Quality Improvement Initiatives for Outpatient Management of COVID-19 in Community Hospitals in Uganda

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Abstract

Background: The coronavirus disease (COVID-19) dramatically disrupted outpatient care delivery. Guidelines for HCPs and refresher courses have been developed to boost their skills and knowledge of the disease though not effectively disseminated through training due to physical distancing and unprecedented disruptions to traditional avenues for delivery of medical education leaving many HCPs with apparent lack of knowledge and skills hence an urgent need to fill knowledge and training gaps.

Objective: Our goal was to improve COVID-19 outpatient management through use of a mobile-based decision support system (DDC19) in COVID-19 patient risk stratification in community hospitals in Uganda.

Methods: The project was implemented in 139 community hospitals in Uganda, the patients were assessed for the risk of COVID-19 and stratified as either Low, Moderate or High risk using the adopted excel sheet based on the DDC19 principle to assist HCPs in real time data collection, dynamic risk assessment, triage management, and follow-ups of COVID-19. We ran an 8 months training using an International Virtual COVID-19 Critical Care Training Forum for Healthcare Workers and five-days QI trainings for hospital leaders using a QI training curriculum developed by USAID and Ministry of Health Uganda QI Frame Work and Strategic Plan (2021-2025).

Results: A total of 319 patients were tested for COVID-19 and stratified as low risk 195(61.1%), moderate risk 102(32.0%) and high risk 22(6.9%), 21(6.6%), a total of 854 HCPs were trained their knowledge score improved from 42.69% to 72.70%, knowledge scores of 139 hospitals leaders in QI projects increased from 59.99% to 70.04%.

Conclusions: COVID-19 patient risk stratification was achieved, The knowledge and skills of HCPs in application of best practices for management of COVID-19 increased from 42.69% to 72.70%, The knowledge and skills of leaders in design and implementation of outpatient QI projects improved from 59.99% to 70.04%.
The innovative nature of the project improved the COVID-19 patient risk stratification was achieved despite the non-approval of use of DDC19 in Africa and the improvement in the knowledge and skills of the HCPs and hospital leaders is key for improved diagnosis, risk stratification and outpatient management of COVID-19 patients

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ABSTRACT

Background: The coronavirus disease (COVID-19) dramatically disrupted outpatient care delivery. Guidelines for HCPs and refresher courses have been developed to boost their skills and knowledge of the disease though not effectively disseminated through training due to physical distancing and unprecedented disruptions to traditional avenues for delivery of medical education leaving many HCPs with apparent lack of knowledge and skills hence an urgent need to fill knowledge and training gaps.

Purpose: Our goal was to improve COVID-19 outpatient management through use of a mobile-based decision support system (DDC19) in COVID-19 patient risk stratification in

community hospitals in Uganda.

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Key Words: Coronavirus Disease, DDC19, Community Hospitals, Risk Stratification

Introduction

The coronavirus disease (COVID-19) has become an urgent and serious global public health crisis [1]. It has dramatically changed how outpatient care is delivered in primary health care practice [2] and resulted in major disruptions to healthcare delivery [3]. To mitigate this challenge, the World Health Organization (WHO) recommends use of acuity-based triage as the standard method of stratifying patients according to their care needs for effective management [4]. In stressed health care systems, Liu, Ying et al. have recommended use of online mobile-based tool to ease patient risk stratification and application of evidence based interventions to improve outpatient COVID-19 care [1].

Health care Professionals (HCPs) lack skills in diagnosis of Covid-19 [5, 6] from other morbidities. Yet again, the pandemic caused unprecedented disruptions to traditional avenues and modalities for delivery of medical education leaving many HCPs with apparent lack of knowledge and skills to manage COVID-19 and urgent need to fill knowledge and training gaps. A poor understanding of the disease among HCPs can result in delayed identification and treatment leading to rapid spread of infections. About 180,000 health workers have lost their lives to COVID−19 so far creating a barrier to fight against the

disease [7]. Guidelines for HCPs and online refresher courses have been developed to boost their knowledge and prevention strategies [8]. But these have not been effectively disseminated through training due to physical distancing SOPs. Cypro et al. have created a proven and effective structured and evidence-based virtual training forum [3] to improved knowledge and skills of HCPs globally.

Research by Ji et al [9] revealed that the current mortality of COVID-19 is significantly positively related to its burden on health care. Therefore, how to evaluate patients with COVID-19, suspected cases, and other patients with similar symptoms, and effectively triage under the conditions of medical resource shortages is of great significance to protect the susceptible population, reduce hospital cross infection, and decrease the burden on medical resources [1]. There was urgent need to redesign and improve COVID-19 outpatient management taking into account of the constrained and burdened health care system if patient outcomes are to be improved and other morbidities like HIV/AIDS, TB, Malaria and other diseases are to be taken care of in Uganda. Liu, Ying et al. analyzed the key issues that need to be solved, designed and constructed a COVID-19 dynamic risk stratification model that uses a mobile-based decision support system in data collection, risk stratification, outpatient triage management and follow up of COVID-19 patients as a proven methodology of improving treatment out comes of these patients [1].

The project's overall goal was to improve COVID-19 outpatient management through use of a mobile-based decision support system in data collection, patient risk stratification, triaging and follow up. Specifically, we improved; i) how Health HCPs do COVID-19 patient risk stratification in outpatient departments; ii) knowledge and skills of HCPs in application of best practices for assessment, treatment and follow up of COVID-19 and iii) knowledge and skills of leaders in design and implementation of outpatient Quality Improvement projects in four community hospitals in Uganda for improved outpatient COVID-19 outcomes.

Methods

To Improve how HCPs, do COVID-19 patient risk stratification, an excel sheet based on the principle of the four early approaches of COVID-19 (DDC19) (early detection, early reporting, early isolation, and early treatment) of patients who have a fever or respiratory symptoms, or suspected infection with COVID-19 was used. The Dynamic risk assessment Decision support system for COVID-19 (DDC19) developed by Liu, Ying et al to assist

HCPs in real time data collection, dynamic risk assessment, triage management, and follow-ups of COVID-19 outpatients. The DDC19 is a free mobile app that can help to achieve the early assessment and triage of patients with COVID-19 and ease the pressure of shortages in medical resources. The DDC19 app is based on the principle of the four early approaches (early detection, early reporting, early isolation, and early treatment) of patients who have a fever or respiratory symptoms, or suspected infection with COVID-19. The patients were assessed for the risk of COVID-19 and stratified as either Low, Moderate or High risk using the adopted excel sheet based on the DDC19 principle.

To improve knowledge and skills of HCPs in application of best practices for management of COVID-19, we ran an 8 months training using an International Virtual COVID-19 Critical Care Training Forum for Healthcare Workers, a rapid and proven delivery of an open access medical education forum developed by the American Thoracic Society to provide a global audience access timely content relevant to their learning needs. This training forum aided HCPs in assessment and treatment of patients with COVID-19, reduced provider anxiety, and disseminated best practices. We streamed live 13 weekly training sessions via zoom from August to November 2022. These sessions were followed by structured debriefs and participant feedback to inform subsequent sessions. A second set of 14 sessions was streamed live from December to March 2022. Content experts were recruited from Makerere University Lung Institute and Mulago National COVID-19 treatment unit. Zoom platform and chat feature and WhatsApp facilitated the interactions between participants and content experts as well as sharing learning resources and for discussion. The topics included; best practices in outpatient management of COVID-19, updates on clinical presentation of COVID-19 challenges, patient risk stratification using DDC19 mobile app, care of the patient with COVID-19 from home to the ICU, healing after COVID-19, COVID-19 home care, managing COVID-19 complications, radiological findings, immune responses and current controversies in COVID-19, medical education during COVID-19 and HCPs wellness and self-care. Pre training assessment was done to determine the baseline knowledge

To increase knowledge and skills of leaders in design and implementation of outpatient QI projects, we ran a five days QI training for hospital leaders using a QI training curriculum developed by USAID and Ministry of Health Uganda and based on the Uganda QI Frame Work and Strategic Plan (2021-2025) [8,9,10]. Training topics shall include; an over view of

Ministry of Health Uganda QI Frame Work and Strategic Plan (2021-2025, Role of leaders in COVID-19 care QI, use of data in QI, use of QI tools, leadership and facilitating change and steps in QI.

RESULTS

Objective 1: COVID-19 patient risk stratification

During the project, a total of 319 patients reported and were tested for COVID-19 majority of whom were of age 41-60 years 111(34.8%) with a mean age= 45.9years, SD= 1.113857 (95% CI =43.7-48.1) and males 212(66.5%) as presented in the tables below;

Table 1: Demographic characteristics of the patients (n=319)

Characteristics	***Frequency(%)***	***Percentage(%)***	***Mean estimation***
Age category			
<20 years	30	9.40	Mean age= 45.9years, SD= 1.113857 (95% CI =43.7-48.1)
21-40 years	105	32.92	
41-60 years	111	34.80	
61 and above	73	22.88	
Gender			
Female	107	33.54	
Male	212	66.46	

From the risk assessment, most of the patients presented with headache and cough 90(28.2%) and 82(25.7%)respectively, followed by body weakness and fever see table 2 below. A further independent assessment of the comorbidities revealed that majority of the patients had asthma 270(84.6%) followed by hypertension 205(64.3%), diabetes, HIV and TB as presented in table 3 below.

Table 2: Presenting complaints

Complaints	Frequency	Percentage
Cough	82	25.71
Body Weakness	74	23.20
Fever	73	22.88
Headache	90	28.21
Total	319	100.00

Table 3: Comorbidities

Comorbidities	Frequency	Percentage
TB		
Yes	150	47.02
No	169	52.98
HIV		
No	168	52.66
Yes	151	47.34
Asthma		
No	49	15.36
Yes	270	84.64
Diabetes		
No	162	50.94
Yes	156	49.06
Hypertension		
No	114	35.74
Yes	205	64.26
Lung cancer		
No	236	73.98
Yes	83	26.02

Risk Stratification was done based on the independent assessment of the symptoms and categorized as low risk 195(61.1%), moderate risk 102(32.0%) and high risk 22(6.9%), 21(6.6%) were hospitalized and 43(13.5%) died as presented in table 6 below.

Table 4: Final Patient Category

Category	Frequency	Percentage
High Risk	22	6.89
Low Risk	195	61.13
Moderate Risk	102	31.97
Total	319	100.00
Hospitalization		
No	298	93.42
Yes	21	6.58
Outcome of the treatment		
Alive	276	86.52
Died	43	13.48
Total	319	100.00

Objective 2: Knowledge and skills of HCPs in application of best practices for management of COVID-19; A total of 1,633 HCPs from the different community hospitals

were recruited into knowledge and skills on COVID-19 risk stratification virtual training but 854 HCPs completed the training, giving a completion rate of 52.3%. The mean pre-training knowledge score was 42.69%, SD=1.80, 95%CI (39.11-46.27) and the post training mean knowledge score was 72.70%, SD=0.72, 95%CI (71.26-74.12). the dropout rate could be due to the poor internet connectivity especially for participants in rural community hospitals however, there was a significant improvement in the knowledge scores of the participants. **Lessons Learned:** i) The virtual trainings offer a great opportunity for learning for diverse participants from a wider geographical catchment area. ii) there were challenges with internet connectivity especially for hospital participants from rural areas and iii). The training was successful despite the challenges and a dropout.

Objective 3; Knowledge and skills of leaders in design and implementation of outpatient QI projects: We ran a five-day on-line QI training for 139 community hospitals leaders, the mean pretest score was 59.99%, SD=.935, 95%CI (58.14-61.83) and the mean post test score was 70.04%, SD=.902, 95%CI (68.26-71.83). Improvement in knowledge scores for the health hospital leaders was found to have a statistically significant association with the patient treatment outcomes (X^2 = 6.0729, p value= 0.048). **Lessons Learned:** i) The e-learning model is an effective method of training busy hospital executives despite the challenges with internet connectivity in rural areas and ii) Home based care for the non-severely ill COVID-19 patients improves their satisfaction with the care and saves hospitals a burden on the resources including space.

Conclusions

- COVID-19 patient risk stratification was achieved
- The knowledge and skills of HCPs in application of best practices for management of COVID-19 increased from 42.69% to 72.70%
- The knowledge and skills of leaders in design and implementation of outpatient QI projects improved from 59.99% to 70.04%.

Implications: The innovative nature of the project improved the COVID-19 patient risk stratification was achieved despite the non-approval of use of DDC19 in Africa and the improvement in the knowledge and skills of the HCPs and hospital leaders is key for improved diagnosis, risk stratification and outpatient management of COVID-19 patients

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DECLARATIONS

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Conflict of interest: The project team declares no conflict of interest.

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