MINISTRY OF HEALTH MALAYSIA

SUPPLEMENTARY JOURNAL

JOURNAL OF HEALTH MANAGEMENT

INTERNATIONAL LEAN HEALTHCARE CONFERENCE 2023

15 - 16 August 2023

IN COLLABORATION WITH

MEDICAL DEVELOPMENT DIVISION
MINISTRY OF HEALTH MALAYSIA

UniKL
UNIVERSITI KUALA LUMPUR

UNIVERSITI
KUALA LUMPUR

ihm

INSTITUTE FOR HEALTH MANAGEMENT
MINISTRY OF HEALTH MALAYSIA

INTERNATIONAL LEAN HEALTHCARE CONFERENCE 2023

15 - 16 August 2023

The Everly Putrajaya, Malaysia

ACKNOWLEDGEMENT

MOH/IPK117.24(JL)-e

eISSN 2948-5126

9 772948 512006

EDITORIAL BOARD

ORGANISING COMMITTEE

Advisor	Dato' Dr. Mohd Azman Yacob
	Dr. Noraziani Khamis
Organising Chairman	Dr. Nor Hayati Ibrahim
Deputy Chairman	Dr. Mohd Ridzwan Shahari
Floor Manager	Dr. Maizatul Izyami Kayat
Scientific Lead	Dr. Intan Syafinaz Saimy
	Ts. Dr Mohd Amran Mohd Daril
Technical Lead	Dr. Zuriyati Zakaria
Abstract Publication	Dr. Nur Jihan Noris
Oral and Poster Competition	Dr. Nur Jihan Noris
	Dr. Natasya Nur Mohd Nasir
	Ms Nur Nadia Renu Abdullah
	Mr Faris Hakim Mazlan

ABSTRACT REVIEWER

Dr. Intan Syafinaz Saimy

Dr. Mohd Firdaus Mohd Radi

Dr. Muniamal Krisnan

Dr. Natasya Nur Mohd Nasir

Dr. Nur Jihan Noris

Dr. Zalina Libasin

Ms Ku Anis Shazura Indera Putera

Ms Lum Kah Yee

JUDGES

Dr. Marzilawati Abd Rahman
Chief Judge
Ministry of Health Malaysia

<table>
<tr><td align="center"><u>Ministry of Health Malaysia</u></td><td align="center"><u>Universiti Kuala Lumpur (UniKL)</u></td></tr>
<tr><td align="center">Dr. Hajah Rosaida Haji Mohd Said</td><td align="center">Associate Professor Ts. Dr Ishamuddin Mustapha</td></tr>
<tr><td align="center">Dr. Siti Suhaila Hamzah</td><td align="center">Ir. Ts. Dr Mohammad Ikbar Abdul Wahab</td></tr>
<tr><td align="center">Dr. Nor Azlin Zainal Abidin</td><td align="center">Ts. Dr Mazlan Awang</td></tr>
<tr><td align="center">Dr. Suriana Suaibun</td><td align="center">Ts. Dr Mohd Amran Mohd Daril</td></tr>
<tr><td align="center">Dr. Wan Noor Azlin Wan Idris</td><td align="center">Ts. Dr Fairul Anwar Abu Bakar</td></tr>
<tr><td align="center">Dr. Intan Syafinaz Saimy</td><td align="center">Ts. Mohd Zul Waqar Mohd Tohid</td></tr>
<tr><td align="center">Dr. Zalina Libasin</td><td align="center">Ts. Mohd Haziq Zakaria</td></tr>
<tr><td align="center">Dr. Nur Ainina Idris</td><td align="center">Mr Rahmat Roslan Buang</td></tr>
<tr><td align="center">Ms Lum Kah Yee</td><td></td></tr>
</table>

Contents of the Conference

PLENARY 1
The Overview of Lean Healthcare: Ten-Year Journey
Dato' Dr. Mohd Azman Yacob
Director of Medical Development Division, Ministry of Health Malaysia

PLENARY 2
The Lean Enterprise: Tools for Developing Leadership in a Lean Culture
Professor Dr. A. Heri Iswanto
Deputy Dean, Faculty of Health Science, University of Pembangunan Nasional "VETERAN" Jakarta, Indonesia

PLENARY 3
Organisational Change Through Lean Methodologies
Professor Ir. Dr Sha'ri M. Yusof
Meiji University, Graduate School of Business Administration, Japan

PLENARY 4
Spearheading Change Towards a Lean Healthcare Organisation
Mark Graban
Consultant and Author of the book "Lean Hospitals: Improving Quality, Patient Safety, and Employee Engagement"

FORUM 1
Charting Next-Generation Lean Thinking
Moderator: Ts. Dr Mazlan Awang, *UniKL MITEC*
Panelists: Professor Dato' Dr Khairanum Subari, *UniKL*
                   Professor Dr Mohd Nizam Ab Rahman, *Universiti Kebangsaan Malaysia*
                   Dr. Ahmad Tajuddin Mohamad Nor, *Hospital Tengku Ampuan Rahimah, Klang*
                   Dr. Mohd Nasir Abdul Kadir, *Hospital Tanah Merah*

SYMPOSIUM 1: Sharing Session 1
"Engaging Everyone Towards Process Improvement"
1. Proof of Concept: Lean in Field Hospital During COVID-19 Pandemic
     Dr. Marzilawati Abdul Rahman, *Hospital Kuala Lumpur*

2. Primary Care is Part of Patients' Journey: Lean from Health Clinic Perspective
     Dr. Anees Abdul Hamid, *Kelantan State Health Department*

SYMPOSIUM 2: Parallel Session
Oral and Poster Presentation
1. Room 1 Oral: Lean Projects
2. Room 2 Oral: Scientific Papers
3. Foyer: Poster Judging Session

SYMPOSIUM 3: Sharing Session 2

"Engaging Everyone Towards Process Improvement"

1. Lean Implementation: Pharmacy Division Experience

   Ms Saidatul Sheeda Ahmad Shukri, *Pharmaceutical Services Division*

2. Ministry of Health Lean Centre of Excellence: The Journey

   Dr. Noraziani Khamis, *Institute for Health Management*

3. Lean Middle Manager: Implementation and Inculcation

   Dr. Nor Azimah Azhari, *Hospital Tengku Ampuan Rahimah, Klang*

4. Role of Nurses and Paramedics in Lean Healthcare

   Ms Nur Nadia Renu Abdullah, *Institute for Health Management*

LUNCH SYMPOSIUM

1. Smart Hospital with Connected Healthcare by Mr Johnny Ong, *Vertical Strategy Leader – Healthcare, APAC*

2. PBUMED Contributions Towards Lean Healthcare Malaysia by Mr Ahmad Kamal, Mr Francis Chen, Mr Ahmad Firdaus and Mr Muhammad Nasir - *PBUMED*

POSTER PRESENTATION

EMERGENCY DEPARTMENT PATIENT TRAFFIC DISPLAY SYSTEM

Yoga Ratnam, K.K.*, Wan, K.S., Seah, P.K.T., Mohd Yusoff, M.F.

Institute for Public Health (IPH), National Institutes of Health (NIH), Ministry of Health Malaysia.

*Corresponding author: Kishwen Kanna Yoga Ratnam, Institute for Public Health, National Institutes of Health, Ministry of Health Malaysia, No. 1, Jalan Setia Murni U13/52, Seksyen U13, Bandar Setia Alam, 41070 Shah Alam, Selangor, MALAYSIA. Email: kishwen87@gmail.com.

ABSTRACT

Problem Statement

To date, numerous recommendations have been adapted; however, Emergency Department (ED) congestion remains a global phenomenon. In Malaysia, it has been reported that the emergency departments are overcrowded and understaffed. Medical errors, misdiagnosis, and poor clinical outcomes are some of the many consequences as a result of overcrowding.

Solution

To provide a situational analysis of the ED to prospective patients remotely and also to health care providers on duty. Armed with such data, patients can decide if they want to seek medical attention at the nearest facility or postpone their visit if it is a non-urgent matter. This technology is intended to increase patient service, satisfaction, and safety. Specifically, this innovative display system will provide live data on patient load, queue number flow, and average waiting times in non-critical zones and admissions.

Methodology

The proposed innovation to improve the quality of care and mitigate the ramifications of systematic overcrowding is the creation of a digital dashboard available to the public that displays estimated waiting time. Relevant real-time data will be captured from the Hospital Information System (HIS) through integrated interfaces, presented as a digital dashboard on Light Emitting Diode screens throughout the hospital, and relayed to a smartphone application/mobile-friendly website accessible to the public anytime, anywhere. Data from subscribing ED facilities will be broadcasted onto a common open-access web/mobile app portal, allowing prospective patients to make informed decisions about where to seek care based on wait-times and availability. Real-time updates on queue position and forecasted call time will help manage patients' expectations and improve their waiting time experience.

Value Stream Mapping (VSM)

The proposed innovation of a digital dashboard displaying real-time data from HIS will significantly impact the processes identified in the VSM. Firstly, the processing time could be reduced as patients can make informed decisions about when and where to seek care, potentially reducing the number of non-urgent cases in ED at peak times. This could lead to more efficient triage and treatment processes, as healthcare providers will have more time and resources for each patient. The inventory, or number of patients waiting in ED, could also be better managed with the proposed innovation. By providing real-time patient load and waiting times data, the system can help distribute patient visits evenly throughout the day, preventing sudden surges that lead to overcrowding.

The First Time Quality could potentially be improved as well. With less pressure from overcrowding, healthcare providers will have more time to accurately diagnose and effectively treat each patient on their first visit, reducing the need for repeat visits. Finally, the waiting time, a significant non-value-added activity, could be significantly reduced with the proposed innovation. By providing real-time updates on queue position and forecasted call time, the system can help manage patients' expectations and reduce the perceived waiting time.

Anticipated Results

By analysing trends pertaining to patient visits, administrators will be able to strategically plan for effective use of resources and take pre-emptive measures to ensure a smooth operational flow. Once the system's potential has been validated, it can be extended to even the outpatient departments as well.

TO ACHIEVE TARGET >95% PRESCRIPTION TO BE DISPENSED IN 30 MINUTES

Ghozali, N.S.*, Narzari, H., Abu Talib, R., Zulkifle, N.

Specialist Clinic Pharmacy, Hospital Sultanah Bahiyah, Ministry of Health Malaysia.

*Corresponding author: Nor Sharliza Ghozali, Specialist Clinic Pharmacy, Hospital Sultanah Bahiyah, KM 6, 05460 Alor Setar, Kedah, MALAYSIA. Email: norsharliza@gmail.com.

ABSTRACT

Background and Problem Statement
The Hospital Performance Indicator Achievement (HPIA) goal is for more than 95% of all prescriptions received to be dispensed in the outpatient pharmacy within 30 minutes. Our performance was 91.4%, 93.1% and 92.6% (2020 – 2022). Many improvement measures have been implemented but failed to improve the situation.

Value Stream Mapping (VSM)
VSM is used to identify waste in the medication supply process, from receiving prescriptions to dispensing medication to patients. Thirteen processes were involved, and problematic prescription processes were the biggest contributors to not meeting the HPIA goal. The total process time was 20 minutes; the total waiting time was 32 minutes; the average first-time quality was 99%, and three manpower were involved. On average, it took 52 minutes (lead time) or more for a patient to receive their medication. Following *kaizen* implementations, HPIA performance achieved 92.4%. Workflows were also simplified. However, the performance slightly decreased due to unavoidable external factors. The future state of VSM will reduce waste in the dispensing process and lead to better HPIA performance.

Kaizen Burst and Root Cause Analysis (RCA)
The main causes were i) human error – prescribing errors; ii) system - no database available for the pharmacist to refer to in screening prescriptions; and iii) method - additional workload for extemporaneous prescriptions. *Kaizen* measures were implemented based on the RCA identified.

Countermeasures and Action Plan
Thirteen *kaizens* have been developed and implemented. The most important *kaizens* that had a major impact on HPIA achievement are i) the provision of an educational video for prescribers and the creation of intervention notes; ii) the creation of a database and quick reference for pharmacists; and iii) the development of a Microsoft Excel worksheet with automatic formulary calculation.

Sustainability
Currently, all *kaizens* are established as Standard Operation Procedure to ensure that all specialist clinic pharmacy staff adhere to the new process and to ensure the sustainability of the *kaizens* implemented.

REDUCED BED WAITING FOR ADMISSION AT EMERGENCY AND TRAUMA DEPARTMENT HOSPITAL SULTANAH NORA ISMAIL AFTER DECISION MADE

Daud, K.*, Abdullah, C.R., Baker, N.A., Saturi, N. S., Yeo, Y.L., Ariffin, K., Zaba'a, A., Othman, H.

Emergency and Trauma Department, Hospital Sultanah Nora Ismail, Ministry of Health Malaysia.

*Corresponding author: Dr. Khursiah Daud, Jabatan Kecemasan dan Trauma, Hospital Sultanah Nora Ismail, 43, Jalan Bahagia 1, 83000 Batu Pahat, Johor, MALAYSIA. Email: drkhursiah@moh.gov.my.

ABSTRACT

Background
Prolonged bed waiting time is a significant contributor to Emergency and Trauma Department (ETD) congestion and increased morbidity/mortality. Lean initiative approach is necessary, in line with the State Director's Key Performance Indicator of Hospital Throughput Bed Waiting Time of more than 80% for admission less than 240 minutes.

Value Stream Mapping (VSM) and Analysis
Value analysis showed a reduction of seven processes to five processes. Through the VSM study carried out, the total lead time before the initiative was uncertain due to insufficient time data in each process. After the initiative, more than 80% admission had waiting time for admission of less than four hours.

Kaizen Burst and Root Cause Analysis (RCA)
A territorial/silo mentality among departments was identified. Certain departments contribute to the highest pending cases that need to be lodged at another department. Communication platforms via Telegram amongst assistant medical officer (AMO) U32, matron, sister, Chief Matron, and head of the department (HOD) were available without time restrictions. The nursing team was given empowerment for bed management. AMO U32's hourly round was enhanced and was able to identify pending cases. Engagements were made between AMO U32, Matron, and sister for bed availability. Chief Matron and HOD were involved in these if necessary. Usage of the right talent at the right time and place was done. Before the initiative (2020), the lead time was uncertain, and the monthly data showed an average waiting time for 14 patients of six to eight hours. However, after the initiative (2021), number reduced to six patients whose waiting time exceeded four hours. Subsequently, in 2022, two to three patients exceeded waiting time of four hours.

Sustainability
The strategy to sustain includes display of the *kaizen* board at ETD as well as to update ETD and Hospital Admission Policy. Also, to continue collecting pending case data. In addition, discussion with HOD and hospital director will be made when necessary.

IMPROVING THE WORKFLOW OF SPECIAL APPROVAL MEDICINE APPLICATION IN HOSPITAL KUALA LUMPUR

Ker, R.T.*, Wong, J.H.Y., Omar, F.Z.

Pharmacy Resource and Coordination Centre (KSF), Hospital Kuala Lumpur, Ministry of Health Malaysia.

*Corresponding author: Ker Ro Toh, Koordinasi dan Sumber Farmasi, Jabatan Farmasi, Hospital Kuala Lumpur, 24, Jalan Masjid Hospital, 50586 Kuala Lumpur, MALAYSIA. Email: kerrotoh@moh.gov.my.

ABSTRACT

Background and Problem Statement

Special Approval Medicine *Ubat Kelulusan Khas (UKK)* are medicines not registered with the Drug Control Authority (DCA) or listed in the Drug Formulary Ministry of Health Malaysia (FUKKM), requiring special approval from the Director General (DG) of the Ministry of Health (MOH). These medicines are usually the last treatment alternatives and are crucial for a patient's survival. Pharmacy Resource and Coordination Centre (KSF) HKL processed around 1,200 UKK applications yearly, representing approximately one-third of the nationwide total. The long processing time of 35 working days at the hospital level has resulted in delayed approval from the DG and affected the timely initiation of the patient's treatment.

Value Stream Mapping (VSM)

A VSM analysis of the process identified long processing times at i) satellite pharmacies to perform initial processing, ensure legibility and completeness of manual application forms; ii) KSF for evaluating applications for clinical rationale and identifying budget; iii) KSF for clarifying misinformation/incomplete justification with applicants; and iv) KSF for transcribing information from manual form to the Pharmacy Information System (PhIS), before forwarding online to MOH for evaluation and approval. Non-value-adding activities, such as time taken to physically dispatch application forms from various satellite pharmacies to KSF, were also identified.

Kaizen Burst and Action Plan

To address these challenges, three approaches utilising *kaizen* bursts were proposed. (1) All satellite pharmacies to create online applications in PhIS, facilitating the identification and resolution of discrepancies and any missing supporting documents at the satellite level. (2) Improve workflow clarity by standardising protocols and regular briefings. (3) Eliminate the need for physical dispatch, reducing workflow redundancy and conserving manpower. Data collected over a four-month period revealed a 30% reduction in average processing time, resulting in a total lead time reduction from 35 to 25 working days.

Sustainability

Encouraged by this success, further implementation of lean strategies is being considered, such as reducing waiting times in other stages and introducing digital UKK applications for prescribers.

OVERCROWDING IN OUTPATIENT ORTHOPAEDIC CLINIC: FACTORS, SOLUTIONS, AND RECOMMENDATIONS

Mohd Hadzir, M.N.*, Zulfakar, A.I., Fakhri Amir, N.

Orthopaedic Department, Hospital Pakar Sultanah Fatimah, Ministry of Health Malaysia.

Corresponding author: Mohd Naqib Mohd Hadzir, Jabatan Ortopedik, Hospital Pakar Sultanah Fatimah, Jalan Salleh, 84000 Muar, Johor, MALAYSIA. Email: naqibhadzir21@gmail.com.

ABSTRACT

Background
Overcrowding in public hospitals' outpatient clinics has been one of the common public health threats in Malaysia. This study aimed to determine the possible factors and implementations to overcome overcrowding in the orthopaedic clinic of Hospital Pakar Sultanah Fatimah, Muar, in 2022. The study endpoint was the achievement of the Key Performance Indicator (KPI) of more than 90% of patients with less than 75 minutes of waiting time from registration till completion of the pre-planned procedure.

Value Stream Mapping (VSM)
The study population was clinic staff and patients, sampled using the random sampling method. The VSM study showed 13 procedures involved. The processing time was 60 minutes, the waiting time was 60 minutes, making the lead time of 120 minutes. Value analysis showed four processes categorised as 'value added', while four processes were 'non-value added'. A total of nine processes were 'movement of patient' and 'waiting'.

Kaizen Burst and Root Cause Analysis (RCA)
Delays in the clinic process and long waiting times were the service delivery factors that contributed to the overcrowding of patients in the orthopaedic clinic. Based on these factors, a computerised time-block-based appointment system was implemented to reduce non-value-added activities. Staff were trained to prepare patients' documents earlier, prior to patients' arrival, while ensuring patients followed the one-way clinic flow to avoid clinic congestion. Our data showed that with these *kaizen* implementations, more than 90% of patients waiting time was less than 75 minutes from registration to consultation, hence achieving our KPI.

Sustainability
The issue of overcrowding in the outpatient clinic has improved with the implementation of a computerised time-block-based appointment system. Further, *kaizen* should focus on improving patients' education, limiting the number of patients per day based on the triage system and ensuring adequate manpower to improve our healthcare system.

OPTIMISATION OF PATIENT'S DISCHARGE JOURNEY USING LEAN HEALTHCARE PRINCIPLES

Wan Jamaluddin, W.S.*, Syed Ibrahim Ismail, N., Ayub, R., Samad, F., Mat Rifin, M.S., Abdul Kadir, M.N.

Ward 1 (Male Ward), Hospital Machang, Ministry of Health Malaysia.

*Corresponding author: Wan Syazana Wan Jamaluddin, Ward 1 (Male Ward), Hospital Machang, D18, Jalan Pasir Puteh, 18500 Labok, Kelantan, MALAYSIA. Email: anatehrani93@gmail.com.

ABSTRACT

Background and Problem Statement
The study was done in Hospital Machang, a 90-bed district hospital with an average of 200 admissions per month. Pre-*kaizen* issues were the delays in discharging patients that led to a backlog of patients in the Emergency Department. The lean implementation objective in this study is to achieve >95% of patients discharged in less than four hours in accordance with the State Lean Performance Indicator.

Value Stream Mapping (VSM)
Through VSM, eight processes were identified, which include vital sign checks, morning review, discharge paperwork, appointment setting, getting medication from the pharmacy, bill payment, relative fetching the patient from the ward, and bed availability. The total process time was 300 minutes, the waiting time was 60 minutes, and the lead time was 240 minutes. Through value analysis, the study showed six processes categorised as value-enabler, one non-value added and one value-added activity. The study showed that the main contributors of waste in the discharge process were process and motion, leading to excess waiting time.

Root Cause Analysis (RCA) and *Kaizen* Burst
Through the fishbone diagram, various inefficiencies, such as human factors, the system, facility, and equipment used, were identified. Nine *kaizen* bursts were driven to optimise these processes, resulting in shorter processes, and waiting times.

Countermeasures and Action Plan
The *kaizen* included rearranging the discharge process flow whereby potential patients to be discharged were identified and marked on a visual board as its paperwork and follow-up appointments were prepared one day earlier. Procedures and investigation forms were kept in one folder to facilitate discharge. On discharge day, these patients were prioritised during vital sign checks and morning rounds. In-house pharmacists were involved in counterchecking the prescriptions and inward dispensing with counselling. A discharge lounge is made available for the patients who wait for their family members to fetch them. Thus, making the bed available for the next patient. With these, we have reduced the processing time from 300 minutes to 220 minutes.

Sustainability
The implementation of lean healthcare and making the outcome as a performance indicator has the potential to revolutionise the discharge process in the male ward of the district hospital. By enhancing coordination among healthcare staff, we plan to expand this method to other wards. As the future progresses, we might also upscale our policy to less than two hours of discharge time.

REDUCED WARD STOCK PRESCRIPTION REJECTION AFTER WORKING HOURS AT IN-PATIENT PHARMACY, SULTANAH NORA ISMAIL HOSPITAL

Ruslan, R.*, Tahir, Z., Abdullah, F., Ng, W.L., Salleh, N.F., Kasbi, N., Kusai, N., Salih, K.

Pharmacy Department, Sultanah Nora Ismail Hospital, Ministry of Health Malaysia.

*Corresponding author: Rumaihah Ruslan, Jabatan Farmasi, Hospital Sultanah Nora Ismail, 43, Jalan Bahagia 1, 83000 Batu Pahat, Johor, MALAYSIA. Email: kirua1314@gmail.com.

ABSTRACT

Background and Problem Statement
Ward stock (WS) is a list of drugs that are usually prescribed after office hours. The list and quantity of the drug are made according to usage and can be amended with agreement from the pharmacy and ward. Hence, pharmacists should not receive any WS prescription after office hours. High WS prescription rejection after office hours increases the workload for pharmacists and staff nurses (SN). On average, eight WS prescriptions are sent to the pharmacy every day and 20% of them need to be supplied due to a shortage in the ward.

Value Stream Mapping (VSM)
Current VSM showed SN collect and sends all prescriptions to the pharmacy. Then, the pharmacist receives all prescriptions, segregates non-WS prescriptions, and rejects WS prescriptions. Next, the pharmacy screened, prepared, and supplied the non-WS drug. After that, SN collects the non-WS drug at the pharmacy. Returning from a pharmacy, SN takes the WS drug from the WS container in the ward. Finally, SN prepared and serve the drugs to the patient. In future state VSM, SN segregates the prescription, and only non-WS prescriptions will be sent to the pharmacy. SN take the WS drug from the WS container in the ward and serve it to the patient.

Kaizen Burst and Root Cause Analysis (RCA)
Findings show that the WS list has been neglected, there is no routine monitoring on WS and SN does not know the drug listed in WS. Furthermore, the ward keeps the WS list as a file and is not practically used.

Countermeasures and Action Plan
Kaizen Burst was done by relocating the WS list to the screening area. Sister amends the level of WS and education regarding the importance of WS given to sister and SN.

Sustainability
This process is sustained by meeting every two weeks to present the number of prescriptions rejected. In addition, continuous data collection and education are made.

IMPROVING THE WAITING TIME OF PATIENTS DURING THE INITIAL REGISTRATION PROCESS IN HOSPITAL AMPANG

Ramli, I., Bujang, J.*, Mohd Sahudi @Sahud, R., Ahmad @ Mohamad, M.

Quality Unit, Hospital Ampang, Ministry of Health Malaysia.

*Corresponding author: Jasmin Bujang, Unit Kualiti, Hospital Ampang, Jalan Mewah Utara, Taman Pandan Mewah, 68000 Ampang, Selangor, MALAYSIA. Email: jasminbujang@moh.gov.my.

ABSTRACT

Background and Problem Statement
Shorter waiting times positively affect outpatient satisfaction, a crucial healthcare quality indicator as recognised by the World Health Organization. Hospital Ampang faces challenges of long waiting times and congestion due to overcrowding and limited resources, particularly in the Revenue Unit (*Unit Hasil)*. To address this issue, a lean methodology approach was employed to analyse the registration process and implement countermeasures.

Value Stream Mapping (VSM)
The current VSM study indicated a processing time of 3.3 minutes, a waiting time of 92 minutes, and a lead time of 95.3 minutes, with waiting time being the major contributor to the overall process. The future state VSM aims to level inventory by educating patients to adhere to their assigned time slots, thereby resolving the bottleneck. Through the implementation of *kaizens*, a significant reduction in total waiting time to 29 minutes and lead time to 32.3 minutes is anticipated. Pre-lean data analysis included 4,095 samples, while post-lean data analysis comprised 4,052 samples. The successful reduction of wait time by 40% at *Unit Hasil* was seen.

Kaizen Burst and Root Cause Analysis (RCA)
Data was collected and analysed from the queue management system. A number of patients were cross-referenced with the timing that the patient came. Results show that most patients are non-compliant with appointment time slots, impacting the efficiency of *Unit Hasil*.

Countermeasures and Action Plan
Several countermeasures were implemented to improve efficiency. These included appointing a staff member to monitor patient adherence to staggered time slots, opening two counters at 7.15 a.m., and ensuring that all eight counters were operational by 7.30 a.m.

Sustainability
The project empowers patients through adherence to time slots given, thereby impacting them positively by reducing wait time and congestion. The implementation effectively utilises the existing resources, ensuring long-term sustainability. Future plans include incorporating the project into hospital policy, sharing findings with stakeholders, and promoting the adoption of sustainable practices in healthcare settings.

DIGITALISATION IN DISASTER – HOSPITAL ACTIVATION 1.0 (DɪGID)

Mohd Abdul Kader Jailani, M.F.*, Saad, M.Z., Mohd Razaly, I.S., Hin, K.G.

Emergency and Trauma Department, Hospital Bukit Mertajam, Ministry of Health Malaysia.

*Corresponding author: Mohd Fahmi Mohd Abdul Kader Jailani, Jabatan Kecemasan & Trauma, Hospital Bukit Mertajam, Jalan Kulim, 14000 Bukit Mertajam, Pulau Pinang, MALAYSIA. Email: mfahmikj@gmail.com.

ABSTRACT

Background
Disaster management is aimed at effectively responding to and mitigating the impact of disasters. Implementing a digital system in disaster management can address these issues by enabling optimal allocation of staff and ensuring they are assigned to appropriate tasks. By effectively tracking staff activity, the digital system enhances overall performance in disaster management.

Value Stream Mapping (VSM)
The pre-Digitalisation in Disaster - Hospital Activation 1.0 (DiGID) had 13 processes, a total process time of 220 minutes and a waiting time of 170 minutes, with a process efficiency of 56.4%. Non-value-added activities identified were motion, waiting, extra processing, overproduction, and non-utilised talent. Value-added activities included staff and patient registration, analysis of the dashboard, and the disaster report. The post-DiGID showed only six processes: a total process time of 43 minutes, a waiting time of 17 minutes, and a process efficiency of 71.7%.

Kaizen Burst and Root Cause Analysis (RCA)
Implementation of Hospital Activation in Digitalisation modules with automation improves coordination between the Operational Room, Control Room, and State Health Department through live data without relying on other modes of communication. The same dashboard is utilised for report submission and stored in secured Cloud storage. Only two DiGID managers are needed to control the dashboard. Ishikawa diagram was used to identify issues such as multiple tools, personnel used, poor communication, extra processing of forms, delay in data submission, and overproduction of papers.

Countermeasures and Action Plan
Patient and Staff Registration Dashboard was developed, linking data and analytics in a single sheet that can be visualised by multiple parties simultaneously. The dashboard ensures patient data confidentiality by utilising a dedicated MyGovUC2.0 account (a goverment Unified Communication and Collaborative Service), providing enhanced security, and immediate analysis.

Sustainability
This project has been integrated into the standard operating procedures and has been implemented across the hospitals in Seberang Perai. Plans are underway to present the project at the Penang State Health Department level for further expansion across all hospitals and health facilities on Penang Island. Additionally, this model can be easily replicated in other health facilities.

IMPROVING THE MANAGEMENT OF PATIENTS IN THE EMERGENCY DEPARTMENT

Amir Hussein, M.Z.A.*, Mohd Farhan, Mohd Lokman, Nur Azeema, Puteri Zalmah, Mohamad Amin, M.A., Mohamed @ Hashim, K.I.

Emergency and Trauma Department, Hospital Kuala Lumpur, Ministry of Health Malaysia.

*Corresponding author: Muhammad Zulfadhli Ariff Amir Hussein, Jabatan Kecemasan & Trauma, Hospital Kuala Lumpur, Jalan Pahang, 50586 Wilayah Persekutuan Kuala Lumpur, MALAYSIA. Email: mrzulfadhliarifff@gmail.com.

ABSTRACT

Background and Problem Statement
Emergency and Trauma Department of Hospital Kuala Lumpur is a national tertiary centre which receives an average of 400-500 patients visit each day. An increasing trend has been observed in recent years, which has resulted in congestion and access blocks in the department. Therefore, a bed waiting time of less than 240 minutes has become one of the key performance indicators for the Ministry of Health under lean healthcare since 2017.

Value Stream Mapping (VSM)
Every patient that comes to the emergency department will be assessed and sent to the respective zone according to severity. The patient registration process is manual, and the patient's demographic will be written again similarly in all forms, such as X-ray form, investigation form, and referral letter. Once decided for admission, the nurses need to book forward via telephone. More non-value-added points afterwards would be waiting for any available bed and searching for the patient's exact location in the emergency for transfer once a ward has been assigned to a patient.

Kaizen Burst and Root Cause Analysis (RCA)
An affinity diagram has been drawn, and the concluded system is the main issue. Thus, we bring in the Emergency Department Resources Intergrated Computer System (EDRICS) system. It is a digitalisation *kaizen* using the lowest cost possible. The system creates stickers for patient identification, captures accurate data collection for statistics, minimises demographic data entry errors, and improves effective communication between staff. However, the average bed waiting time in 2020 was 248 minutes, and it rose to 472 minutes in 2022. This unexpected result may probably be due to many factors, such as worsening ward congestion and delayed discharges. More discussion is required to reach for a better solution.

APPLICATION OF LEAN PRINCIPLE TO REDUCE CONGESTION IN FEVER CLINIC AT KLINIK KESIHATAN PUTRAJAYA PRESINT 11

Aljunid Merican, I.S.M.[1]*, Norfaizren, M.N.[1], Masturah, A.[1], Rahimah, H.[1],
Rose-Faiza, H.M.S.[1], Chong, F.Y.[1], Wan Azlin, W.I.[2]

[1]Fever Clinic, Klinik Kesihatan Putrajaya Presint 11, Ministry of Health Malaysia.
[2]Fever Clinic, Klinik Kesihatan Putrajaya Presint 9, Ministry of Health Malaysia.

*Corresponding author: Intan Safinaz Merican Aljunid Merican, Klinik Kesihatan Putrajaya Presint 11, Kuarters Penjawat Awam, Zon 6B, Jalan P11J, Presint 11, Putrajaya, 62300 Putrajaya, Wilayah Persekutua Putrajaya, MALAYSIA. Email: intansafinazmerican@gmail.com.

ABSTRACT

Background and Problem Statement
Klink Kesihatan Putrajaya Presint 11 (KKPjP11) is one of the health clinics in Putrajaya, operating at the lower ground of an apartment. One of the services provided is a fever clinic. We receive a high number of clients ranging from 1,303 to 2,293 per month, and during the peak time, there will be overcrowding in the registration area with other cases (non-fever cases) due to space limitations.

Aim
Thus, our aim is to reduce the congestion by improving the arrival to consultation time (ATC) by 10%, although we have fulfilled the Health Ministry's key performance indicators, which is 90% of clients seen by doctors within 90 minutes ATC.

Method
A time-motion study was conducted for pre- and post-lean implementation by using a data pro forma sheet where time was recorded at each station within a period of three weeks with the randomised sample.

Value Stream Mapping (VSM)
Through the VSM study carried out, the total process flow before improvement was nine processes that mainly involved screening and registration counter. The total waiting time and total processing time were 30 minutes and 17 minutes, respectively.

Kaizen Burst
From the value analysis, one value-added and eight value enablers were identified. A total of nine different wastes were found, which included waiting, transport, and motion.

Countermeasures
The *kaizens* were introduced to eliminate waste and improve the fever clinic flow by rearranging existing manpower from the screening counter to the registration counter, thus expediting the registration process and reducing congestion. Post-lean implementation, the lead time is 33 minutes, reduced by 29.8%.

Sustainability
The implementation of lean principles shows significant improvement in ATC at the highly congested clinic of KKPjP11. Sustainability of lean by continuous monitoring using waiting-time slips and regular evaluation by client experience survey form has been used to sustain good performance achieved.

REDUCING TIME FOR COMPOSITE RESTORATION TREATMENT AT KLINIK PERGIGIAN KETEREH

Wan Mohammad Din, W.M.N.*, Engku Hassan Ashari, E.H.M., Mat, S., Mohamed, A., Ahmad, R., Razak, A.

Klinik Pergigian Ketereh, Ministry of Health Malaysia.

Corresponding author: Wan Mohd Najme Wan Mohammad Din, Klinik Pergigian Pengkalan Chepa, Jalan Maktab, 16100 Pengkalan Chepa, Kelantan, MALAYSIA. Email: drnajme@moh.gov.my.

ABSTRACT

Background and Problem Statement

Klinik Pergigian (Dental Clinic) Ketereh has experienced an increase in the number of patients every year. There was a five per cent increase in the number of patients from 2017 to 2018. The situation was complicated by the implementation of an immediate treatment policy at government dental facilities. The procedure of composite restoration requires precision and takes longer than other treatments. This has contributed to long waiting times at the clinic and does not meet the Customer Charter standard of outpatients receiving the treatment within 30 minutes. Therefore, the main objective of this project is to reduce treatment time from patient arrival to completion.

Value Stream Mapping (VSM)

Through the conducted VSM study, each patient was required to go through the registration counter, waiting area, and treatment room. They also must undergo a total of 22 processes, which collectively took 42.4 minutes for each patient. The total waiting time for five patients was 188.3 minutes, while the lead time was 231.1 minutes. Value analysis had three processes categorised as "value-added", while two processes were "non-value added". Seventeen processes were considered "value enablers".

Root Cause Analysis (RCA) and *Kaizen* Burst

Using the fishbone diagram, the main causes that slowed down the treatment process were system factors, human resources, environmental conditions, and intricacies of treatment. System-related factors and treatment processes were inherent; the *kaizen* process only considers improvements in human resources and environmental conditions. The implemented *kaizen* initiatives aimed to minimise tasks at the counter, increase the number of counter personnel, strengthen the 5S strategy, ensure that the attending staff is always prepared for treatment, place composite restoration materials adjacent to the treatment chair, and rearrange the waiting area layout. These *kaizen* efforts have successfully reduced the treatment duration to 36 minutes.

Sustainability

The sustainability of lean practices will be regularly monitored through *Gemba*. Measures will be taken to improve the new registration system and will be shared with other clinics.

OPTIMISING PRE-TRANSFUSION BLOOD GROUPING AND ANTIBODY SCREENING AT THE TRANSFUSION MEDICINE DEPARTMENT, HOSPITAL RAJA PEREMPUAN ZAINAB II, USING THE LEAN INITIATIVE

Ab Aziz, N.*, Che Shamsudin, S., Mohd Yusoff, J., Abdul Wahab, R., Ramli, N.A., Ab Aziz, N., Zulkifly Apandi, S., Salman, M.A., Hussin, A.I.

Transfusion Medical Department, Hospital Raja Perempuan Zainab II, Ministry of Health Malaysia.

Corresponding author: Nurfarhana Ab Aziz, Jabatan Perubatan Transfusi, Hospital Raja Perempuan Zainab II, Jalan Hospital, 15200 Kota Bharu, Kelantan, MALAYSIA. Email: nurfarhanaabaziz@gmail.com.

ABSTRACT

Background and Problem Statement
Pre-transfusion testing involves two essential laboratory procedures: blood grouping and antibody screening (GSH) and crossmatching (GXM). Analysis of internal GSH data between 2017 and 2019 revealed a high GSH load (40,000 - 50,000 cases per year) but low conversion to GXM (60-70%), indicating the likelihood of unnecessary GSH requests. This resulted in wasted resources, increased workload, and higher pre-transfusion error risks. The project aims to reduce the workload and cost of GSH testing, targeting <30% of GSH requests that do not proceed to GXM (unconverted GSH) as its Key Performance Indicator (KPI).

Value Stream Mapping (VSM)
From current data, processing and waiting times in a testing batch of 12 samples involving 22 steps were 208 minutes and 31 minutes, respectively. VSM throughout sample reception until disposal further revealed nine value-added steps, 12 value enablers, and one waste. Wastage refers to GSH tests performed without prior vetting, but eventually not proceed for GXM and thus disposed of.

Root Cause Analysis (RCA) and *Kaizen* Burst
Using the fishbone diagram to elicit the causes of high unconverted GSH is multifactorial, such as guideline/ protocol misuse and lack of knowledge among clinicians. Poor communication skills and inadequate monitoring contribute to these issues. The project implemented multiple *kaizen* events; a low-effort, high-impact one was successfully introduced, namely GSH screening by a blood bank medical officer, besides continuous education. Moreover, automation testing using an IH-500 GSH analyser aimed to streamline processes and reduce errors was employed. Comparing pre-lean (Aug-Oct 2021) to post-lean (Aug-Oct 2022) data depicted reduced GSH workload, specimen rejection, and costs (MYR 42,182.10 savings) within just three months. Staff efficiency was enhanced, and the KPI was almost attained at 32.4% unconverted GSH.

Sustainability
To ensure project sustainability, we establish a lean corner, enhance *kaizen* during quality and inter-departmental meetings, and extend its implementation to other hospitals.

OPTIMISED WORKFORCE UTILISATION AND REDUCED CONGESTION BY ESTABLISHING A CENTRALISED PHLEBOTOMY UNIT IN HOSPITAL SULTANAH NORA ISMAIL

Musa, M.A.*, Ahmad, M., Ismail, M.M., Syed Mohd Yasni, S.M.H., Salleh, M.F.

Centralised Phlebotomy Unit, Hospital Sultanah Nora Ismail, Ministry of Health Malaysia.

*Corresponding author: Mohd Aidil Musa, Centralised Phlebotomy Unit, Hospital Sultanah Nora Ismail, 43, Jalan Bahagia 1, 83000 Batu Pahat, Johor, MALAYSIA. Email: tgcoc4@gmail.com.

ABSTRACT

Background and Problem Statement
Patient congestion, overcrowding, and overutilisation of manpower are major issues affecting outpatient services in specialist clinics at Hospital Sultanah Nora Ismail. Therefore, a phlebotomy unit was established to improve blood-taking procedures in order to solve the above-mentioned issues and, at the same time, ensure compliance with COVID-19 standard operating procedures.

Value Stream Mapping (VSM)
Current VSM, there are two categories of patients who visit specialist clinics, either for blood-taking procedures or to seek consultations. During registration, staff members verify patients' identities and the purpose of the visit. Assistant medical officers (AMO)/nurses/doctors call the patient, confirm the patient's identity, manually label the specimen bottles, and proceed with blood taking. Specimens are then dispatched to the laboratory by a healthcare assistant (HA).

Kaizen Burst
With the establishment of a centralised phlebotomy unit, patients from all specialities are instructed to take blood in a designated new setting. Patients' arrival time and registrations were handled mainly by one appointed HA using a laptop. Patients then queued up and moved forward according to seat vacancy for blood taking. The AMO and doctor verified the patient's identity, manually labelled specimen bottles, and proceeded with blood taking. HA dispatched specimens to the laboratory hourly.

Countermeasures and Action Plan
Empowerment of HA in the process of patient registrations is an effective approach. Before the phlebotomy unit was established, approximately 36 staff members were allocated daily to deliver the blood-taking services for six specialist clinics, but currently, only eight staff members are allocated per day to the centralised phlebotomy unit. This system analysed and identified the overutilisation of human resources and limited space in each specialist clinic. These improvements will reduce waiting times and crowding, enhance queuing efficiency, optimise space, and improve overall workflow and resource utilisation.

Sustainability
Healthcare managers periodically conduct patient satisfaction surveys, create Standard Operating Standards at the phlebotomy unit, and constantly communicate and discuss with the Hospital Chief AMO Supervisor regularly for sustainability.

REDUCING WAITING TIME IN NON-COMMUNICABLE DISEASE CLINIC FROM ARRIVAL TO CONSULTATION IN KLINIK KESIHATAN PUTRAJAYA PRESINT 14

Siti Nor Akmal, A.*, Wan Nor Azlin, W., Nor Mazida, W., Syed Mohd Yasni, S.M.H., Salleh, M.F.

Outpatient Department, *Klinik Kesihatan* Putrajaya Presint 14, Ministry of Health Malaysia.

Corresponding author: Siti Nor Akmal Abdullah, Jabatan Pesakit Luar, Klinik Kesihatan Putrajaya Presint 14, Kuarters Kakitangan Kerajaan, Jalan P14, Presint 14, 62000 Putrajaya, MALAYSIA. Email: drsitinorakmal@moh.gov.my.

ABSTRACT

Background
One of the services of Klinik Kesihatan Putrajaya Presint 14 is the non-communicable disease (NCD) clinic, where patients are followed up for their chronic illnesses. The average total number of patients received per year was 13,000 - 16,000, with daily attendance of around 70-96 patients. One-third of these patients were NCD patients. The Ministry of Health set the standard waiting time from arrival to consultation to be less than 90 minutes. Pre-lean, the longest waiting time from arrival to consultation (ATC) was 130 minutes. Our aim is to improve the ATC to less than 90 minutes. A time-motion study was conducted using a time sheet where time was recorded at each encounter point.

Value Stream Mapping (VSM)
VSM was plotted to determine the problems and areas needed for *kaizen* implementation. The VSM study showed eight procedures. The processing time was 18 minutes, the waiting time was 60 minutes, and the lead time was 78 minutes. Value analysis had three processes categorised as 'value added' and three processes that were 'non-value added.' Two processes were counted as 'value enablers'. The main contributors to the whole process were 'transportation,' 'extra processing', and 'waiting.'

Root Cause Analysis/*Kaizen* Burst
A fishbone diagram was used as the analysis tool to find the root cause of the problem. *Kaizen* bursts identified were to revamp the filing system, prepare patient cards one day prior to the appointment date, rezoning the Family Doctor Concept coverage area, and educate patients to be punctual on the given appointment time and date. Follow-up analysis revealed ATC improvement from 78 minutes to 38 minutes (51%).

Sustainability
The time motion will continue using the timesheet to monitor the sustainability of the measures taken.

ENHANCING FLOW OF FEVER CLINIC IN PUTRAJAYA HEALTH CLINIC PRESINT 9

Subramaniam, P.*, Che Awang, N.A.F., Shabli, N.A.

Putrajaya Health Clinic Presint 9, Ministry of Health Malaysia.

Corresponding author: Prabha Subramaniam, Unit Lean, Klinik Kesihatan Presint 9 Putrajaya, No 1, Jalan P9E, Presint 9, Pusat Pentadbiran Kerajaan Persekutuan, 62250 Putrajaya, MALAYSIA. Email: prabha25@live.com.my.

ABSTRACT

Background and Problem Statement
The fever clinic in Putrajaya Health Clinic Presint 9 is congested, with a high attendance of patients estimated at around 250 to 300 per day. Pre-lean, the average duration from the moment patients arrived at the ticket counter until they reached the consultation room was 80 minutes per patient. Despite meeting the Key Performance Indicator for the waiting time, there is still congestion among patients in the fever clinic due to space limitations. The objective was to improve the overall patient journey in the fever clinic by reducing the total lead time by 20% through the implementation of lean methodology, which subsequently reduced the congestion. Time motion studies were conducted pre- and post-intervention, with each cycle completed within two weeks.

Value Stream Mapping (VSM)
Data on time spent at each counter were recorded during the study. The VSM identified four processes according to patient flow, namely, ticket counter, registration counter, triage, and consultation room. Through the application of lean principles, specific areas for improvement were identified, namely the backlog at the registration counter and delays in the triaging process.

Kaizen Burst and Result
The proposed *kaizen* approach involved optimising the skills of administration staff and rearranging their placement, as well as introducing a second triage counter adjacent to the existing one. Following the implementation of these changes, the total lead time was reduced from 80 minutes to 58 minutes, representing a 27.5% improvement and demonstrating the effectiveness of lean methodology in reducing waiting times in a highly congested clinic.

Sustainability
Moving forward, it is advisable to gather feedback from both patients and clinic staff regarding their experiences after the implementation of these new changes. This feedback will serve as valuable insight for future improvements.

IMPROVING PATIENT TRANSPORTATION IN THE FACILITY THROUGH THE CENTRALISED PORTER SYSTEM: A LEAN INITIATIVE

Gunasekaran, T.[1]*, Zakariya, M.[1], Abd Maei, M.N.[1], Mat Nashi, I.[1], Jantan, R.[1], Kamarudin, E.W.[1], Azhari, N.A.[2]

[1]Hospital Supervision Department, Hospital Tengku Ampuan Rahimah Klang, Ministry of Health Malaysia.
[2]Quality Unit, Hospital Tengku Ampuan Rahimah Klang, Ministry of Health Malaysia.

*Corresponding author: Thevanath Gunasekaran, Bahagian Penyeliaan Hospital, Hospital Tengku Ampuan Rahimah, Jalan Langat, 41200 Klang, Selangor, MALAYSIA. Email: thevanathgunasekaran@gmail.com.

ABSTRACT

Background and Problem Statement
Healthcare attendance at hospitals facilitates patient mobilisation. Hospital Tengku Ampuan Rahimah has a high rate of patient mobilisation for radiological examination and ward movement. It takes 80–130 minutes to transfer a patient; thus, the ward will i) lose personnel, ii) pay overtime, and iii) overload another staff member. These issues degrade patient care at the hospital.

Value Stream Mapping (VSM)
In pre-*kaizen* VSM, there were seven processes amounting to a total lead time of 128 minutes: 22 minutes value-added and 106 minutes non-value-added. Value analysis classified five processes as "value-added" and five as "non-value added". "Extra-processing" and "waiting" took 15 to 90 minutes each. The new porter system streamlined patient transfer to five stages in the future state VSM. In future state VSM, the procedure takes 26 minutes, 10 of which are value-added and 16 non-value-added.

Kaizen Burst and Root Causes Analysis (RCA)
Using VSM and Five Whys, we found three main causes: i) lack of dedicated staff for patient transportation; ii) sharing job scope as in multitasking; and iii) staff doing double shifts owing to pending work, which increased financial costs.

Countermeasures and Action Plan
The "porter" section identified strategies to optimise the patient transferring process between departments. This unit identified barriers to the primary goal, such as personnel shortages amid abrupt patient surges. The establishment of the Hospital-wide Centralised Porter System successfully eliminated 75% of overtime charges in one year and saved MYR1,632,960.

Sustainability
This porter system's efficacy allows building-based expansion. Porter's patient mobilisation processing time must be monitored.

LEAN: A REMEDY FOR HOMESTAY TO SUSTAIN?

Zulkifley, M.*, Ab Rahman, M.N., Mohd Tawil, N.

Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia (UKM).

*Corresponding author: Mastura Zulfifley, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, Lengkungan Ilmu, 43600 Kajang, Selangor, MALAYSIA. Email: maszulkifley@gmail.com.

ABSTRACT

Purpose
Lean management is a sustainable business that operates with a combination of social, economic, and environmental. Defining value, mapping value stream, creating flow, establishing pull, and pursuing perfection are the five lean principles that encourage continuous improvement for better flow in the work process. Implementing lean in the service sector is also crucial, especially in enhancing the homestay's business. This paper aims to present the level of lean practices among homestay service providers in Malaysia.

Design/Methodology/Approach
The research adopted a quantitative approach involving 50 respondents consisting of the owners, workers, and suppliers in homestay chain networks. The selection of homestays is based on three criteria: registered under the Malaysia Homestay Experience Programme, managed by the cooperative entity, and obtaining the highest profit in its state.

Findings
Lean culture has been practised widely among homestay service providers. However, each component that is involved in the homestay's ecosystem needs to be proffered with tailored activities to intensify the demand and supply activities. Further, skilful resources will stimulate innovation in producing and marketing homestay products that will lead to sustainability.

Practical Implications
This paper provides information on the level of lean practices among homestay communities. The findings of this study will assist policymakers and academicians in focusing further on the sustainability of the ecosystem, including social, economic, and environmental factors.

Originality/Value
This study asserts the need to sustain the three pillars of the homestay ecosystem by determining the level of lean management practices in the homestay business. As per the authors' knowledge, to date, studies related to homestay sustainability and the importance of lean in the service sector are very limited. Thus, this study will help entrepreneurs enhance their competency in homestay business by adapting only quality services in the ecosystem.

REDUCING TOTAL LEAD TIME FOR PATIENT WHO CAME FOR BLOOD TESTS AND URINE TESTS (WALK-IN AND APPOINTMENT) AT KLINIK KESIHATAN PRECINT 18

Abd Rahim, A.S.*, Azeila, N.

Klinik Kesihatan Presint 18 Putrajaya, Ministry of Health Malaysia.

*Corresponding author: Amirah Syamimi Abd Rahim, Klinik Kesihatan Presint 18 Putrajaya, Jalan P18C1, Presint 18, 62602 Putrajaya, MALAYSIA. Email: amirahsyamimi93@gmail.com.

ABSTRACT

Background and Problem Statement
Klinik Kesihatan Putrajaya Presint 18 is a Type 2 primary care clinic with a capacity of 800 patients per day and provides primary care services, including lab services. Pre-lean, the total lead time for patients who came for blood taking by appointment was 65.27 minutes; blood taking for walk-in patients was 65.30 minutes, 40.23 minutes for urine dipstick, and 48.26 minutes for urinalysis. Our aim is to reduce the total lead time for lab services by 20%.

Value Stream Mapping (VSM)
A time-motion study was done using a data pro forma sheet where time was recorded at each checkpoint. A value-stream motion was constructed to identify the problems that needed *kaizen* implementation.

Kaizen Burst and Root Cause Analysis (RCA)
One of the main root causes identified by using the Ishikawa diagram is that all appointments and walk-in patients came at the same time, did not adhere to appointment dates, and lacked manpower.

Countermeasures and Action Plan
The *kaizen* burst implemented was staggered appointments to reduce the number of patients at a specific time, thus reducing the waiting time. We have separated fasting and non-fasting appointments, whereby we created a new slot for non-fasting blood in the evening session while fasting blood tests remained in the morning session. Post-lean data showed improvements in the total lead time in all situations studied, whereby we managed to achieve 38% improvement for blood-taking appointments, 14.8% for walk-ins, 17.1% for urinalysis, and 58.9% for urine dipstick.

Sustainability
To ensure the sustainability of our new flow, a slip was clipped on patients' appointment books as a reminder for them to comply with their appointments.

LEAN HEALTHCARE PARADIGM SHIFT PRE- AND POST-COVID-19 PANDEMIC AT EMERGENCY AND TRAUMA DEPARTMENT, HOSPITAL PULAU PINANG

Goh, J.*, Fathiyah, Chuah, T.H., Yeoh, C., Wong, K.D., Cheng, M.H., Syahmun, I., Jarshana.

Emergency and Trauma Department, Hospital Pulau Pinang, Ministry of Health Malaysia.

*Corresponding author: Goh Jolene, , Emergency and Trauma Department, Hospital Pulau Pinang, Jalan Residensi, 10990 Pulau Pinang, MALAYSIA. Email: fathiaabdghani@gmail.com.

ABSTRACT

Background and Problem Statement

Emergency and Trauma Department (ETD) Hospital Pulau Pinang statistics in 2019 showed 108,563 patients who visited ETD. Seventy-eight per cent of patients were green zone patients. A total of 54,742 green zone patients were seen in ETD (G1, G2, G3), and 30,244 patients (G4) were seen at the Locum ETD. Seventy-two per cent of patients attending the green zone were discharged within two hours. During the COVID-19 pandemic years, the Outpatient Department (OPD) service was closed down for the management of stable COVID-19 patients. Post-pandemic year, OPD service was discontinued. The number of patients coming to ETD in 2023 had increased by 40 to 48%. This contributed to long waiting hours and prolonged length of stay (LOS) for green zone patients in ETD, Hospital Pulau Pinang.

Kaizen Burst and Root Cause Analysis (RCA)

Root cause analysis using the Ishikawa chart identified several causes, including the overcrowding of patients, exacerbated by the closed OPD due to the pandemic, insufficient staff and equipment, inadequate workspace, and disorganised patient files, causing more stress in patient care. Furthermore, the complexity of each patient's condition necessitates multiple interdepartmental referrals which added to the LOS. Also, insufficient funds for system and space upgrades compromised bed availability in ETD when the wards were full. There were also lengthy radiology processes and delays in getting blood results due to frequent internet breakdowns.

Current State Value Stream Mapping (VSM) Pre-Pandemic COVID-19

A set of standard data collection was determined for the pre - and post-COVID-19 pandemic (2019-2023). Three parameters to monitor waiting time were identified- Average time to consultation (ATC), length of stay (LOS), and call not answered.

Countermeasures and Action Plan

To tackle the problem and to improve patient care efficiency, several action plans were carried out. More staff were allocated to ETD comprising medical officers, paramedics, and staff nurses to cope with an increasing number of patients. A patient identifier with a unique QR code for each patient was implemented, which aided in the patient flow tracker. Increased slots were opened to medical officers for ETD's locum to reduce workload in the green zone. More computers and faster internet streaming were installed in the green zone, with the additional help of the Information Technology (IT) system. For example, an online communication platform with a bed manager unit to aid patient admission and an information technology system that links the radiology unit and laboratory unit to ETD for easier tracing of X-rays and blood results were created. A new discharge bay was also erected to allow a higher patient turnover rate, as patients awaiting discharge can be placed there while waiting for discharge procedures to be completed. This is to make room for incoming patients who were waiting to be admitted for further acute care.

Future State VSM and Measure

There was an improvement in the ATC from 210 minutes to an average of 115 minutes. Average LOS has also improved from an average of 372 minutes to 306 minutes. The process efficiency has shown an increase of 63.9 to 72.7%.

Sustainability

Implementation of a Lean Healthcare system needs continuous commitment from top management, as well as from all categories of staff, for successful quality improvement. The IT system was used to increase efficiency and reduce waste. The "Lean Corner" was built to showcase our improvement activities, sharing purposes, and, at the same time, creating awareness to adopt the lean culture.

IMPROVING ROUTINE BLOOD-TAKING SERVICE AT THE OUTPATIENT DEPARTMENT, KLINIK KESIHATAN KAMPUNG GIAL VIA LEAN APPROACH

Mohamed Yusof, R.*, Najmi Azizan, A., Jamil Nasri, N.H., Yussoff, Y., Ali, Z., Asyrani, N.A.

Klinik Kesihatan Kampung Gial, Kangar District Health Office, Ministry of Health Malaysia.

*Corresponding author: Rohana Mohamed Yusof, Klinik Kesihatan Kampung Gial, Kampung Gial, 02500 Kangar, Perlis, MALAYSIA. Email: drmyana81@gmail.com.

ABSTRACT

Background and Problem Statement
Routine blood taking is one of the services provided by Klinik Kesihatan Kampung Gial. It is pre-ordered using request forms and conducted at a shared procedure room with a waiting area outside the premises. Observation showed that inconducive waiting areas, longer process time, and longer patient walkabouts result in patient dissatisfaction and affect the quality of service. Our aim is to evaluate the current work process and patient flow in blood-taking procedures, to identify and eliminate non-value-added processes, and to modify the existing process, thus improving the efficiency of blood-taking services.

Value Stream Mapping (VSM)
An overall assessment of all current work processes involved was conducted and detailed using VSM to identify various process flows, time elements involved, and waste. A spaghetti diagram was used to identify the patient's walkabout.

Root Cause Analysis (RCA)
Fishbone diagram analysis highlighted an inconducive waiting area and procedure room, longer patient walkabouts, and various documentation that prolonged the overall procedure time, affecting the quality of service and causing patient satisfaction.

Countermeasures
Our *kaizen* is restructuring our documentation system using a simpler checklist to shorten process time and modifying the working space layout to reduce patient walkabout and provide a more comfortable waiting and procedure area. With a new layout and simpler documentation, the overall work process has improved with a shorter patient walkabout with a 55% reduction, reduced process time by 40%, and a more conducive procedure area.

Sustainability
Further monitoring of process time and documentation issues is required to address other inventory involved.

Lesson Learned: The application of the lean approach can improve the patient flow and work process and should be developed with the participation of all healthcare professionals.

IMPLEMENTING TRAUMA ACTIVATION PROTOCOL IN NON-LEAD HOSPITAL, HOSPITAL BUKIT MERTAJAM IN 2023

Kathiravelu, L.V.*, Suhaimi, N.A.H., Tan, Y.H., Goay, X.T., Shanmugasundram, J., Varatharajoo, A., Mohd Razally, I.S., Goh, H.K.

Emergency and Trauma Department, Hospital Bukit Mertajam, Ministry of Health Malaysia.

Corresponding author: Logaguhan Vignes Kathiravelu, Jabatan Kecemasan dan Trauma, Hospital Bukit Mertajam, Jalan Kulim, 14000 Bukit Mertajam, Pulau Pinang, MALAYSIA. Email: log91zai@gmail.com.

ABSTRACT

Background

Hospital trauma activation criteria are designed to spot patients who may need efficient resuscitation or surgical procedures that call for the resources of a trauma team right at the patient's bedside. For the severely injured patient, admission with a multidisciplinary trauma team may be essential as this enables quick diagnosis and treatment, allowing the patient to be transferred to the lead hospital within the 90-minute timeframe based on the Key Performance Indicator cluster Seberang Prai.

Value Stream Mapping (VSM)

Before implementing the trauma activation protocol, each polytrauma patient spent 34 processes before transferring out to the hospital. Out of a total of 34 processes, there were 15 non-value-added, 5 value-enablers, and 14 value-added. The total process time was 462 minutes. After implementation, only 14 processes were needed, and the total process time was reduced to 87 minutes for a polytrauma patient to reach the lead hospital.

Kaizen Burst and Root Cause Analysis (RCA)

Analysis was done by using a fishbone diagram and five Whys, and we identified that common wastes are waiting, overprocessing, and in motion. By having a systematic and organised trauma activation protocol, every discipline plays an important role in resuscitating polytrauma patients.

Countermeasures and Action Plan

Based on the 14 criteria, trauma teams can be activated with the help of the Hospital Bukit Mertajam operator, with further decisions to be made by the team leader. Trauma activation of the patient's data was linked together in a single Google Form sheet, allowing multiple parties to view it simultaneously, hence allowing the patient to be transferred to the lead hospital promptly.

Sustainability

Trauma activation protocol has been integrated as a standard operating procedure between Hospital Bukit Mertajam and Hospital Seberang Jaya to facilitate severe trauma cases in each hospital. Further meetings among heads of the trauma departments with the hospital director allow for a smooth transition of this protocol to be implemented with fewer ramifications.

IMPROVEMENT OF APPOINTMENT BLOCK SYSTEM IN *PUSAT PEMINDAHAN DARAH SETEMPAT* HOSPITAL MELAKA

Ishak, S.M.[1], Han, Y.P.[1]*, Afzanizan, M.A.[2], Muhammad Afiq, A.[2], Azhar, A.[2]

[1]Cluster Unit, Hospital Melaka, Ministry of Health Malaysia.
[2]*Pusat Pengambilan Darah Setempat (PPDS)*, Hospital Melaka, Ministry of Health Malaysia.

Corresponding author: Han Yun Pok, Unit Kluster, Hospital Melaka, Jalan Mufti Haji Khalil, 75400 Melaka, MALAYSIA. Email: pokhanyun@moh.gov.my.

ABSTRACT

Background and Problem Statement
Hospital Melaka is the state hospital and the only major specialist hospital in Melaka. The growing population that needs tertiary medical attention in the state of Melaka has led to prolonged waiting times for central outpatient phlebotomy services in view of the system's inadequacy in managing appointment slots.

Methods
We adopted lean principles and scrutinised current processes in *Pusat Pengambilan Darah Setempat* (PPDS), focusing on eliminating waste and improving flow. Processes involved were appointment allocation by the respective clinic, which determines the patient's journey during the blood-taking service. The setting of the appointment block is dynamic and done by on-site surveys and interviews with the supervisor in charge. Information, including clinic load, type of appointments, and process time in PPDS, is gathered during the construction of the block system.

Countermeasures and Action Plan
A total of six *kaizens*; *Sistem Pengurusan Pesakit* Hospital Melaka (SPPHM), triage, fast track, My Phlebo, and mobilisation of manpower, were identified during this project, and all *kaizens* were fulfilled and implemented.

Results
Data collection on waiting time and process time have shown significant improvement and have been sustained after *kaizen* implementation. These changes resulted in no waiting time needed for Fast Track patients and an average of 30 minutes for the blood-taking service.

Sustainability
A continuous effort was made to ensure all *kaizens* are being implemented. Steps have been taken to implement and further expand the initiative to other centres under Hospital *Kluster* Melaka. Measures are also taken to ensure standardisation in practice by incorporating this initiative into the hospital policy. We foresee that this initiative can be replicated in other centres, including primary health care.

LEAN HEALTHCARE PRINCIPLE IMPLEMENTATION IN COVID-19 BED MANAGEMENT IN KLANG VALLEY MALAYSIA

Ma'arif, N.S.[1]*, Abdul Rahman, M.[2], Sheikh Abdul Karim, S.[1], Sadison, P.[1], Azhari, N.[1]

[1]Hospital Sungai Buloh, Ministry of Health Malaysia.
[2]Hospital Kuala Lumpur, Ministry of Health Malaysia.

*Corresponding author: Naufal Shamsul Ma'arif, Hospital Sungai Buloh, Jalan Hospital, 47000 Sungai Buloh, Selangor, MALAYSIA. Email: naufalsm@moh.gov.my.

ABSTRACT

Background and Problem Statement
In Klang Valley, Malaysia, the initial COVID-19 referral process faced challenges due to single-channel infectious disease physician referral, limited bed capacity, and time-consuming manual procedures. We found a high admission load with long processing of the hospital Bed Management Unit (BMU), causing delays in arranging admission for COVID-19 cases. To address these issues, the COVID-19 regional BMU was established.

Approach and Improvements
We used Value Stream Mapping (VSM) to identify waste and implement *kaizen*. The following changes were made; 1) The introduction of a "Line-listing" referral process via a Google platform enables over one thousand mass patient referrals. The regional BMU can rapidly triage patients, assign suitable facilities according to the bed capacity availability while visualising data using operational data sheets and data studio. 2) Case selection (clinical syndrome matrix) and diversion for emergency COVID-19 patients requiring immediate attention, such as those needing oxygenation or critical care, were directed to the emergency department without delay. 3) Virtual visual and communication board. Referring centres under the Ministry of Health can simultaneously access real-time bed availability and send patients to assigned facilities. 4) Accessibility to the largest admission centre for COVID-19 in Klang Valley. Having direct access to a low-risk quarantine centre, *Pusat Kuarantin dan Rawatan Berisiko Rendah* (PKRC) Malaysia Agro Exposition Park Serdang (MAEPS) 2.0 allowed quick bed assignment for low-risk patients.

Result
By implementing these improvements, a bed can now be assigned to low-risk patients at PKRC MAEPS 2.0 in under one minute from the time of referral. The average time for stable ill patients and special populations to be admitted to hospitals has been reduced to two hours and 53 minutes.

Conclusion
By identifying and addressing waste through the application of *kaizen* principles, the COVID-19 referral and admission process in Klang Valley, Malaysia, has been significantly accelerated, leading to a reduction in patient mortality rates.

INPATIENT ELECTRONIC REFERRAL SYSTEM BY PHYSIOTHERAPY DEPARTMENT, SELAYANG HOSPITAL

Adanan, N.A.[1], Saiedin, S.[1], Naim, M.Z.[1], Musa, N.I.[1], Rangasamy, A.[2]*, Sunderajan, D.R.[2], Tarmizi Thayaparan, F.S.[3]

[1]Physiotherapy Department, Selayang Hospital, Ministry of Health Malaysia.
[2]Quality Secretariat, Selayang Hospital, Ministry of Health Malaysia.
[3]University of New South Wales, Sydney, Australia.

*Corresponding author: Abirami Rangasamy, Quality Secretariat, Hospital Selayang, Lebuhraya Selayang-Kepong, 68100 Batu Caves, Selangor, MALAYSIA. Email: abirami@moh.gov.my.

ABSTRACT

Background and problem statements
Before 2022, Selayang Hospital inpatients were referred for physiotherapy service through manual forms, which has caused several issues, mainly delays in patients receiving interventions. Each physiotherapist spends a longer time sorting out referrals and handling decreased quality referral forms (incomplete, incorrect, poor handwriting, and non-standardised forms), causing delays in attending referred patients. The average waiting time for patients to be seen by a physiotherapist was 15 hours and 1 minute. Department store space wastage was noticeable, too, as a 2 x 7 feet three-tier rack was fully occupied with manual forms, leaving limited space for hydrotherapy equipment.

Value Stream Mapping (VSM)
The current VSM study shows a total of six procedures with a processing time of 68 minutes, a waiting time of 1,190 minutes, and a lead time of 1,258 minutes. Value analysis revealed three value-added processes, two non-value-added processes, and one value-enabler process. Major contributing wastes were extra-processing and waiting.

Kaizen Burst and Root Canal Analysis (RCA)
Delay in time patients seen by physiotherapists is analysed using the five Whys approach, and no electronic referral system is identified as the root cause.

Countermeasures and Action Plan
Google Form with a QR code was generated and distributed to all clinical wards/units in the hospital. By referring electronically, the average waiting time for patients to be seen by physiotherapists improved by 4 hours and 8 minutes (28%), allowing efficient intervention planning by physiotherapists. Other improvements include resolving missing/incomplete details and incomprehensible handwriting in forms, saving MYR385.35 within the first five months (A4 paper cost: MYR0.15 x 2,569 referrals in January to May 2023) and refinement in department physical storage space by 50%.

Sustainability
The inpatient electronic referral system will be expanded to the intensive care unit/high-dependency care unit/critical care unit/burn, remaining general wards and clinics in phases, and subsequently to other allied health services as an internal referral system. This electronic referral system will be incorporated into hospital policy, and the performances will be monitored as a key performance index.

LEAN RADIOLOGY BY IMPLEMENTATION OF RADIOLOGY INFORMATION SYSTEM FOR X-RAY IMAGING AT EMERGENCY DEPARTMENT HOSPITAL BUKIT MERTAJAM

Tan, W.*, Goay, X.T., Saad, M.Z., Mohd Abdul Kader Jailani, M.F., Azman, N.E.A., Hadi, N., Mohd Razally, I.S., Goh, H.K.

Emergency Department, Hospital Bukit Mertajam, Ministry of Health Malaysia.

*Corresponding author: Weihao Tan, Quality Secretariat, Jabatan Kecemasan dan Trauma, Hospital Bukit Mertajam, Jalan Kulim, 14000 Bukit Mertajam, Pulau Pinang, MALAYSIA. Email: waynetan1025@gmail.com.

ABSTRACT

Background
A common complaint during an orthopaedic clinic day is the absence of an x-ray film that requires repeat imaging on appointment day. The manual system was replaced with an imaging system by a Radiology information system (RIS) to increase value to the patient. RIS is a networked software system designed for managing medical imagery and associated data.

Value Stream Mapping (VSM)
Pre-RIS VSM showed a total of 36 processes, with a total process time of 173.50 minutes and a total waiting time of 331 minutes, with a process efficiency of 34.4%. Waste deleted in the manual system were inventory, overproduction, waiting, transportation, and motion. Meanwhile, value-added was an online viewing system and reduced film printing. Post-RIS VSM showed a total of 36 processes, with a total process time of 134.5 minutes and a total waiting time of 251 minutes, with a process efficiency increase of 34.9%.

Kaizen Burst and Root Cause Analysis (RCA)
Implementation of the RIS system helps to save time and cost on printing X-ray film as well as facilitates good communications between doctor-patient, interdepartmental, and interhospital. Ishikawa diagram was used to identify issues such as long waiting times in the radiology department and overproduction of X-ray films.

Countermeasures and Action Plan
Submission proposal that requires server, desktop, electricity upgrade, and network port using MyGov*Net with support from the hospital director. Data collection pre- and post-implementation with regular meetings empowered the flow and increased process efficiency in the future.

Sustainability
RIS system has been successfully implemented in Hospital Bukit Mertajam, from emergency department to outpatient clinics and can be widely spread to ease interhospital or community health referral.

THE LEAN IMPLEMENTATION IN MEDICAL WARDS

Hon, S.A.*, Musa, S., Ghazali, R., Liam, C.C.K.

Medical Ward, Hospital Sultanah Aminah, Ministry of Health Malaysia.

*Corresponding author: Shu Ann Hon, Wad Perubatan, Hospital Sultanah Aminah, Jalan Persiaran Abu Bakar Sultan, 80100 Johor Bahru, Johor, MALAYSIA. Email: honshuann@gmail.com.

ABSTRACT

Background and Problem Statement
Hospital Sultanah Aminah is a tertiary referral centre in Johor, with the medical ward's bed occupancy rate above 100%. Lean key performance index previously demonstrated achievement of discharge time (DT) within four hours but was unable to sustain during the post-pandemic era. From 1 to 7 February 2023, there were 137 pending medical admissions due to bed deficiency. Hence, we aim to shorten the DT from 11 hours to 4 hours.

Value Stream Mapping (VSM)
We have identified eight value-added steps in the discharge process: discharge order, subspeciality review, discharge documentation, appointment dates arrangements, billing production, bill collection, bill payment, and handover of discharge documentation and medication. The lead time was 10 hours and 45 minutes, of which nine hours and 40 minutes (90%) were taken up by non-value-added activities such as waiting time, motions, and transportation, while the remaining 65 minutes (10%) were process time.

Kaizen Burst and Root Cause Analysis (RCA)
The root causes spotted were high turnover of staff, low lean awareness, insufficient manpower and facilities, no discharge prioritization, inadequate cooperation from supporting departments, poor advanced discharge planning, and patients' logistic issues. Kaizen bursts mainly focused on preparation for discharge.

Countermeasures and Action Plan
Measures implemented included early discharge planning and appointment dates arrangement, advanced preparations of discharge documentation, family notification one day in advance, and ward attendants facilitating the billing process. Pre and post-Lean implementation results: female ward (C3) DT is kept within four hours despite increasing discharges; most discharges from the male ward (D3) are kept within the designated time, barring those awaiting family arrival.

Sustainability
Continuous lean concept education during weekly departmental meetings and gazettement of new discharge flow process incorporating kaizen burst measures as routine clinical practice. The discharge flow document should be reviewed intermittently to improve the flow.

HOW TO IMPROVE FLOW OF INDENTING AND SUPPLYING IN PHARMACY DEPARTMENT BUKIT MERTAJAM

Rohizam, R.[1]*, Choon, T.Y.[2], Sing, Y.L.[2], Manikam, S.[2], Yuzrin, N.[2]

[1]Quality Unit, Hospital Bukit Mertajam, Ministry of Health Malaysia.
[2]Pharmacy Department, Hospital Bukit Mertajam, Ministry of Health Malaysia.

*Corresponding author: Rafeeqa Rohizam, Unit Kualiti, Hospital Bukit Mertajam, Jalan Kulim, 14000 Bukit Mertajam, Pulau Pinang, MALAYSIA. Email: rafeeqa@moh.gov.my.

ABSTRACT

Introduction

A sub-store unit in the pharmacy department is involved in connecting the purchasing unit (pharmacy logistics) and the end consumer (patient). It plays an important role in ensuring adequate storage and continuous supply of pharmaceuticals and medical inventories for patient service. By implementing lean methodologies, we aim to improve the workflow and achieve good distribution and storage practices in pharmacy logistic services.

Value Stream Mapping (VSM)

The VSM pre-*kaizen* shows a total of 48 processes, of which 32 were value-added and 16 non-values added, with the total time (TPT) needed being 38 days, 23 hours, and 14 minutes. However, post-*kaizen* shows a reduction with only 32 processes with TPT 35 days, 18 hours, and 20 minutes. Process efficiency increases by 100%. Some of the non-value-added activities identified were transportation and non-utilised talent.

Kaizen Burst and Root Cause Analysis (RCA)

We used the fishbone diagram method to identify the root cause of the problem. Previously, the indenting process needed two forms, which were redundant despite using the online system, and it was simplified to using only one form. Difficulty in transporting loads was averted by changing the loading locations to the outpatient department's pharmacy, which is accessible to everyone.

Countermeasures and Action Plan

The pharmacist in the main store is in charge and will monitor the progress of stocks and the indenting process monthly.

Sustainability

Monitoring is done by updating in monthly meetings. *Kaizen* was shared during *Gemba's* visit from Pharmacy Negeri Sembilan and will propagate there.

IMPROVING LEAD TIME FOR TREATMENT OF NEONATAL JAUNDICE PATIENTS IN KLINIK KESIHATAN JERAM USING LEAN HEALTHCARE APPROACH

Nik Aziz, N.A.A.*, Dollah Ruzaimi, D., Mat Noor, R., Mohamad, S.N., Wan Ruslan, W.I.

Klinik Kesihatan Jeram, Ministry of Health Malaysia.

*Corresponding author: Nik Azfar Amirah Nik Aziz, Klinik Kesihatan Jeram, KS 123, Jalan Kapar, 45800 Jeram, Kuala Selangor, Selangor, MALAYSIA. Email: ncqamie1121@gmail.com.

ABSTRACT

Background and Problem Statement
The number of cases seen at the Maternal and Child Unit Klinik Kesihatan Jeram was increasing each year. The total number for 2022 was 9,502 cases, with 698 (7.3%) cases being babies with neonatal jaundice. On average, neonatal jaundice (NNJ) babies spent a total of 97 minutes from registration until complete consultation. Prolonged lead time results in dissatisfaction among accompanying post-partum mothers. The aim of this project is to reduce the lead time for NNJ patients to less than 60 minutes.

Value Stream Mapping (VSM)
Based on the current VSM, an NNJ patient needs to go through five stations: the triage counter, registration counter, treatment room, laboratory, and consultation room. The total lead time was 97 minutes, with a total walking distance of 43 meters (135 steps). Analysis of the total 24 process steps showed six value-added steps, ten value enablers, and eight non-value-added steps. In future VSM, the number of stations for NNJ patients was reduced to four stations (triage counter, treatment room, laboratory, and consultation room). Reductions were found in all parameters: lead time decreased to 42 minutes (57%), total steps to 96 (28%), walking distance to 33 meters (23%), and 38% identified wastes were eliminated.

Root Cause Analysis (RCA) and *Kaizen* Burst
The reasons for the long waiting time were an ineffective system, limited manpower, and material problems.

Countermeasures and Action Plan
Four *kaizen* plans have been implemented. They were, registration is done at the treatment room, changing the area of capillary blood taking, implementing a fast lane, and using the neonatal clerking sheet. Measures were taken to maintain the momentum of the projects, which include continuous medical education for all staff, *Gemba* to monitor performance, progress, limitations, and flexible work allocation among staff.

Sustainability
The outcome of the programme will be shared with another clinic in the district and state. In conclusion, the implementation of the lean concept enables us to achieve significant outcomes with fewer adjustments.

MINIMISING LEAD TIME OF ANTENATAL PATIENTS AT CHEKOK HEALTHCARE CLINIC, PASIR MAS, KELANTAN

Abd Aziz*, M.S., Hassan, M., Che Daud, M., Che Noh, R., Huzaimi, H., Zakria, N.M.

Chekok Health Clinic, Ministry of Health Malaysia.

*Corresponding author: Mohamad Shahzerin Abd Aziz, Klinik Kesihatan Chekok, Chekok, 17060 Pasir Mas, Kelantan, MALAYSIA. Email: shahzerin91@gmail.com.

ABSTRACT

Background and Problem Statement
Chekok Health Clinic is a Type 4 clinic with an increment of antenatal patient attendance (25.0%) from 1,949 patients in 2021 to 2,436 patients in 2022 after the COVID-19 pandemic, causing patients dissatisfaction with extensive lead time. On average, antenatal patients spend 95 minutes from registration to the pharmacy. This project aims to reduce antenatal patients' lead time to meet the standard target lead time of less than 60 minutes by the Ministry of Health.

Value Stream Mapping (VSM)
From the current VSM, antenatal patients should go to eight stations (registration counter, nursing counter three times, triage counter, laboratory, consultation room, and pharmacy). This involved 38 process steps, of which 16 steps were value-added, 13 steps were non-value added, and 9 steps was value enabler. In future VSM, kaizen bursts boost the value from eight to seven stations, total process steps reduced to 34 steps (10.5%), lead times reduced to 72 minutes (23.3%) and patient's walking distance reduced by 26.4%. Overall process efficiency improved by 3.6%, from 63.7% to 67.3%.

Root Cause Analysis (RCA) and Kaizen Burst
Current VSM analysis shows multifactorial influences for extensive lead time, which were human factors (staff and patient), ineffective and disorganised environment factors, and material and method factors.

Countermeasures and Action Plan
Six kaizen bursts have been implemented, including empowerment of staggered appointments, finding and tracing before the appointment, providing a call bell, using an audio system, additional examination couches, and reorganising forms and equipment.

Sustainability
Rapid process and continuous improvement using lean tools create opportunities to optimise the healthcare system. The lean journey is monitored every six months to assist with continuity and performance, ensure sustainability, and lessen limitations.

DELAY DISCHARGE FROM OBSTETRIC WARD, HOSPITAL TUANKU FAUZIAH, PERLIS

Che Soh, C.A., Tan, J.W., Ahmad, M.A., Ahmad Nazli, A.S.*, Hashim, H., Osman, N., Rosli, R., Ajis, R.

Obstetrics and Gynaecology Department, Hospital Tuanku Fauziah, Ministry of Health Malaysia.

*Corresponding author: Amanina Syamim Ahmad Nazli, Jabatan Obsetrik dan Ginekologi, Hospital Tuanku Fauziah, No. 3, Jalan Tun Abdul Razak, Pusat Bandar Kangar, 01000 Kangar, Perlis, MALAYSIA. Email: ninasyamim@gmail.com.

ABSTRACT

Delays in discharging are not only the main concern to patients and family members but also impact wider health services, making it more difficult to admit patients and leading to further pressure on ambulance services and the urgent care system in general. In this study, delayed discharge is referred to as a patient able to be discharged home after three hours from the discharge plan according to Hospital Tuanku Fauziah (HTF)'s client charter. The obstetrics ward in HTF is an integrated ward, which consists of antenatal and postnatal patients. The discharge process includes billing payment, prescribing medication, medical leave/confinement slips, discharge summaries, and discharge notes. The aim of this study is to look into the time taken for each process and to identify the main causes of delayed discharges and how to improve it.

The study was conducted for six months, from August 2020 until January 2021. The study sample consists of 80 patients from antenatal and postnatal (pre- and post-remedial action). The initial result showed that 19/40 (47.5%) patients were discharged after three hours from the planned discharge. Data analysis showed seven patients had problems with family members/husbands to settle the billing (it took three hours and more to come to the hospital) and subsequently to settle medication at different counters.

The remedial action that was taken included training the house officer to do concise discharge summaries and notes, direct contact with the husband/relative to settle the payment bill by staff, pharmacy staff providing medication in the ward and scheduling time for the house officer to get an appointment from the clinic. After remedial action, the total number of patients with delayed discharges became 10/40 (25%), a reduction of about 22%. Delay in the husband/relative to come early to the hospital to settle payment is still a major problem (6/10).

By sustaining prescribing of medication in the ward before discharge, some improvements were seen in that the patients were able to be discharged early. Thus, this should be continued in the Obstetrics and Gynaecology Department and other departments. This study was presented at the hospital level and was then spread to others.

TOWARDS ENDLESS TRANSFORMATION

Abdullah, N.I.*, Ghani, H.L., Abdullah, N.H., Mukhtar, N., Che Harun, Z., Muhamad, M.

Medical Department, Hospital Tumpat, Ministry of Health Malaysia.

*Corresponding author: Nur Idayu Abdullah, Jabatan Perubatan, Hospital Tumpat, Jalan Kelaburan, 16200 Tumpat, Kelantan, MALAYSIA. Email: yuri_idayu@ymail.com.

ABSTRACT

Bed congestion is a major problem for most hospitals in Malaysia, including district hospitals, to which most of the stable patients will be sent. While there are multiple contributing factors, one of them is the long waiting time for patient to be discharged, which in turn causes delay in bed availability for the next patient. In an attempt to solve this issue, a lean healthcare initiative was introduced in the female ward of Hospital Tumpat.

The lean healthcare project in the female ward started in January 2023. Our aim is to reduce the waiting time for discharge from six hours to less than four hours. The waiting time mentioned above was measured from the decision for discharge until the patient left the bed. For the purpose of comparison, data used in this report for pre-lean intervention was taken from 1 to 31 August 2022. Data for post-lean intervention were taken from 1 January to 31 May 2023, and the average percentage was calculated.

The analysed pre-lean data showed that nine per cent of the patient had a waiting time for discharge of more than six hours, 50% of the patient was discharged after more than four hours, 41% of the patient was discharged for less than four hours, and almost none of the patient was discharged less than two hours. The post-lean intervention showed significant improvement in discharge time where almost none of the patient had a waiting time of more than six hours, only 5.4% of the patient was discharged within four to six hours, 51.2% of the patient was discharged less than four hours and 43.4% patient was discharged less than two hours.

The intervention that was implemented was early pre-discharge plan, medication dispensing in the ward, discharge trolley formation and file compilation that was done only after the patient left the ward. This intervention, while it may look like a simple effort, can have a big effect after we eliminate all waste and non-added value.

OPTIMISING LEAD TIME FOR TREATMENT OF NEONATAL JAUNDICE PATIENTS AT KLINIK KESIHATAN KOTA JEMBAL

Muhamad, A.M.*, Ibrahim, A.F., Nik Ab Rahman, N.N., Ishak, H., Mohammad @ Ismail, N., Che Bakar, I.

Klinik Kesihatan Kota Jembal, Ministry of Health Malaysia.

*Corresponding author: Ahmad Mustaqiim Muhamad, Klinik Kesihatan Kota Jembal, Bandar Kota Jembal, Kedai Lalat, 16150 Kota Bharu, Kelantan, MALAYSIA. Email: ahmadmustaqiim@gmail.com.

ABSTRACT

Background and Problem Statement
In 2022, a total of 27,714 cases attended the maternal and child health (MCH) unit at Klinik Kesihatan Kota Jembal. Among 6,548 cases of blood taking in MCH, 2003 (30%) cases were for neonatal jaundice. On average, the lead time for neonatal jaundice patients was 47 minutes. Despite achieving waiting time for paediatric outpatient cases below 60 minutes, there were multiple complaints and dissatisfaction among accompanying postpartum mothers to improve waiting time. This project aims to reduce lead time by 25% for neonatal jaundice treatment at the clinic.

Value Stream Mapping (VSM)
Current VSM showed neonatal jaundice patients had to encounter six stations from triaging to the consultation room. These involved 48 meters distance (159 walking steps). From the value analysis, there were 32 processes, 5 value-added, 7 non-values added, and 10 wastes (*muda*) and *muri*. Post *kaizen*, VSM was reduced to five stations, and the lead time was 35 minutes (25.5% reduction). *Muri* was successfully eliminated, and *Muda* was reduced to seven (30% reduction).

Root Cause Analysis (RCA)
No priority lane for the neonates, bottleneck at the examination station, sharing of room for blood taking, and imbalance work allocations were the root causes identified by the fishbone diagram.

Countermeasures and Action Plan
Five *kaizen* bursts have been implemented at four stations by removing the triage counter, instilling an extra baby cot to facilitate changing clothes for the baby, an additional setup for blood taking during peak hours and providing a neonatal fast lane. *Heijunka* was applied by reorganising staff to assist in the procedure room.

Sustainability
A step forward has been taken to maintain sustainability by spreading this project's *kaizens* as a component in establishing a standard workflow for neonatal jaundice patients in all health clinics in Kelantan. Besides, the lean journey will be monitored every six months via *Gemba* for the continuity of the new policy. In conclusion, the lean philosophy is proven to be an effective tool to enhance value for patient care.

PENDING ADMISSION DASHBOARD EMERGENCY DEPARTMENT HOSPITAL BUKIT MERTAJAM

Khor, C.C.*, Kamarudin, N.I., Mohd Abdul Kader Jailani, M.F., Abdul Manap, S.A., Othman, N., Mohamad, A.S., Mohd Razally, I.S.

Emergency and Trauma Department, Hospital Bukit Mertajam, Ministry of Health Malaysia.

*Corresponding author: Chin Chuan Khor, Jabatan Kecemasan dan Trauma, Hospital Bukit Mertajam, Jalan Kulim, 14000 Bukit Mertajam, Pulau Pinang, MALAYSIA. Email: ahmadmustaqiim@gmail.com.

ABSTRACT

Background and Problem Statement
Emergency and Trauma Department Hospital Bukit Mertajam (HBM) has an average of 220 to 250 patient visits per day, with 30 to 50 admissions per day. A high bed occupancy rate in the ward will result in delayed admission from the Emergency Department (ED). Thus, backlog and overcrowding in the ED affect patient care. An efficient patient admission system through digitalisation named Pending Admission Dashboard Emergency Department (PADDED) HBM can help bed managers monitor stranded patients. All the data can be assessed online, and the waiting time is colour-coded.

Value Stream Mapping (VSM)
The pre-PADDED HBM showed a total of nine processes with a total process time (TPT) of 222 minutes and total waiting time (TWT) of 407 minutes, resulting in a process efficiency (PE) of 35.3%. The post-PADDED HBM revealed a total of 10 processes, with TPT of 172 minutes, TWT of 237 minutes and PE of 42.1%. The PE increased by 6.8%. Non-value-added activities identified were waiting, motion, transportation, and non-utilised talent. The value added was referring patients to the primary team and entering data in PADDED HBM.

Kaizen Burst and Root Cause Analysis (RCA)
The implementation provides a centralised and visual representation of pending admission applications, allowing bed managers to have a comprehensive overview of the admission pipeline. It enables quick and easy monitoring of the patient status, and prioritisation of patient admission can be done based on the duration of waiting time. The Ishikawa diagram was used to identify a few issues, such as poor communication between ED and ward and prolonged length of stay.

Countermeasures and Action Plan
This system is placed under nurses' surveillance and will be updated regularly in the Bed Watcher WhatsApp group. The team leader will be notified if there are more than four stranded patients.

Sustainability
This project has been integrated into the standard operating procedures of ED and is part of Hospital Bed Watcher system initiatives.

LEAN DIGITAL TRANSFORMATION APPROACH IN HOSPITAL BUKIT MERTAJAM

Kamarudin, N.I.*, Tan, Y.H., Mohd Abdul Kader Jailani, M.F., Yusof, A.I., Abdul Manap, S.A., Mohd Razally, I.S.

Emergency and Trauma Department, Hospital Bukit Mertajam, Ministry of Health Malaysia.

*Corresponding author: Nurul Ibnu Kamarudin, Jabatan Kecemasan dan Trauma, Hospital Bukit Mertajam, Jalan Kulim, 14000 Bukit Mertajam, Pulau Pinang, MALAYSIA. Email: nurulibnu.k@gmail.com.

ABSTRACT

Background and Problem Statement
Digital courses are recognised as a valuable tool in today's digital landscape, offering benefits such as staff empowerment, continuous learning, and sustainable practices. The focus here is on the lean digitalisation initiative in healthcare, aiming to engage healthcare workers, improve their skills, and reduce paper usage. Embracing digital education fosters a culture of digital literacy, minimises paper waste, and contributes to a more efficient and sustainable future in healthcare.

Value Stream Mapping (VSM)
The pre-lean Digital Transformation Approach in Hospital Bukit Mertajam (LeaDIGITAPPHBM) showed a total of 13 processes with a total process time (TPT) of 3,515 minutes and a total waiting time (TWT) of 3,735 minutes, resulting in a process efficiency (PE) of 48.48%. The post-LeaDIGITAPPHBM revealed a total of 11 processes, with a TPT of 262 minutes, TWT of 99 minutes and a PE of 72.58%. The PE increased by 24.1%. Non-value-added (NVA) activities identified were over-production, waiting, transportation, inventory, and non-utilised talent. The value added was Google Form, e-receipt, registration dashboard, and presentation using miracast projection.

Kaizen Burst and Root Cause Analysis (RCA)
The implementation of LeaDIGITAPPHBM emphasizes the significant role of digital courses in reducing paper usage. This course encourages the transition from paper-based processes to digital workflows so that organisations can achieve substantial cost savings, minimise environmental impact, and enhance information accessibility and security. This abstract used the Ishikawa diagram to identify a few issues, such as manual operation and inefficient workflow.

Countermeasures and Action Plan
Digitalisation automates administrative duties and removes manual processes, decreasing the stress on healthcare workers and optimising workflow efficiency. This allows healthcare providers to spend less time on paperwork and boost overall efficiency.

Sustainability
Successfully implemented in Hospital Bukit Mertajam, from emergency department to outpatient clinics and wards. This system can be widely used in other healthcare facilities, which will result in better healthcare experiences for both patients and providers.

DIGITAL QUEUE BOARD EMERGENCY DEPARTMENT HOSPITAL BUKIT MERTAJAM

Valaigam, N.*, Kamarudin, N.I., Othman, N., Mohd Abdul Kader Jailani, M.F., Khor, C.C., Mohd Razally, I.S.

Emergency and Trauma Department, Hospital Bukit Mertajam, Ministry of Health Malaysia.

*Corresponding author: Nalene Valaigam, Jabatan Kecemasan dan Trauma, Hospital Bukit Mertajam, Jalan Kulim, 14000 Bukit Mertajam, Pulau Pinang, MALAYSIA. Email: unique3sha@gmail.com.

ABSTRACT

Introduction
In 2018, the key performance index for *Pengarah Kesihatan Negeri* for calls not attended (CNA) was less than one per cent in the non-critical zone (green zone). Generally, patients want to know roughly the estimated time waiting for consultation in non-critical areas. At the Emergency Department (ED) Hospital Bukit Mertajam, green zone visits in 2020 were 73% of all ED zones' visits and 78% in 2022. CNA in March 2020 while using a manual whiteboard update was documented as 3.1%. The target of <1% CNA was achieved in October 2022 after using digitalisation named Digital Queue Board Hospital Bukit Mertajam (DQ-BED HBM) with CNA of 0.3%.

Value Stream Mapping (VSM)
The HBM manual queue board update showed a total of four processes with a total process time (TPT) of nine minutes and a total waiting time (TWT) of eight minutes, resulting in a process efficiency (PE) of 52.9%. The post-DQ-BED HBM revealed a total of two processes, with a TPT of two minutes, TWT of zero minutes and a PE of 100%. The PE increased by 47.1%. Non-value-added activities identified were inventory, transportation, and non-utilised talent.

Kaizen Burst and Root Cause Analysis (RCA)
The Ishikawa diagram was used to identify a few issues. In a manual system, nurses need to calculate and times 10 minutes for each card to be seen. Then, nurses will go to the triage counter and write down the numbers. Using the DQ-BED HBM card's number, nurses will just put card in the table, it is auto-calculated, and updated with different colour codes: green (<11), yellow (<21) and red colour (<31).

Countermeasures and Action Plan
DQ-BED HBM is placed under nurses' surveillance and will be updated twice at 10 a.m. and 9 p.m. at weekends / public holidays, 9 p.m. on weekdays or when surge of patients happened.

Sustainability
Monitoring is done daily by updating WhatsApp group, and a weekly key performance index CNA review is done at ED Hospital Bukit Mertajam.

JAMBOARD VISUALISED BETTER

Yusof, A.I.*, Mohd Razally, I.S., Kamarudin, N.I., Othman, N., Mohd Abdul Kader Jailani, M.F., Tan, Y.H., Khor, C.C., Abdul Manap, S.A.

Emergency and Trauma Department, Hospital Bukit Mertajam, Ministry of Health Malaysia.

*Corresponding author: Dr Asrul Izzani Yusof, Jabatan Kecemasan dan Trauma, Hospital Bukit Mertajam, Jalan Kulim, 14000 Bukit Mertajam, Pulau Pinang, MALAYSIA. Email: asrulizzani@gmail.com.

ABSTRACT

Background and Problem Statement
Google Jamboard is an interactive digital whiteboard developed by Google that allows users to collaborate and share ideas visually with others. A visual board in lean is a physical or digital display that offers a visual representation of relevant data about a process, project, or team. It acts as a focal point for coordination, tracking development, and pinpointing areas for development. Google Jamboard works well as a virtual lean visual board to make visualised data more interactive and comprehensive.

Value Stream Mapping (VSM)
The pre-Google Jamboard showed a total of three processes with a total process time (TPT) of 90 minutes and a total waiting time (TWT) of 30 minutes, resulting in a process efficiency of 75%. The post-Google Jamboard revealed a total of three processes, with TPT of 30 minutes, TWT of zero minutes and PE of 100%. The PE increased by 25%. Non-value-added activities identified were inventory, motion, extra processing and non-utilised talent.

Kaizen Burst and Root Cause Analysis (RCA)
The Ishikawa diagram was used to identify a few issues. In a physical visual board, the preparation takes time, and the board has limitations on data that can be shown. The implementation provides a centralised and digital visual representation of the lean visual board using a QR code as a medium to assess the Google Jamboard. It easily tracks work progress updates and understands the current status of projects or processes.

Countermeasures and Action Plan
The Google Jamboard will be updated by the lean team member every four months, and the data will be kept in Google Drive.

Sustainability
The Google Jamboard was successfully used in the Emergency Department (ED) Hospital Bukit Mertajam and will be integrated into the standard operating procedures of ED. The Google Jamboard will be widely used, such as in creating a virtual board dedicated to *Gemba* observations.

TO IMPROVE WAITING TIME AND LENGTH OF STAY OF PATIENT IN THE ORTHOPAEDIC CLINIC, HOSPITAL SULTANAH MALIHA

Abu Bakar Siddik, M.B., Ab Rahman, M.*, Ihsanulhadi, N.I., Abu Bakar, M.N., Salleh, N.F.

Orthopaedic Department, Hospital Sultanah Maliha, Ministry of Health Malaysia.

Corresponding author: Mahfuzah Ab Rahman, Jabatan Ortopedik, Hospital Sultanah Maliha, Bukit Tekuh, Jalan Padang Mat Sirat, 07000 Langkawi, Kedah, MALAYSIA. Email: mahfuzahrahman@gmail.com.

ABSTRACT

Background
Orthopaedic Clinic Hospital Sultanah Maliha (HSM) functions as the primary centre of orthopaedic referral in Langkawi Island. The increasing number of patients (average 50 to 60 patients per day) causes longer waiting times. The waiting time is an important indicator of service quality and reflects patient satisfaction. Hence, lean healthcare methods are undertaken as a tool to achieve this aspiration.

Value Stream Mapping (VSM)
Data was collected and consolidated in the VSM to calculate the total process time. There were ten steps of a process in the current VSM, with a total process lead time of 93 minutes and a total waiting time of 41 minutes.

Root Cause Analysis (RCA)
Analysis using the fishbone diagram shows: 1) Limited human resources, equipment, and space in the clinic. 2) Crowded patient in a limited amount of time.

Kaizen Burst, Countermeasures and Action Plan
After *kaizen* improvements have been identified, ten processes have been reduced to eight processes, and the implements are "direction with colour coded signage to physiotherapy, radiology, pharmacy, and occupational therapy", "desk organiser", "to come again (TCA) board", "Ortho box", and "staggered time appointment". After the implementation, waiting time at the clinic reduced to 37 minutes, which is below the key performance index standard.

Sustainability
Continuous data analysis and effectiveness evaluation were done every three months. This lean healthcare programme will be spread through knowledge sharing through talks and seminars, soliciting feedback from patients for further improvement, simplification of policy by making posters of flow and work process and encouraging participation in quality improvement competitions such as clinical audits and Hospital Specific Approach.

Conclusion
Lean is proven to be effective and successful in reducing clinic waiting time and length of stay. The sustainability of the initiatives relies on the philosophy of the organisation and its belief in the lean culture. Hence, support from all categories in the hospital is crucial.

STREAMLINED AND CONVENIENT CARE FOR EXPECTING MOTHERS: A VIRTUAL NEW ANTENATAL CARE THROUGH LEAN IMPLEMENTATION

Micheal, J.*, Molling, G., Kimlen, R., Humjoe, A.

Klinik Kesihatan Kota Sentosa, Ministry of Health Malaysia.

Corresponding author: Jennet Micheal, Klinik Kesihatan Kota Sentosa, Jalan Stakan, Kota Sentosa, 93250 Kuching, Sarawak, MALAYSIA. Email: jmd8416@yahoo.com.

ABSTRACT

Background and Problem Statement
Maternal and child healthcare workloads have been increasing year by year, especially in new antenatal booking mothers (10% increase compared to the previous year), antenatal cases, postnatal cases, and paediatric cases. This has contributed to congestion and long waiting times. Thus, our objectives are to reduce waste (waiting time, redundant documentation, traffic), barriers (geographic limitations, time constraints, and scheduling difficulties), personalised care (more privacy), and overall patient satisfaction during nurse consultation.

Value Stream Mapping (VSM)
Mapping of the area was done and there were 47 total steps. Steps in which the most time was wasted were identified. Pre-lean value analysis from patient registered till finished showed 13 value added steps, 25 value enablers, and 9 non-value steps.

Kaizen Burst and Root Cause Analysis (RCA)
Analysis of data showed the long waiting time for new antenatal booking was attributed to nurses' consultation time, no staggered appointment/walk-in, staff competency, and non-adherence to appointment. Pre-lean data from eight samples showed the average time for nurses' consultation on new antenatal cases was 48 minutes.

Countermeasures and Action Plan
Henceforth, immediate measures were implemented for the new suitable antenatal mother to participate in virtual consultation for nurses' consultation. Post-lean data from eight samples showed that the average time taken for the nurse's consultation reduced to 21 minutes.

Sustainability
Doing virtual consultation for new antenatal cases can help to reduce waiting time by 57%, indirectly reducing late bookers (Sustainable Development Goals target: early booking by 12 weeks > 70%) while developing new strategies to promote it among new mothers and can be applied in Standard Operating Procedures.

ESTABLISHMENT OF A MEDICAL BED MANAGEMENT UNIT TO ACCELERATE PATIENT ADMISSION AND TRANSFER OUT OF PATIENTS WITHIN MEDICAL WARDS DURING THE COVID-19 EPIDEMIC

Mohd Shabre, S.A.*, Md Said, R., Wan Ibrahim, N.R., Panem, S.P., Tan, S.Y.

Medical Department, Hospital Serdang, Ministry of Health Malaysia.

*Corresponding author: Syamimi Aslina Mohd Shabre, Jabatan Perubatan, Hospital Serdang, Jalan Puchong, 43000 Kajang, Selangor, MALAYSIA. Email: syamimiaslina@gmail.com.

ABSTRACT

Background and Problem Statement
In early 2022, our nation experienced a significant surge in COVID-19 cases, leading to an overload of patients in the emergency department (ED), including COVID-19, severe acute respiratory infection (SARI), and medical cases. The main cause of this overcrowding was the increased bed waiting time (BWT). Difficulties faced by ward personnel in accepting patients from ED and managing COVID/SARI step-down cases were major contributors to the admission delays. To address this issue, a Medical Bed Management Unit (BMU) was established with the aim of reducing BWT.

Value Stream Mapping (VSM)
There were seven stages involved in transferring a patient from ED to ward. The processing time for this transfer was 67 minutes, and there was a substantial waiting time of 1,090 minutes, resulting in a lead time of 19 hours and 18 minutes. The value analysis highlighted the presence of four non-value-added activities. To expedite patient admittance, VSM study identified four steps that could be eliminated and replaced with the development of a medical BMU. Upon implementing this change, the future state VSM showed a processing time of 39 minutes, a waiting time of 480 minutes, and a lead time of 8 hours and 42 minutes. This improvement resulted in a significant 45% reduction in lead time compared to the previous state. BWT, after the creation of Medical BMU, has reduced by 80.1% from November 2019 to July 2020.

Kaizen Burst and Root Cause Analysis (RCA)
Root cause analysis using the Ishikawa diagram was performed. Factors in task and technology, team, work, and environment, patient, and individual were identified. BMUs for medical patients were created.

Countermeasures and Action Plan
The creation of the Medical BMU aimed to expedite patient admissions and reduce BWT in medical department. This unit efficiently identifies appropriate patients and allocates beds based on their needs and conditions. They also enable early transfers from acute cubicles to accommodate acute admissions from ED. Moreover, the medical officers have direct access to trace COVID-19 test results, enabling them to expedite patient transfers to either clean or COVID-19 wards.

Sustainability
Creating a Medical BMU as part of a kaizen effort during the COVID-19 pandemic aids in accelerating patient admission to the ward. Providing orientation to incoming medical officers about the Medical BMU contributed to maintaining the progress achieved. Sustaining the Medical BMU involves partnering with the Hospital BMU and fostering cooperation among multidisciplinary teams to decrease the waiting time for each department within the hospital.

ADMISSION LOUNGE: STREAMLINING ELECTIVE ADMISSION BY INTERCONNECTING BED DEMANDS FROM ACUTE AND ELECTIVE PATHWAY

Nordin, N.A.A., Hasan, U.L., Mohd Arif, S.B., Ab Rahim, H., Kamarozaman, S., Maamin, R.F.*, Nordin, N.A.

Bed Management Unit, Nursing Division, Hospital Tengku Ampuan Rahimah, Ministry of Health Malaysia.

*Corresponding author: Rose Farizawaty Maamin, Hospital Tengku Ampuan Rahimah, Jalan Langat, 41200 Klang, Selangor, MALAYSIA. Email: anisadila87@gmail.com.

ABSTRACT

Background and Problem Statement
The increasing demand for hospitalisation necessitates strategies for the facilitation and optimisation of bed utilisation. At Hospital Tengku Ampuan Rahimah (HTAR), the Bed Management Unit (BMU) initially facilitates admission through the Emergency Department; however, there are also elective or acute elective admissions from specialist clinics and referral admissions from other hospitals. Unpredictable numbers of elective patients compete with the bed demand from the acute stream. The multi-gates of admission routes made BMU unable to manage daily elective cases, leading to improper prioritisation of cases.

Value Stream Mapping (VSM)
Current state VSM recognises five steps for elective admission in HTAR. The lead time was 385 minutes, but the actual process time required was only 35 minutes. The excessive time was contributed by non-value-added bed waiting. Future state VSM shows that the admission lounge (AL) enhances Bed Watcher system utilisation by establishing an early booking platform to manage elective bed requirements. Lead time was reduced to 80 minutes, and value-added activities were carried out while patients wait for bed. The elective admission patient's bed waiting time saw 79% reduction on lead time.

Kaizen Burst and Root Cause Analysis (RCA)
From the fishbone diagram, several factors affecting the ineffective coordination of elective admission were recognised. There was no dedicated team to monitor and manage elective admissions from multiple specialist/subspecialist clinics, which works in silos. This leads to overcrowding in wards and clinics with elective patients waiting for bed availability and indirectly affects the prioritisation of cases from the acute stream.

Countermeasures and Action Plan
AL re-engineered the elective admission process to improve patient flow and the hospital's service delivery. AL complements BMU in managing daily elective bed demands and providing quality service to customers by providing a designated area for elective cases, reducing time wasted waiting for bed availability by coordinating and promoting staggered admission time, and utilising the waiting time by providing hospital orientation and assisting with required blood or radiological investigations.

Sustainability
Hospital management involvement will streamline the elective admission process and promote multidisciplinary teamwork in order to achieve service standardisation. Incorporating the AL process flow in BMU Policy as references and establishing training modules may ensure compliance towards the flow.

USING LEAN METHODOLOGY TO IMPROVE PATIENTS' WAITING TIME IN ORTHOPAEDIC CLINIC HOSPITAL KUALA LUMPUR

Zainal Abidin, N.A., Mohd Khalid, S.*, Mohamad, F., Masri, N., Mohd Said, N.A., Shamsul Baharin, S., Elias, M.H.H., Jamal, Z.

Orthopaedic Clinic, Hospital Kuala Lumpur, Ministry of Health Malaysia.

*Corresponding author: Sharina Mohd Khalid, Klinik Ortopedik, Hospital Kuala Lumpur, Jalan Pahang, 50586 Kuala Lumpur, MALAYSIA. Email: j.alfattah@gmail.com.

ABSTRACT

Background and Problem Statement
Efficient patient flow and reduced waiting time are crucial for enhancing patient satisfaction in healthcare services. To address this challenge, the application of lean methodology was employed to analyse patient flow and minimise waiting time in a clinic. With a daily patient load of 200 to 300 patients, meeting the Key Performance Indicator of a 90-minute waiting time set by the Ministry of Health posed difficulties.

Value Stream Mapping (VSM)
VSM was utilised to examine the time taken from patient arrival to registration, consultation, procedures, and scheduling of the next appointment. The average waiting time from patient arrival to consultation was identified as 148 minutes.

Kaizen Burst and Root Cause Analysis (RCA)
Root cause analysis using the fishbone diagram, identified inadequate manpower, a high number of patients, and limited collaboration with other clinical and supportive departments as the primary causes of the problem. The influx of conservatively treated patients, who declined treatment at local health clinics due to the unavailability of specific Class A drugs, as well as new cases from the Emergency Department (ED), also contributed to the patient volume. Additionally, poorly organised patient files in the Record Unit resulted in difficulties locating patients' medical records, further prolonging waiting times.

Countermeasures and Action Plan
To address these issues, several measures were implemented. *Kaizen* bursts involved placing appointment books and forms in the Green Zone in collaboration with ED to control the number of walk-in patients. Cooperation with the pharmacy department ensured the availability of controlled medicines (Class A drugs) at the local health clinics to encourage the discharge of conservatively treated patients from orthopaedic clinic. Collaboration with the Record Unit involved rearranging manpower and enlisting orthopaedic staff (*Pembantu Perawatan Kesihatan*) to work overtime in organising and locating patients' medical records. Non-active medical records were expedited for disposal to create a more organised space in the record office. Staggered appointment times and a block system were also implemented to alleviate overcrowding at the registration counter. Following the execution of these improvements, patient volume in the orthopaedic clinic was managed effectively, and patients' medical records were easily traced. Waiting times for patients improved to 85 to122 minutes, leading to increased overall patient satisfaction.

Sustainability
In conclusion, achieving a successful mission of reduced waiting times requires continuous cooperation between departments.

IMPROVING CLIENT SATISFACTION BY REDUCING THE LEAD TIME OF BLOOD-TAKING PROCEDURE IN KLINIK KESIHATAN TEMANGAN

Mohamad Basir, U.Y.*, Ahamad@Abdul Razak, N.E.W., Syed Mahmood, S.E.

Klinik Kesihatan Temangan, Ministry of Health Malaysia.

Corresponding author: Ummi Yasirah Mohamad Basir, Klinik Kesihatan Temangan, Temangan, 18400 Machang, Kelantan, MALAYSIA. Email: ummiyasirah11@gmail.com.

ABSTRACT

Background and Problem Statement
Quality of service in many organisations has benefited from the implementation of lean principles in reducing waste and improving operational efficiency. Klinik Kesihatan Temangan is a Type 5 clinic with an average of 120 clients per day, of whom 30 to 40 came for blood-taking procedures. Seventy-five per cent of them are non-communicable disease (NCD) patients. Based on a survey done, blood-taking has been one of the main problems causing dissatisfaction among NCD patients who need to spend almost one hour for this procedure. Therefore, lean implementation is done for the blood-taking procedure.

Value Stream Mapping (VSM)
According to current VSM, patients need to go through three main stations (registration counter, procedure room, and laboratory) and on average, patients need to spend 50 minutes for this procedure. In future VSM, *kaizen* bursts manage to increase clients' satisfaction towards quality of service for this blood-taking procedure (assessed by using CSAT score - 0% of clients rated as "satisfied" and "very satisfied" for pre-*kaizen*, to 73.3% for post-*kaizen*).

Countermeasures and Action Plan
This was achieved by adding one more staff member in the procedure room during peak hours, relocating the procedure room nearer to the laboratory, and having all clients for this procedure registered in the procedure room. These countermeasures remarkably reduced lead time to 16 minutes (68%), reduced 12 process steps to eight (33.3%), and reduced distance to 18 steps (78%).

Sustainability
This lean journey is monitored every six months to maintain its sustainability, and it should be extended to all units/procedures in our healthcare settings in the future. Steps have been taken to implement lean principles in other health facilities in the Machang District Health Office by giving lean awareness through continuous medical education. It has been proven that lean implementation is a good way to improve clients' satisfaction and optimise overall service performance.

ONE-STOP CENTRE FOR APPLICATION *OF PERTUBUHAN KESELAMATAN PEKERJA* OR *KUMPULAN WANG SIMPANAN PEKERJ*A MEDICAL REPORT

Radhakrishnan, J.*, Mohamad Azmi, A., Hassan, N., Anthony Dass, V.A.M., Yee, S.Y., Bavanandan, S.

Nephrology Department, Hospital Kuala Lumpur, Ministry of Health Malaysia.

Corresponding author: Jayakiran Radhakrishnan, Jabatan Nefrologi, Hospital Kuala Lumpur, Jalan Pahang, 50586 Kuala Lumpur, MALAYSIA. Email: jkiranr94@gmail.com.

ABSTRACT

Background and Problem Statement

Chronic kidney disease stage 5 patients are funded by *Pertubuhan Keselamatan Pekerja* (PERKESO) for long-term dialysis upon application and submission of medical reports. The aims are to shorten the waiting time for completion of PERKESO/*Kumpulan Wang Simpanan Pekerja* (KWSP) medical reports, reduce the number of patients admitted for urgent dialysis, and provide a more patient-centric service.

Value Stream Mapping (VSM)

The initial process requires up to 28 working days. Pre-dialysis patients would need to confirm their eligibility at the KWSP/PERKESO office, obtain relevant forms, and their application will be submitted to the *e-Sistem Permohonan Lembaga Perubatan* (e-SPLP) system by Hospital Kuala Lumpur main records office. Their records were retrieved and sent to the Nephrology Office for a specialist to complete the report. Patients will get the report to be submitted to the KWSP/PERKESO once it has been completed and returned to the records office.

Kaizen Burst and Root Cause Analysis (RCA)

Four main root causes of delay were identified and analysed using a fishbone diagram. They include a lack of awareness among records officers to prioritise applications, overcrowding in the records office, multiple redundant steps within the application system, and inability to offer these services at the Nephrology clinic.

Countermeasures and Action Plan

Application for medical records were handled by the nephrology clinic clerk. Medical records can be accessed via Nephrology electronic medical records, and completed medical records can be collected from the nephrology clinic. Since the implementation of lean care approach in May 2020, 94.5% of medical records were completed within 14 days, with a mean turnaround time of 8.2 days once these interventions were implemented, compared to 93.8% completed within 28 days. This also offered a more patient-friendly service, such as saving patients from walking multiple trips of one kilometre under the hot sun between the Nephrology clinic and records office.

Sustainability

This new initiative has been running quite well since 2020, and the workflow process and workflow process have been outlined. However, more staff need to be trained to extend this service to include other types of medical reports.

FROM BOTTLENECK TO BREAKTHROUGH: SIMPLE LEAN SOLUTIONS TO REDUCE PATIENT'S WAITING TIME IN AN OUTPATIENT'S UNIT OF A RESOURCE LIMITED, GOVERNMENT HEALTH CLINIC

Lis, E.S.*, Jerampang, P., Mathew Nyodem, H.M.

Outpatient Unit, Klinik Kesihatan Tanah Puteh, Ministry of Health Malaysia.

*Corresponding author: Esther Sumi Anak Lis, Unit Pesakit Luar, Klinik Kesihatan Tanah Puteh, Jalan Kwong Lee Bank, Tanah Puteh, 93450 Kuching, Sarawak, MALAYSIA. Email: er8598@googlemail.com.

ABSTRACT

Background and Problem Statement

Klinik Kesihatan Tanah Puteh is a Type 4 clinic with 20 medical officers and two family medicine specialists. From January to March 2023, the average daily attendance was 300 patients, totalling 22,388 for that period. Among them, 23% (n=5,325) were active diabetic patients. Although nearly 90% of patients were seen within the key performance index of 90 minutes from arrival, numerous complaints from patients about the long waiting time received. The existing e-Masa focuses on capturing patients' arrival time up till the doctor's consultation call, but it neglects the overall time spent in the clinic, from arrival to exit.

Value Stream Mapping (VSM)

Diabetic patients are triaged in a dedicated room where vital signs and necessary screening take place before consultations. Non-diabetic patients go through a separate triaging process. VSM revealed long waiting times at the treatment room (TR) and diabetic room (DR), which were 30.1 minutes and 30.1 minutes, respectively.

Countermeasures and Action Plan

Kaizen at TR, which includes strategically placing seats within an audibility radius, informative signage, and implementation of a standardised referral chit for referral to TR, significantly reduced waiting time by 22.3 minutes. *Kaizen* at DR, which included pharmacy queue rerouting, optimising room signage, and assigning underutilised staff, led to a waiting time reduction of 4.7 minutes. Additionally, the optimisation of an online lab information system enabled real-time tracking of specimen results and reduced patient movement and staff workload. This intervention resulted in a 32% reduction (63.20 minutes) in total lead time and a 39.5 minute reduction in overall waiting time, with the elimination of four waste steps.

Sustainability

To ensure sustainability, we plan to implement *kaizen* burst at other units and facilitate ongoing monitoring, evaluation, and continuous improvement efforts.

REDUCING THE TIME TAKEN TO COMPLETE TODDLER REGISTRATION FOR FLUORIDE VARNISH APPLICATION IN THE KOTA BHARU DENTAL CLINIC

Mohamed, N.A.*, Wan Mohamed, W.N.F., Que, J.M., Wan Ismail, W.N., Wan Mohammad Din, W.M.N., Che Mat, M., Ahmad, R., Ab Razak, A.

Kota Bharu Dental Clinic, Ministry of Health Malaysia.

Corresponding author: Dr. Nurin Amalina Mohamed, Klinik Pergigian Kota Bharu, Jalan Mahmood, Bandar Kota Bharu, 15200 Kota Bharu, Kelantan, MALAYSIA. Email: drnurinamalina@moh.gov.my.

ABSTRACT

Background and Problem Statement
Fluoride varnish (FV) application is the only professionally applied topical fluoride recommended for dental caries in toddlers. For effective prevention, there should be at least four FV applications at six monthly intervals, starting with the first FV application at one to two years old. The dental surgery assistant spent more than one-hour completing new toddler registration for the FV application. This delay would lead to loss of data and will end up with duplication of dental records. This compromises safety, could delay care, and result in inappropriate care for toddlers. The aim is for toddler registration for the FV application to be completed within an hour. Therefore, the main objective of this lean health project is to reduce the time taken from registration to filing the dental card.

Value Stream Mapping (VSM)
The VSM study identified 13 procedures. The processing time was 49.5 minutes, the waiting time was 26.5 minutes, and the lead time was 1 hour and 16 minutes. Value analysis had four processes categorised as "value added", while as many as two processes were "non-value added". A total of seven processes were counted as "value enablers". The main contributors to the whole process were "extra processing" and "waiting".

Kaizen Burst and Root Cause Analysis (RCA)
Using the fishbone diagram, the main causes that delayed the registration process were manual registration and documentation, shortage of human resources, unorganised filing of dental records and improper tagging, and misplaced or delayed dental records given by dental officers to dental surgery assistants.

Countermeasures and Action Plan
Kaizen was made to minimise tasks by using online registration, digital daily monitoring, a smart appointment system, task efficiency, easy traceability, and well-organised dental records. *Kaizen* has successfully reduced registration time to 58.5 minutes and reduced the working process to 10 processes.

Sustainability
Lean sustainability will be monitored periodically through *Gemba*, continuously integrated with the new system, and shared with other clinics.

IMPROVING LONG WAIT FOR PATIENTS TO COLLECT MEDICINE IN HOSPITAL SULTANAH AMINAH, JOHOR BAHRU

Muhamad, S.A.*, Abdul Rashid, A., Balakrishnan, A., Abdul Rahman, F.N., Mohhan, S.

Outpatient Pharmacy Department, Hospital Sultanah Aminah, Ministry of Health Malaysia.

*Corresponding author: Siti Aishah Muhamad, Jalan Persiaran Abu Bakar Sultan, 80100 Johor Bahru, Johor, MALAYSIA. Email: caisa.muhd@gmail.com.

ABSTRACT

Background and Problem Statement
The Outpatient Pharmacy of Hospital Sultanah Aminah, Johor Bahru (HSAJB) serves an average of 1,800 patients daily. Prolonged waiting times due to inefficiencies and overcrowding have led to an increasing number of complaints. On average, patients currently experience a 76-minute wait time to collect their medication at HSAJB, well above the standard Key Performance Indicator of 30 minutes.

Value Stream Mapping (VSM)
The drug preparation process involved seven stages in the VSM, with a total of 13 steps. The average waiting time for patients to receive their medication was 76-minutes, with 69.1 minutes considered a non-value-added time and 7.1 minutes as a value-added time. The patient's journey experience was considered at each stage of the VSM.

Kaizen Burst and Root Cause Analysis (RCA)
Fishbone diagrams were employed to identify the main root causes, including insufficient workflow, limited counter space, inadequate resource allocation, overcrowding, and understaffing. A total of 30 areas of waste were identified. To address the issues, eight *kaizen* bursts were implemented, focusing on process optimisation, workflow improvement, infrastructure enhancement, and patient mobilisation.

Countermeasures and Action Plan
Kaizen bursts led to the development of a standardised process with total lead times reduced to 4.9 minutes. The seven stages of VSM were streamlined to three, and the total processes were minimised from 13 to 6. Workforce optimisation resulted in reducing personnel for medication dispensing from six to one. This was accomplished by prioritising countermeasures, including the utilisation of the MedXpress ordering service and the enhancement of collection infrastructures, resulting in a significant reduction in waiting times. MedXpress, an innovative digital solution, pre-prepares medicines so that patients can conveniently collect them at the new collection point known as *Pusat Pengambilan Ubat Susulan Setempat*.

Sustainability
To ensure the sustainability of these improvements, continuous monitoring and evaluation processes have been established. Lean awareness is promoted by creating a "Lean Corner" and empowering *kaizen* culture through weekly *Gemba* and brainstorming sessions.

IMPROVEMENTS ON THE ORDERING SYSTEM AND THE SERVING OF FOOD SERVICES AT HOSPITAL KUALA LUMPUR

Abdul Rashid, S.[1]*, Abdul Rahman, N.A.[2], Mahmud, M.N.[1]

[1]Dietetic and Foodservice Department, Hospital Kuala Lumpur, Ministry of Health Malaysia.
[2]Dietetic and Foodservice Department, Hospital Tunku Azizah, Ministry of Health Malaysia.

*Corresponding author: Suhaila Abdul Rashid, Jabatan Pemakanan dan Perkhidmatan Makanan, Hospital Kuala Lumpur, Jalan Pahang, 50586 Kuala Lumpur, MALAYSIA. Email: suhaila.rashid@moh.gov.my.

ABSTRACT

The online patient food ordering system helps staff to review order data in real-time and process it efficiently in order for the food to be delivered to the patient exactly as prescribed, and thus, it can help to avoid food wastage and other related costs as a whole. A total of seven ward pantries were involved in the study, where the study was conducted before and after using the online system as well as before and after using the centralised serving system. The results of the study found that there was an increase in the accuracy percentage of food servings from 84.5% (2020) to 87.6%, a decrease in the cost of food waste by an estimated six per cent (from 17% to 11%); and through centralised serving, no food wastage was found in four ward pantries. The conclusion of this study is the online patient food ordering system can help patients get the right food as prescribed, portioned according to scale, the food prepared at the kitchen level according to the actual number of patients in the ward, and finally, the cost of preparation and the serving of food is carried out prudently and effectively.

IMPROVING CHILDREN'S JOURNEY FROM HOSPITAL BEDS TO THEIR BEDS AT HOME

Ka, L.H.*, Hadzir, A.S., Mohd Khairi, M.

Paediatric Ward (Melur), Hospital Sultan Haji Ahmad Shah, Ministry of Health Malaysia.

*Corresponding author: Ka Liang Ho, Wad Pediatrik (Melur), Hospital Sultan Haji Ahmad Shah, Jalan Maran, Taman Harapan, 28000 Temerloh, Pahang, MALAYSIA. Email: hokaliang@hotmail.com.

ABSTRACT

Being discharged from the hospital is often a joyous news for the child and parent. However, a prolonged discharge time affects the experience for patients and carers and has devastating effects on ward overcrowding, cancelled discharges and prolonged bed waiting time for other children needing admissions. Lean healthcare is an adaptation from the original lean concept coined by Taiichi Ohno for the Toyota Production System based on the philosophy of achieving the complete elimination of all waste in pursuit of the most efficient methods. This poster will depict the process of discharging a patient from the paediatric ward by reviewing existing hospital discharge policies with reference to the national standard of Discharge Time (DT) of less than 240 minutes. Value Stream Mapping (VSM) was created based on that and modified according to the "actual practice" happening at ground level by using the "*Gemba* concept". Analysis of every component in VSM was conducted with various lean tools, and "*Kaizen* Burst" was applied to streamline the process to become more efficient. A framework was developed to capture key indicators for comparison pre-and post-lean implementation, such as median discharge time, DT, Bed Occupancy Rate (BOR) and bed turnover time. The pre-lean data before 2019 depicts a median discharge time of six hours, an overall throughput DT of less than 240 minutes at 25 to 50%, and a BOR of 110-120%. Post-lean data (2019-2020) showed a reduction in median discharge time to two and half to three hours, an overall throughput DT of less than 240 minutes up to 75%, and a BOR of 90 to 110%. However, the post-COVID-19 era data (2022) showed some drop in performance. The results showed that lean healthcare is important in improving patient experience and creating a more efficient workflow to reduce the burden on healthcare workers. It also highlights the challenges of implementing lean healthcare, such as silo mentality, resistance to change, sustainability and complacency.