

Proactive Improvement for Handling Patients with COVID 19 During the Pandemic, in PHC, Riyadh, Saudi Arabia

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Abstract

Background: Dealing with the surge of the COVID-19 pandemic patients in the health care facilities needs proper ways to effectively detect the patients with flu symptoms and prevent the transmission of the infection to the other patients and the health care workers in the same time. The fundamental aim of this project is. To improve early detection and management of Covid19 patients during covid19 pandemic

Methods: Intervention: Failure Mode Effect Analysis, (FMEA) was used as a Methodology for improvement starting by Possible risk of transmission of infection during patient movement in Wazarat primary healthcare center

Implemented change concepts in the form of: (1). Reduce unnecessary steps in patients suspected to have covid19. (2). Performing tasks parallel with the main process, (3). Smooth workflow in a step. (4). Eliminate hand-off failure. (5). Replace with a better value steps, based on outcome redesign the work process

Results: Improve Average Pre consultation from 22 minute to 1 minute, Improve Average consultation from 17 to 4 minutes, before swabbing time improved from 7 to 2 minutes, Improved Pharmacy waiting time from 4 to 1, Patient journey improved from 50 to 8 minutes. Outcome results; outbreak infection rate between healthcare professionals Improved overall from 9.8% to 0.5%. Balancing results Overall staff satisfaction Improved from 24% to 85%.

Conclusions: In situations of uncertainties like covid19 pandemic, urgent management of situation and interventions are needed. Proactive quality improvement tool like Failure mode and effect analysis and change management concept is recommended to improve.

Keywords: COVID-19; Visual Triage; Outbreak Infection Rate; FMEA; Pandemic; Swabbing for Covid19

Abbreviations

FMEA: Failure Mode Effect Analysis

Introduction

Problem description

Coronaviruses are a large family of RNA viruses that cause illnesses ranging from the common cold to more severe diseases.

The new strain of coronavirus was identified in December 2019 and has been named by the International Committee on Taxonomy of Viruses (ICTV) as Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-CoV-2). The WHO has named the disease associated with SARSCoV-2 Infections as Corona Virus Disease 2019 (COVID-19). The COVID-19 pandemic is affecting the whole world health care systems including Saudi Arabia. According to the KSA

Ministry of Health, total number of confirmed cases of COVID-19 is approaching 350,000 cases (beginning of November 2020). Dealing with the surge of the COVID-19 pandemic patients in the health care facilities needs proper ways to effectively detect the patients with flu symptoms and prevent the transmission of the infection to the other patients and the health care workers in the same time. Triage is defined as "The sorting out and classification of patients or casualties to determine priority of need and proper place of treatment" [1].

Triage is particularly important to separate patients likely to be infected with the pathogen of concern. In 2017 the Saudi Ministry of Health released a visual triage system with scoring to alert healthcare workers in emergency departments (EDs) and hemodialysis units for the possibility of occurrence of MERS-CoV infection [3] visual triage play very crucial role for prevention and control of MERS CoV/H1N1 among health care professionals [2].

Rationale

Proper handling of patient during covid19 pandemic contributes toward early detection and risk reduction for the patients and health care workers attending the primary health care facility. Visual triage has a crucial role in isolating patients that can potentially transmit infections to other patients or healthcare professionals. The inability to detect the patient suffering from COVID19 contributes to the spread of infection in the center.

Project objectives

The fundamental aim of this project is to improve early detection and management of Covid19 patients during covid19 pandemic.

Specific aims

- To proactively prevent the outbreak of infection to healthcare professionals from the COVID-19 infection. (Less than 5% of health care workers in the center).
- To Decrease total waiting time for patient with suspected covid19 in the center total management process from 50-minute to 13 minutes divided as follows. (3 minutes from visual triage to consultation for consultation, 5 minutes consultation, and 2 minutes waiting for swab, 2 minutes for swab 1 minute for medication dispensed)

- To Improve isolation process distancing, PPEs to and alcohol hand rub to 100%
- To Improve priority pass of patients with covid19 in the primary health care center to 100%
- To redesign the center clinical area to fit the covid19 patient management process in terms of (area for triage, redesign patient flow, adding fever clinic, isolation room, and specific pharmacy).

Materials and Methods

Research design

Intervention: FMEA will be used as a Methodology for improvement starting by possible risk of transmission of infection during patient movement in Wazarat healthcare center (Table 1,2). Implementation change concepts in the form of: Reduce unnecessary steps in patients suspected to have covid19, Redesign of the patient flow from the entrance to discharge detailed flowchart (process Map) was the quality tools used to develop new pathway starting from patient entrance ended by patient discharged from the center (Figure 2). Performing tasks parallel with the main process, Smooth workflow in a step, Eliminate hand-off failure, Replace with a better value steps, based on outcome redesign the work process, matrix flowchart was used as quality tools to Redesign of the facilities and infrastructure to cover the new requirement (Figure 3). The strategy proposed for dealing with the COVID-19 cases (visual triage) has the following criteria: (1) Alignment with WHO, MOH, MSD, PSMMC and FCM mission and strategic goals in facing Covid 19 pandemic. (2) Meeting the infection control and patient safety standards. (3) Meeting the strategic goals of Al Wazarat Health Care Center strategic plan. (4) Covering the gaps and recommendations of safety around conducted during pandemic. (5) The implementation of the visual triage is supposed to achieve:

- Proper patient triage system.
- Safe environment for patient and healthcare workers
- Improve patient flow in the center.
- Improve services provided according to patient needs
- Improving the compliance with IPC precautions.

Analysis

The initial process to define the gaps in the process of handling the patient in the Wazarat center starting at center entrance to avoid transmission of the infection from the suspected patient to other patient or in-between healthcare provider’s detailed flow-chart (process Map) was the quality tools used to define the possible risk during patient moving in-between the services provided in the center (Figure 1).

Figure 1: Possible risk of transmission of infection during patient movement in Wazarat healthcare center.

Figure 2: Redesign of the patient flow from the entrance to discharge.

Results and Discussion

Results and discussion must illustrate and interpret the reliable results of the study.

Conclusion

Conclusion should reflect and elucidate how the results correspond to the study presented and provide a concise explanation of the allegation of the findings.

Figure 3: Redesign of the facilities and infrastructure to cover the new requirement.

(1) Failure Mode	(2) Effect	(4) Severity	(3) Potential Cause	(5) Occurrence	(6) Detectability	(7) RPN	(8) Rank
What you observed when failure occurs	How the failure impacts the customer	How severe is the effect to the customer? (10 - 5 - 1)	The most likely causes of the failure-this line must always be filled in	How often does the cause or Failure Mode occur? Common Rare 10 5 1	How likely are we to be able to detect the failure or cause? Unlikely Likely 10 5 1		
Process failure The unavailability of visual triage check point at the entrance No clear or specific pathway for suspected or confirmed patient with Covid 19) No specific medication management process No unidirectional patient flow for suspected or confirmed patient with Covid 19) No clear hand of process No clear pathway for confirmed positive patient Long Waiting time in the all process and in between .		9		10	9	990	1
Unclear Guideline and case definition for Covid 19 Pandemic Changing in the Guideline (new pandemic) No Specific patient registration form in the system. Failure in visual triage screening tools.		6		7	5	210	4
Infrastructure deficiency The un availability specific waiting and consultation area for suspected or confirmed patient with Covid 19) No specific area for swabbing (-ve) pressure room.		9		8	9	648	2
Improper training for IC PPEs Over utilization of PPEs. No clear infection control measure for transferring high risk/confirmed patients with covid19		5		6	9	270	3

Table 1: FMEA - Handling patients with COVID 19 during the pandemic proactive improvement.

	Failure mode selected	Change Concepts applied	Action	Collection of Data	Statues
Process Failure	1	The un availability of visual triage check point at the entrance	Smooth work flow in the steps	Developed 4 visual triage check disk at the entrance. Keeping Distancing 1.2 meters in-between patient and patient Adopting MOH KSA Visual triage Forms. Applying All IC percussion in all process. Applying patient identification at the check points see attached form 2)	Daly observed Reported Weekly Done And on-going monitoring
	2	No clear or specific pathway for suspected or confirmed patient with Covid 19)	Smooth work flow in a steps Eliminate hand of failure	Developing new patient flow process starting from the entrance.	Daly observed Reported Weekly Done And on-going monitoring
	3	No specific medication management process	Smooth work flow in the steps	Developed new pharmacy in the area of fever clinics Preparing ready medication doses according to the protocol	Daly observed Reported Weekly Done
	4	No unidirectional patient flow for suspected or confirmed patient with Covid 19).	Smooth work flow in the steps Perform tasks parallel with the main process	Redesign the facilities in the fever clinic to be in unidirectional flow (see attached form 2) Unidirectional patient flow for XR rea outside the fever clinic and within the center.	Daly observed Reported Weekly Done And on-going monitoring
	5	No clear hand of process	Eliminate hand off failure	Special track one to one nursing handing confirmed (+ve) Covid patient to the specific area at fever clinic.	Daly observed Reported Weekly Done And on-going monitoring
	6	No clear pathway for confirmed	Redesigned the process based on the outcome	Transferring unstable confirmed (+ve) Covid patient to Hospital ER. Developing IC Guideline for transportation (see attached form 3)	Daly observed Reported Weekly Done
	7	Long Waiting time in the all process and in between.	Smooth work flow in a steps Eliminate steps On-going redesigned the process based on the outcome	Standardization of healthcare services provided in relation to the facilities of the center. Modified MOH HESN Form to me partial electronic system for	Daly observed Reported Weekly Done And on-going monitoring
Infra-structure deficiency	1	The un availability specific waiting and consultation area for suspected or confirmed patient with Covid 19)	Replace with better value step	Redesigned the waiting areas to be 2 pre consultation And 2 in between process before swabbing with HEBA filters. Developed 4 fever clinics which will deal with suspected patient with Covid 19. Supported documentation room for the consultation area.	Daly observed Reported Weekly Done And on-going monitoring
	2	No specific area for swabbing (-ve) pressure room.	Replace with better value step	Developed new 2 Isolation rooms for swabbing with multi-laminated air flow Applling all IC and safe environmental standard. Developed new protocol for cleaning and disinfection of the rooms. Developing and Implementing of new evidence base monitoring process with deferential pressure device to monitoring air flow exchange and (-ve) pressure	Daly observed Reported Weekly Done And on-going monitoring

Table 2

Results

Process KPIs:

The infrastructure in the center redesigned between the eight services (visual triage at center Entrance, emergency isolation respiratory room in the Fever clinics area, fever clinics waiting area, dedicated fever clinic, Flu pharmacy, and negative pressure isolation room for swabbing and other clinic in the center) patient was directed between the services according to the patient categories, conditions and initial diagnoses, critical and highly suspected patient marked by red lines in the pathway and low risk patient marked by green line.

It was challenges during pandemic to redesign the services and create new isolation rooms with multi laminated airflow, modify an area was specific for emergency management to be an area for fever clinics isolation, and swabbing rooms. The training of the staff on the new process Applying the infection control measures and percussion in each steps in the process was a big challenges because of the individuals can also be infected from touching surfaces contaminated with the virus and touching their face (e.g., eyes, nose, mouth). While COVID-19 continues to spread it is important that health care facilities take action to prevent further transmission, reduce the impacts of the outbreak and support control measures [7].

Monitoring of the project categorized in three type of Key performance indicators process, outcome and balance.

Process	Outcome	Balancing
Waiting time	Outbreak infection rate between healthcare professionals (per categories)	Staff satisfaction
Average Pre consultation.		
Average Consultation.		
Average waiting time before swabbing.		
Average waiting time in Pharmacy.		
Over all patient Average journey time.		

Table 3

Pre consultation waiting time improved from 22minutes to 1 minute.

Figure 4

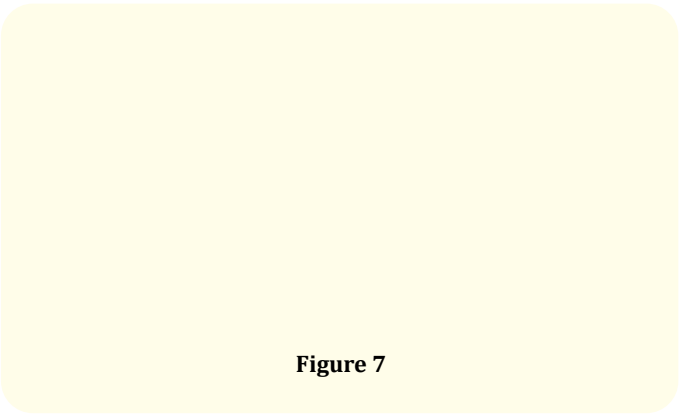
Average Consultation time improved from 17 minutes to 4 minutes.

Figure 5

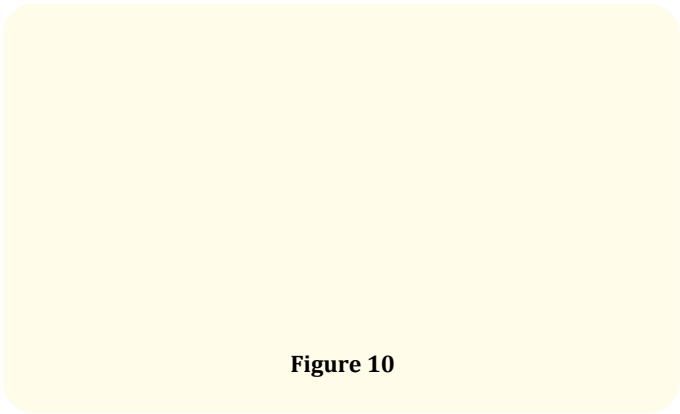
Patient waiting time before swabbing decreased from 7 minutes to 2 minutes.

Figure 6

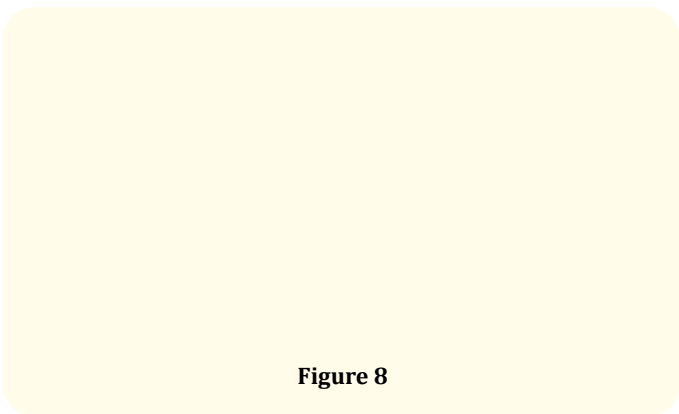
Patient waiting time to dispense medication decreased from 4 minutes to 1 minute.



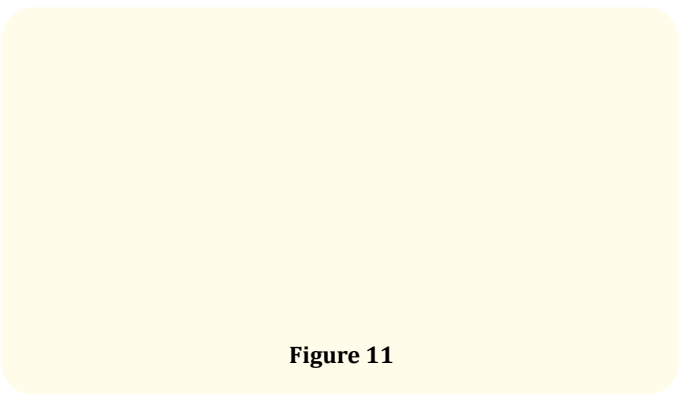
Covid19 infection among physicians dropped to 0.9% in Sep and to 1.6% in Oct.



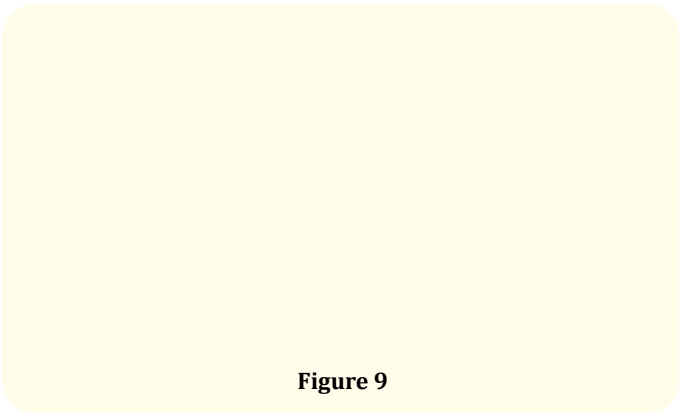
Overall suspected covid19 patient journey time in the Wazarat health care center decreased from 50 minutes to 8.



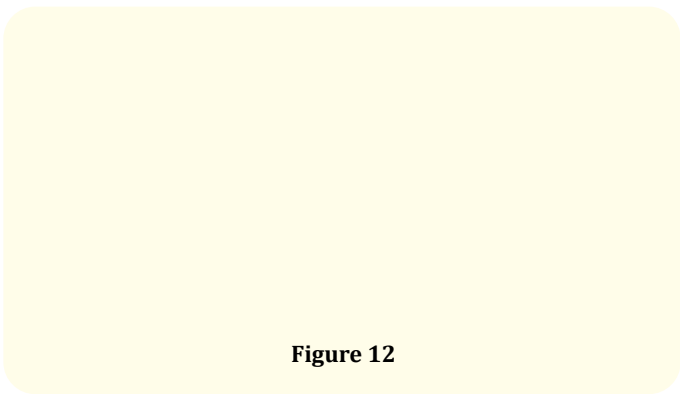
Infection rate among other health care professional decreased from 14.1% to 0% in Oct.



Outcome KPIs: Infection percentage among nursing reached 0% in SEP and OCT.



The overall infection rate improved from 9.8% in Jan to 0.5% in Oct.



Balancing KPIs: Staff satisfaction regarding environment safety, clear work instructions, availability of forms, smooth clinic work, PPEs availability had been improved in the second round in august compared to the first one in March.

Figure 13

Overall staff satisfaction had been improved from 24% in March to 85% in August.

Figure 14

Summary and Interpretation

The outbreak of coronavirus disease (COVID-19) has been declared a Public Health Emergency of International Concern (PHEIC) and the virus has now spread to many countries and territories. While a lot is still unknown about the virus that causes COVID-19, we do know that it is transmitted through direct contact with respi-

ratory droplets of an infected person

Recommendation for outpatient facilities and ambulatory care practices were to:

- Contact patients who may have an increased risk of severe illness from COVID-19 related complications to ensure they are adhering to current medications.
- Ask symptomatic patients who require an in-person visit to call before they leave home, so staff are ready to receive them using appropriate infection control practices and personal protective equipment.
- Do not penalize patients for cancelling or missing appointments because they are ill.
- Place visual alerts, such as signs and posters in appropriate languages, at entrances and in strategic places providing instructions on hand hygiene, respiratory hygiene (including the use of cloth face coverings), and cough etiquette).

Set up waiting rooms to allow patients to be at least 6 feet apart. If your facility does not have a waiting area, then use partitions or signs to create designated areas or waiting lines.

Reduce crowding in waiting rooms by asking patients to remain outside (e.g., stay in their vehicles or in a designated outdoor waiting area), if feasible, until they are called into the facility for their appointment [8].

These measures were not enough because it did not represent the possible new process failure to control infection Wazarat health care center quality unit used FMEA to evaluate processes for possible failures and to prevent them by correcting the processes proactively rather than reacting to adverse events after failures have occurred. This emphasis on prevention may reduce risk of harm to both patients and staff.

FMEA is particularly useful in evaluating a new process prior to implementation and in assessing the impact of a proposed change to an existing process [9].

Implementing FEMA, many system failures have been discovered in terms of.

The unavailability of visual triage check point at the entrance
 No clear or specific pathway for suspected or confirmed patient with Covid 19)
 No specific medication management process
 No unidirectional patient flow for suspected or confirmed patient with Covid 19)
 No clear hand of process
 No clear pathway for confirmed positive patient
 Long waiting time in all process and in between patient movement in the center.

The unavailability specific waiting and consultation area for suspected or confirmed patient with Covid 19.

No specific area for swabbing (-ve) pressure room have Proactive action plan was developed to limit the gaps and improve the care processes.

Waiting time, health care professional infection and staff satisfaction have been improved after implementing the pro corrective actions

Limitations

This management system could be easily implemented in all primary care centers. Not enough published data about the use of FEMA as a quality improvement tool during covid19 pandemic. Changing the guidelines and recommendation regarding dealing with covid19 infection. No published data assessing the percentage of COVID19 infection rate prevention after assessment of efficiency of preventing measures.

Conclusions and Recommendations

Covid 19 pandemic cause a huge burden on health care services, and necessitate new quality improvement projects, this work provide that Proactive quality improvement for the new process failure is essential to reduce the risk of harm to both patients and staff. Proactive intervention in terms of implementing change concepts in the form of: Reduce unnecessary steps in patients suspected to have covid19 Performing tasks parallel with the main process, Smooth workflow in a step, eliminate hand-off failure, replace with a better value steps, based on outcome redesign the work process. Implementing strategies for dealing with the COVID-19 cases, with the following criteria: Alignment with WHO, MOH, MSD, PSMCMC and FCM mission and strategic goals in facing Covid-19 pandemic. Clear improvement in pre consultation waiting time from 22minutes to 1 minute Contribute directly to reducing patient contact time in the waiting area with other patient which decrease the

chance of infection transmission. Meeting the infection control and patient safety standards Meeting the strategic goals of Al Wazarat Health Care Center strategic plan Covering the gaps and recommendations of safety around conducted during pandemic Implementation of the visual triage to achieve proper patient triage system. The overall infection rate decreased from 9.8% to .5% among health care professional decreased from 14.1% to 0.5% reflect that the intervention by new process and redesign of the services provided in the center directly created. Safe environment for patient and healthcare workers and Improved patient flow in the center. Improve services provided according to patient needs improving the compliance with IPC precautions it was reflected in improvement of staff from 24% to 85% overall staff between 1st and 2nd round.

Leadership support to implement such a program is crucial. Further in-depth study to calculate the cost effectiveness may be advised Further study to calculate the risk reduction. Also, this work helps us to prepare for and identify the carry on experiences to the inevitable coming pandemics.

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