%; $n = 30/50$), followed by nAMD (30%; $n = 15/50$). Our survey showed that the reasons for non-compliance were multiple hospital visits and the long waiting time (82%; $n = 41/50$). The fear of IVT and COVID-19 hospital infection (68%; $n = 34/50$) also contributed to patients defaulting their appointments. Other reasons were logistic issues such as transportation (44%;

n = 22/50) and the patient's family members who could not take leave from work to bring them (34%; *n* = 15/50). From a financial aspect, patients faced problems with increased cost per hospital visit, and the loss of their daily working wages further discouraged them from coming for follow-up (30%; *n* = 15/50).

The post-intervention audit showed a total of 895 scheduled IVT in 3 months. Among these patients, 844 patients completed their appointment, while 51 patients missed the scheduled IVT. The patients' compliance rate also rose from 89.6% to 94.3% (Fig. 3). In addition, there was an increase of 87.1% in the total number of scheduled IVT as compared to the pre-intervention phase. Figure 4 presents a summary chart of improvements achieved by the new interventions.

Discussion

Penang Hospital is a government tertiary hospital with vitreoretinal services in the northern region of peninsular Malaysia. We started delivering IVT anti-VEGF in 2010. Due to our historical hospital building structure and clinic space constraints, patients needing IVT treatment were reviewed in the eye clinic, followed by another day appointment for IVT in the operation theatre. The financial burden on patients also contributed to the poor compliance. We identified an issue of non-compliance among our patients receiving IVT in our department, hence we carried out this full cycle audit to address this issue.

During the COVID-19 pandemic, many healthcare services were adversely affected, including our IVT delivery. In a study conducted in Portugal, Campos *et al.* reported a 33% decrease (from 304 to 204) in IVT delivery from January to April 2020.[4] These led our department to take steps to rectify the problem. The interventions increased the patient compliance rate for IVT treatment from 89.6% to 94.3%.

According to Vermeire *et al.*, the reasons for non-compliance in medicine are multifactorial. Many factors have been studied, including patient demography, disease factors, psychiatric disorders, and the treatment duration or frequency of dosing.[5] The main reason for non-compliance in our cohort was the burden of multiple hospital visits (80%). A study by Sivaprasad *et al.* on the impact of IVT therapy on patients' quality of life with DME and RVO found that patients requested fewer injections.[6] Reducing clinic appointments in the new IVT work process was in line with the measures taken during the MCO period to reduce the number of patients coming to the hospital. There was less crowding in the clinic, and we could advocate proper social distancing. We also ensured that the MCO restrictions did not affect the patients' IVT treatment intervals and that treatment outcomes were maintained.

Our audit showed that most patients who missed their IVT were indicated for DME (60%). This is in concordance with Cramer *et al.*, where adherence and compliance to therapy were significant issues in patients with diabetes.[7] A study by Weiss *et al.* analysed compliance among patients with DME and AMD. While both groups had

similar numbers of visits and injections, they showed a notable difference in the number of missed appointments and the amount of therapy break-off (AMD 22% versus DME 46%).[8] Another study by Obeid *et al.* also found that the loss to follow-up rates exceeded 20% for patients with proliferative diabetic retinopathy after treatment with panretinal photocoagulation or IVT with anti-VEGF over approximately 4 years.[9] However, in other studies[10,11] the rates of loss to follow-up were much lower, approximately between 5% and 10% over a 1- to 2-year observation period.

Despite not reaching our audit target of 95% patient compliance rate, the number of treated patients increased by 87.1%. More patients were successfully treated despite the COVID-19 pandemic. Eighteen patients missed their IVT due to home quarantine for category 1 and 2 COVID-19. Some patients were also in close contact with COVID-19-positive cases and were under monitoring at home. This accounts for 2% of the patients who missed IVT appointments. Several studies have proposed the reasons for reduced compliance with meticulous follow-up and IVT schedules, including the lack of insurance coverage, the severity of visual impairment, and the distance between the patient's residence and the hospital.[12-14] However, our audit did not include the data on the patient's education level, financial income, burden, and travel distance from their home to the hospital.

In our audit, the average age of patients who defaulted IVT treatment is 63.7 years. It is a known fact that comorbidities increase with age.[15] Based on other studies, more than 80% of patients with AMD have 5 or more comorbidities.[16] Conversely, DME patients also show similar results.[17] Another problem faced by these patients with multiple comorbidities is that many forget to resume their eye treatment after being discharged home when hospitalised for their medical illness. These comorbidities can severely limit the patient's ability to operate independently. Patients over 70 years of age are more likely to require assistance with activities of daily living,[18] especially coming to the hospital for follow-ups and IVT procedures. Such dependency can contribute to patient non-compliance as well.

The average visual acuity of patients who defaulted IVT in our audit was 0.73 LogMAR. Nevertheless, the severity of visual impairment has not been sufficiently studied as a contributing factor for patient non-compliance.[19-21]

Conclusion

In conclusion, the same-day review and IVT procedure has greatly benefited our patients, department, and hospital. We have increased the number of patients receiving IVT treatment and improved patient treatment compliance rate. By improving the efficiency of our workflow, we can reduce the patients' hospital visits, waiting time in the clinic, follow-up costs, and the risk of hospital infection.

Declarations

Ethics approval and consent to participate
Our audit is registered under the National Medical Research Register (NMRR ID-22-02117-34A).

Competing interests
None to declare.

Funding
None to declare.

Acknowledgements
None to declare.

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