Transforming patient care: The QWIC system to optimise waiting times and efficiency in surgical outpatient clinics in Malaysia

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ABSTRACT

Introduction: Waiting time at surgical outpatient clinics in Malaysian hospitals has become a critical concern, impacting patient satisfaction and overall healthcare efficiency. Many facilities face challenges leading to extended waiting periods for surgical consultations and procedures. These delays not only affect patient outcomes but also contribute to increased anxiety and frustration among patients. Implementing innovative solutions, such as advanced queue management systems, can play a significant role in operational workflows and reducing wait time. Thus, this study aims to determine the efficiency of waiting time using the Queue Won't Intimidate Customer (QWIC) system towards surgical outpatient clinics at the National Cancer Institute (NCI).

Materials and Methods: Data were collected retrospectively through a cross-sectional design over a six-month period, from April 1 to September 31, 2021, following the implementation of the QWIC system on 3 surgical clinics (bariatric clinic, general surgery (GS) clinic, and Upper gastrointestinal (UGI) clinic) under NCI. The Ministry of Health (MOH) established an acceptable waiting time benchmark of 60 minutes or less.

Results: The most efficient clinic was GS (98.9%), followed by UGI (96.2%) and bariatric (83.4%). Based on logistic regression analysis, bariatric clinic (COR: 18.72, 95% CI: 6.51-51.28, p < 0.001; AOR: 15.33, 95% CI: 5.32-44.13, p <0.001) and new surgical cases (COR: 3.19, 95% CI: 1.96-5.22, p < 0.001 and AOR: 2.56, 95% CI: 1.42-4.52, p = 0.001) are strongly associated with longer waits. UGI clinic also show increased waiting times (COR: 3.67, 95%CI: 1.23:10.94, p = 0.020; AOR: 3.34, 95% CI: 1.12-10.02, p = 0.031). Conversely, consultation durations over 60 minutes and attendance status did not significantly affect waiting times.

Conclusion: The QWIC System represents a significant advancement in managing patient appointments and consultations within surgical clinics. Overall, types of surgical clinic and case status were key factors influencing waiting times in surgical clinics.

KEYWORDS:
Waiting time, surgical clinics, outpatient, patients care, efficiency

INTRODUCTION

Prolonged waiting times in hospitals for consultations with physicians at surgical outpatient clinics have become a significant concern, impacting patient care and satisfaction globally.[1-3] The issue of long waiting times at outpatient clinics in public hospitals is not a recent occurrence but rather a persistent concern among healthcare professionals. As healthcare systems strive to provide timely and effective services, prolonged waiting times can significantly hinder patient outcomes, leading to increased anxiety and dissatisfaction.[4-5] Recent studies highlight the adverse effects of long wait times, an indication that patients often experience delays that can detract from their overall health experiences.[6] Other factors influencing patient satisfaction on waiting time were identified, including age under 20 years, literate, expectation versus actual waiting time.[1,7] Thus, understanding the complexities of waiting times is essential for improving healthcare delivery and enhancing patient satisfaction.

Several factors contributed to the prolonged waiting times encountered at surgical outpatient clinics. Insufficient staffing level including trainee, inefficient appointment scheduling, and limited availability of operating rooms are among the primary issues that hinder timely patient access.[8-9] Additionally, a mismatch between patient demand and available healthcare resources often leads to significant backlogs, prolonging the time patients must wait before seeing a physician.[8] Administrative inefficiencies, including poor communication between departments and a lack of coordination among healthcare providers, further exacerbate these delays.[10-12] These systemic issues not only affect the patient experience but can also lead to adverse health outcomes, underscoring the necessity for comprehensive reforms within healthcare systems.

In response, certain countries have set appropriate waiting time for patient to be serve at clinic such as South Africa who set 60 minutes at specialised hospitals.[12] A study on hospitals in five countries revealed that Australia, Canada, New Zealand, the United Kingdom, and the USA experienced average wait times of two hours or more.[7] Repeatedly, the stress of prolonged waiting time has resulted in aggressive tendencies by patients.[7] Patients' satisfaction could be enhanced through the implementation of real-time

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information dissemination in hospital experiencing significant queuing issues.[6]

In Malaysia, the average waiting time from registration to meet a doctor in hospital outpatient departments is 60 minutes[11], meanwhile primary health clinics recorded 41 minutes.14 Patients have expressed numerous concerns about prolonged wait times at outpatient clinics. The important concern are the prolonged wait time for a doctor's appointment and the punctuality of healthcare workers themselves. For instance, a doctor's punctuality can contribute to prolonged waiting times, especially when their consultation duration is too short. Overseas studies have shown that patients are willing to wait an average of between 30 and 45 minutes to see a doctor.[8-9] When the number of patients waiting for consultation surpasses the rate of service delivery, queues form Healthcare in Malaysia is always in a state of "excess demand". Overcrowding in outpatient clinics is a common occurrence. A high number of patients, a shortage of staff, malfunctioning equipment, constrained facilities (such as shared consultation rooms with multidisciplinary teams), and a disorganised system are among the factors contributing to lengthy waiting times.[10-11]

Although prolonged waiting time is an issue in Malaysia, the Ministry of Health (MOH) acknowledged this emerging issue in 2008 and proposed incorporating "waiting time" as a key performance indicator (KPI) in general surgery clinical services, as it reflects the efficacy of healthcare services.[2-3] Thus, MOH has implemented several initiatives aimed at reducing waiting times for surgical outpatient consultations. Recent strategies include optimising appointment scheduling to improve patient flow, enhancing staffing levels to meet the growing demand for surgical services, and streaming operational processes within healthcare facilities.

Nevertheless, the appointment system at surgical outpatient clinics of NCI did not adhere to staggered appointment times prior this study. The system operated on a "first come, first served" principle, resulting in overcrowding and a backlog of cases at the clinic. This imposes a direct burden on the entire process. Following the audit of clinic waiting times, researchers identified several modifiable factors that could reduce the waiting duration. Therefore, a novel queue system has been suggested to address the potentially alterable or unpredictable variables. This system is referred to as the QWIC (Queue Won't Intimidate Customer) system.

MATERIALS AND METHODS

Study Design

This study employed a retrospective cross-sectional design using secondary data collected from the surgical outpatient clinics of National Cancer Institute (NCI), Malaysia. The data collected was within 6 months of study period starting 1 April until 31 September 2021. The surgical clinics comprise of bariatric clinic, general surgery clinic, and upper gastrointestinal clinic.

Study Participants

Inclusion Criteria

- *Scheduled Surgical Patients:* All surgical patients with pre-scheduled appointment are included in this study. This to ensures a focus on individuals who have a planned visit to the surgical clinics.
- *Outpatient Surgical Clinic Visits:* Patient must visit outpatient surgical clinics during the designated study period, allowing for consistent data collection and analysis related to scheduled care.

Exclusion criteria

- *Physician-Specific Appointments:* Patients who seek appointments specifically with a particular physician are excluded from the study to maintain a uniform patient population and reduce variability in data.
- *Walk-in Patients:* Individuals who present themselves at the clinics without a prior appointment, referred to as 'walk-in' patients, will not be included. This ensures that only scheduled visits are considered.
- *Multi Discipline Appointments:* Patients with appointments form two or more medical disciplines on the same day will be excluded. This helps maintain focus on a single specialty and reduces complexity in patient management.
- *Special Consultations:* Patients scheduled for special consultations, such as central line care, are excluded from this study.

Study Instrument

The QWIC System (Figure 1) is designed to optimise patient flow and enhance the consultation experience in surgical clinics. By standardising appointment times and streaming processes, the QWIC System aims to reduce waiting times and improve overall efficiency in patient care. The QWIC system incorporates several key features:

1) Staggered appointment scheduling
2) Patient ownership (dedicated patient lists for each consultation times)
3) Timekeeping and real-time tacking of consultation times
4) Maximising consultation room utilization during clinic sessions
5) Adequate manpower allocation on the floor during clinic hours

Step 1: Staggered Appointment System

The staggered appointment system efficiently schedules patient visits, aiming to optimize the use of consultation rooms and medical staff while minimizing patient wait times. Key components include:

1. Staggered Appointments:

- Appointments are scheduled at short intervals (60 minutes for new cases and 30 minutes for follow-ups) to spread patient arrivals throughout the day, reducing congestion and facilitating a smoother patient flow.
- Patients are scheduled the day prior to their designated consultation room with the assigned doctor.

2. Timekeeping:

- The QWIC system tracks consultation durations with predefined timeframes. A visible digital timer ensures adherence to schedules and optimizes clinic flow.
- Consultation Time for New Cases

o Bariatric and Upper GI Cases: Each new patient consultation is allocated 60 minutes to ensure through assessment and discussion.

- General Surgery Cases: New consultations are allotted 30 minutes to address patient needs effectively.
- Consultation Time for Follow-Up Cases
- Bariatric and Upper GI Cases: Follow-up consultations are scheduled for 30 minutes, allowing adequate review of patient progress and ongoing management.
- General Surgery Cases: Follow-up visits are set for 15 minutes, focusing on essential updates and care continuity.

3. Time from Registration to Vitals Examination
- The waiting period between registration and the vitals examination is waived, allowing patients to move promptly into the next stage of their visit without unnecessary delays.

4. Queue Time
- The queue time officially begins only after the vitals examination, ensuring that patients are acknowledged and ready for their consultations, thereby minimising idle waiting periods.

5. Doctor Queueing:
- Doctors are placed in a queue rather than nurses, enabling them to manage their caseloads effectively. Patients are registered and placed in a virtual queue, with doctors moving between consultation rooms to see patients in order.

6. Patient Ownership:
- Each patient is assigned to a specific doctor, ensuring continuity of care.
- The assigned doctor is responsible for the patient's treatment plan and follow-ups, allowing for better awareness and management of case backlogs.

Step 2: Enhanced Capacity and Flexibility

The administration has taken steps to increase consultation room availability, significantly improving the efficiency of the staggered appointment system:

1. Increased Consultation Rooms:
- Additional rooms allow for more patients to be seen simultaneously, enhancing flexibility and reducing bottlenecks.

2. Reallocation of Shared Rooms:
- Moving shared rooms to another building ensures dedicated space for the primary discipline, reducing scheduling conflicts and creating a focused environment.

Step 3: Staffing Enhancements

To support the success of the QWIC system, the clinic has increased nursing and medical staff at the surgical clinics:

1. Dedicated Nursing Staff:
- Nurses focus on specific tasks, reducing errors and bottlenecks while improving patient care.

2. Additional Medical Doctors:
- The supply of doctors is proportionate with the scheduled patients and allocated consultation rooms

Data Analysis

This research used Statistical Package for Social Sciences (SPSS) version 25 for data management and analysis. The continuous data analysis was represented as mean and standard deviation (SD) for a normal distribution. The association between the independent and dependent variables was determined using the Chi-square test. Concurrently, performed multiple logistic regression to verify the significant risk factors associated with prolonged waiting times.

Ethics approval

This study was registered and approved by the National Medical Research Registry (NMRR ID-22-00005-6GC(IIR) and the Medical Research and Ethic Committee (MREC), respectively. This research was conducted with highest ethical principles as outlined in the Declaration on Helsinki and Malaysian Good Clinical Practice Guideline.

RESULTS

A total of 1134 patients attended surgical clinics at the NCI during the six months of study period. Meanwhile, 287 (25.3%) patients visited Bariatric clinic, 358 (31.6%) patients visited GS clinic and 466 (41.1%) patients visited UGI clinic.

Across the surgical clinics at the NCI, the bariatric clinic received highest percentages of new surgical cases (26.4%) while the GS clinic reports the lowest (17.0%) (Table I). Most cases across all clinics are follow-ups, with the GS clinic having the largest share (83.0%) and the Bariatric clinic reveals the lowest percentages of punctual attendees (28.8%), while the GS clinic ranks highest at 41.0%. A substantial majority of patients at all clinics arrived after their schedules appointment time, with the Bariatric clinic exhibiting the highest rate (71.2%).

The average waiting time at surgical clinics was 24.9 minutes. The Bariatric clinic has a mean waiting time of 36.1 minutes (SD = 35.19), whereas the GS clinic exhibits the shortest mean waiting time of 14.7 minutes (SD = 11.12). The UGI clinic has an average waiting time of 23.9 minutes (SD = 21.35). Majority of patients in all clinics attended to within 60 minutes, with GS (98.9%) and UGI (96.3%) demonstrating exceptionally high rates. The Bariatric clinic exhibits a lower rate of 83.4%. Bariatric patients exhibit the highest proportion, at 16.6%, of those waiting over 60 minutes.

The average consultation duration for the Bariatric clinic is 44.4 minutes (SD = 40.58), which is significantly longer than the GS clinic's average of 26.1 minutes (SD = 24.29) and the UGI clinic's average of 28.9 minutes (SD = 23.54). This indicates that the Bariatric clinic manages more complicate or extensive assessments. The GS clinic exhibits the highest proportion of consultations, with 39.9% lasting under 15 minutes. Both GS and UGI exhibit comparable distributions for consultations lasting 16-30 minutes. The Bariatric clinic shows the highest proportion of consultations lasting 31-60 minutes (32.8%) , whereas 22.3% of its patients have consultations exceeding 60 minutes, in contrast to merely 7.3% in the GS clinic.

Majority of patients (93.7%) attended surgical clinics waited 60 minutes of less for their appointments, while only 6.3% experienced waits exceeding this duration. This difference is statistically significant ($p < 0.001$), highlighting the general efficiency of the surgical clinics. Looking at the breakdown of the clinic, the Bariatric clinic shows that 83.4% of patients waited 60 minutes or less, with 16.6% exceeding this time.

This suggests a higher percentage of longer waits compared to the overall average. In contrast, the GS clinic demonstrates impressive efficiency, with 98.9% of patients waiting 60 minutes or less and only 1.1% waiting longer. The UGI clinic also performs well, as 96.2% of its patients are seen within 60 minutes, with 3.8% waiting longer (Table I).

The waiting times by surgical case status indicates that 87.1% of new cases waited 60 minutes or less, whereas 12.9% experienced longer wait times ($p < 0.001$), suggesting that new cases generally endure longer waiting times than follow-up cases (Table II). In fact, a higher percentage of follow-up patients (95.6%) waited 60 minutes or less, with only 4.4% exceeding that duration. Regarding attendance status, patients who arrived punctually experienced a waiting time of 60 minutes or less in 94.3% of cases, while only 5.7% waited longer, but the p-value indicates that the difference is not statistically significance ($p = 0.535$). Meanwhile, patients who arrived after their scheduled appointment, 93.4% experienced a wait time of 60 minutes or less, while 6.6% waited longer. This suggests that arriving late does not have substantial impact on waiting times in a statistically significant manner.

Patients with consultations under 15 minutes encountered the shortest waiting time, with 96.9% waiting 60 minutes or less and merely 3.1% surpassing this duration ($p=0.002$). In the 16-30 minutes consultation group, 94.0% of individuals waited 60 minutes or less, while 6.0% experienced longer waiting times. For patients whose consultations lasted 31-60 minutes, 92.9% experienced waiting time of 60 minutes or less, whereas 7.1% waited longer. Significantly, patients with consultations exceeding 60 minutes experienced 87.6% waiting 60 minutes or less, while 12.4% waited longer. This. Signifies a correlation between prolonged consultation durations and increased waiting times.

Table III identified factors associated with waiting time experienced by patients who visited surgical clinics at NCI. The bariatric clinic has a strong association with >60 minutes waiting time (COR: 18.72, 95% CI: 6.51-51.28, $p < 0.001$; AOR: 15.33, 95% CI: 5.32-44.13, $p <0.001$). In contrast to the GS clinic, bariatric clinic patients were significantly more likely to experience the longer waiting time. A moderate association observed between the UGI clinic and waiting time (COR: 3.67, 95%CI: 1.23:10.94, $p = 0.020$; AOR: 3.34, 95% CI: 1.12-10.02, $p = 0.031$).

Furthermore, surgery outcomes are strongly correlated with new cases compared follow-up cases (COR: 3.19, 95% CI: 1.96-5.22, $p < 0.001$ and AOR: 2.56, 95% CI: 1.42-4.52, $p = 0.001$). Nevertheless, no correlation was found between attendance on-time or past time the appointment time. Meanwhile, consultation duration yields mixed results. An initial correlation exists (COR:4.4, 95% CI: 1.98-9.76, $p < 0.001$) for consultations more than 60 minutes; however, upon adjusting for additional variables, the correlation was no longer significant (AOR=1.55, 95% CI: 0.71-3.39, $p = 0.264$). Consulting sessions of 31-60 minutes initially demonstrate a significant association (COR: 2.36, 95%CI: 1.12-4.94, $p = 0.023$) but lose significance in the adjusted model (AOR: 1.25, 95%CI: 0.56-2.77, $p = 0.573$). Following adjustment, 16-30 minutes consultations were not statistically significant (AOR: 1.48, 95%CI: 0.60-3.64, $p = 0.384$).

DISCUSSION

Overall, the data suggests that waiting times are generally efficient across the surgical clinics at NCI, particularly in the GS clinic. As more than 90% of patients experience wait times was less than 60 minutes, demonstrating the adherence to the Ministry of Health Malaysia's benchmark. However, notable variations do exist across different clinic types and patient categories which still meet the desired waiting time. New cases tend to experience longer waits compared to follow-up cases, and consultation duration significantly influences waiting times (8). Attendance status appears not to have a significant effect on waiting time outcomes, indicating that other factors may contribute to the overall efficiency of the clinics.

The bariatric clinic exhibits elevated rates of new cases, extended consultation and waiting durations, and a considerable proportion of patients arriving after their scheduled appointments. The GS clinic shows the shortest waiting and consultation durations, yet it also possesses the highest proportion of extremely short consultations (under 15 minutes). Between the two, the UGI clinic stands out due to its significant predominance of follow-up cases. The findings indicate possible disparities in patient complexity, operational efficiency, and differing practices or patient demographics across the three clinics under surgical department, National Institute of Cancer. These findings align with a recent study who identified similar challenges in specialised surgical cases, which could be the complexity of cases and execution of a management plan.[15] Previous study also has highlighted similar pattern prominence, which is the additional detailed patient educations that mostly require multidisciplinary care components pose unique challenges in managing bariatric patients.[16]

By implementing structured time allocations and streamlining processes, the QWIC system has shown significant efficiency in managing patients at surgical outpatient clinics at the NCI. Nevertheless, the surgical department must determine the department's service priority to forecast the number of patients coming to the surgical clinic so that the QWIC system is sustainable. According to the study, the percentage of new cases in the Bariatric clinic was higher than in the GS clinic and UGI clinic. This aligns with findings from recent studies[17-18] that highlight the increasing demand for bariatric procedures due to rising obesity rates. Nevertheless, the majority of patients in the bariatric clinic experience wait times of less than 60 minutes. However, the proportion exceeding this threshold (16.6%) is concerning, as multivariate analysis reveals that patients at the bariatric clinic are 15 times more likely to experience prolonged waiting time. Another research emphasises that extended wait times can negatively affect patient satisfaction and compliance.[19] Another finding in the Bariatric clinic was that a substantial proportion of consultations in the Bariatric clinic extend beyond 60 minutes (22.3%), which was consistent with the findings from previous researches20-21,

Table I: Patient characteristics across different type of clinics (N=1134)

Variables	Patient, n (%)		
	Bariatric clinic (n=287)	GS clinic (n=358)	UGI clinic (n=466)
Status of surgical case			
New case	78 (26.4)	63 (17.0)	10.8 (23.1)
Follow-up	217 (73.6)	308 (83.0)	360 (76.9)
Attendance status			
On-time	85 (28.8)	152 (41.0)	185 (39.5)
Past-time	210 (71.2)	219 (59.0)	283 (60.5)
Waiting time (mins)			
Mean (standard deviation)	36.1 (35.19)	14.7 (11.12)	23.9 (21.35)
<60 minutes	246 (83.4)	367 (98.9)	450 (96.2)
>60 minutes	49 (16.6)	4 (1.1)	18 (3.8)
Consultation time (mins)			
Mean (standard deviation)	44.4 (40.58)	26.1 (24.29)	28.9 (23.54)
<15	54 (18.4)	143 (39.9)	156 (33.5)
16-30	75 (26.1)	107 (29.9)	135 (29.0)
31-60	94 (32.8)	82 (22.9)	136 (29.2)
>60	64 (22.3)	26 (7.3)	39 (8.4)

Table II: Distribution of waiting times in surgical clinics by patient characteristics (N=1134)

Variables	Waiting time, n (%)		p valuea
	<=60mins	>60mins	
Overall Surgical clinics	1063 (93.7)	71 (6.3)	
Surgical clinics			
Bariatric clinic	246 (83.4)	49 (16.6)	<0.001
GS clinic	367 (98.9)	4 (1.1)	
UGI clinic	450 (96.2)	18 (3.8)	
Status of surgical case			
New case	217 (87.1)	32(12.9)	<0.001
Follow-up	846 (95.6)	39 (4.4)	
Attendance status			
On-time	398 (94.3)	24 (5.7)	0.613
Past appointment time	665 (93.4)	47 (6.6)	
Consultation duration			
<15mins	342 (96.9)	11 (3.1)	0.002
16-30 mins	298 (94.0)	19 (6.0)	
31-60 mins	290 (92.9)	22 (7.1)	
>60mins	113 (87.6)	16 (12.4)	

[a] Chi-square test

Table III: Logistic Regressions of factors associated with waiting time among patients visiting surgical clinics at National Cancer Institute

Variables	Simple logistic regression			Multiple logistic regression		
	COR	95% CI	p	AOR	95% CI	p
Types of clinics						
GS clinic			Ref			Ref
Bariatric clinic	18.72	6.51-51.28	<0.001	15.33	5.32-44.13	<0.001
UGI clinic	3.67	1.23-10.94	0.020	3.34	1.11-10.02	0.031
Status of surgical case						
Follow-up			Ref			Ref
New case	3.19	1.96-5.22	<0.001	2.56	1.45-4.52	0.001
Attendance status						
On-time			Ref			Ref
Past appointment time	1.17	0.70-1.94	0.536	0.88	0.51-1.52	0.656
Consultation duration						
<15mins			Ref			Ref
>60mins	4.40	1.98-9.76	<0.001	1.55	0.71-3.39	0.264
31-60 mins	2.36	1.12-4.94	0.023	1.25	0.56-2.77	0.573
16-30 mins	1.98	0.93-4.23	0.077	1.48	0.60-3.64	0.384

COR= Crude odd ratio, AOR= Adjusted crude ratio, CI = Confidence interval, Ref = reference

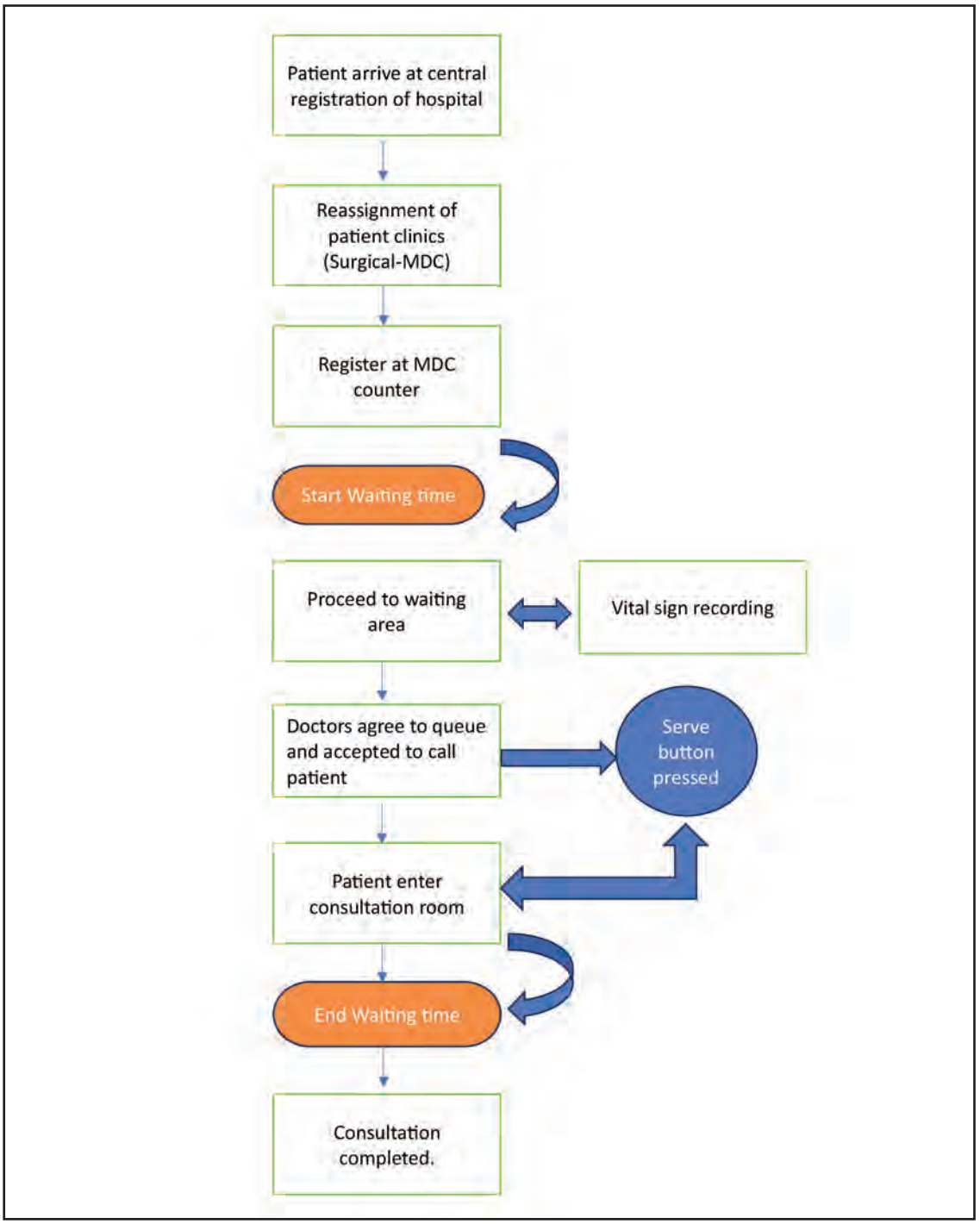

Fig. 1: Patient's Flow Chart of QWIC System at National Cancer Institute

who reported that comprehensive pre-operative evaluations in Bariatric surgery necessitate extended consultations.

In addition to the discipline, the type of cases (new or follow-up cases) represents a significant factor influencing patient waiting times within healthcare settings. Effectively managing these cases in a structured manner has the potential to enhance and reduce overall waiting times. The present analysis indicates that new cases consistently exhibit prolonged waiting times when compared to follow-up appointments, with this difference reaching statistical significance. This finding was consistent with another study who emphasised that the extended duration required for the initial assessment of new patients is a primary contributor to prolonged waiting times.[22] Such assessments typically involve detailed reviews of medical history, comprehensive physical examinations, and the development of treatment plans, all of which contribute to the extended wait. Furthermore, other studies also observed that the initial consultation phase places additional demands on time, as it requires a thorough evaluation of the patient's condition.[8] These findings collectively suggest that optimising the initial assessment

process by assigning senior surgical doctor for improving patient flow and reducing waiting times. the analysis revealed that attendance status-whether patients adhered to their scheduled appointment times or arrived beyond the designated time-did not exhibit a statistically significant impact on extended waiting times. This finding challenge traditional assumptions that punctuality and adherence to scheduled appointment times directly influence clinic flow. Previous research suggests that appointment adherence is commonly believed to affect clinic operations and management strategies, as delays can often lead to cascading disruptions throughout the daily schedule.[23] For instance, a further analysis of patient attendance at a bariatric clinic in this study revealed that over 65% of patients arrived beyond their scheduled appointment time. This behaviour resulted in significant disruptions to the clinic's ability to maintain an orderly flow of appointments, ultimately affecting overall clinic efficiency and patient wait times. While clinical settings often emphasise punctuality, these results suggest that other systematic factors may exert a more significant influence on waiting times and clinic management. The findings from this study highlight significant disparities in patient characteristics and clinic performance metrics across the three types of surgical clinics. The implications of these findings suggest a need for Bariatric clinic to evaluate their operational efficiencies and patient flow processes. Building a streamlined process for complex consultation is a requisite step. Additionally, implementing differentiated time allocation for new versus follow-up cases would be an important improvement to consider.

CONCLUSION

The QWIC System represents a significant advancement in managing patient appointments and consultations within surgical clinics. By implementing structured time allocations and streamlining processes enhanced patient satisfaction and clinical efficiency. Addressing the differences through targeted interventions and resource allocation could lead to improved patient experience and more efficient operations across all surgical expertise. Future research should explore patient truth satisfaction who attend surgical clinics to get dual feedback on improving the queue system at the clinic. Thus, this approach could be implemented in other surgical clinics at tertiary hospitals, which received an almost similar burden of patient flow.

CONFLICT OF INTEREST

All authors have no conflict of interest to declare and no competing interests on this study.

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