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ASSESSMENT OF COVID-19 MANAGEMENT BY HEALTHCARE PROVIDERS IN BUSIA COUNTY REFERRAL HOSPITAL, BUSIA COUNTY, KENYA

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Assessment of Covid-19 Management by Healthcare Providers in Busia County Referral Hospital, Busia County, Kenya

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Abstract

Purpose: The main objective was to assess COVID-19 management by healthcare providers in Busia County Referral Hospital, Busia County, Kenya by November 2021.

Materials and Methods: A sample size of 153 was considered to give the data from the different clustered cadres The data collection tools included a facility readiness assessment for COVID-19 observation checklist adopted from the World Health Organization, an Interview structured questionnaire, and a key informant guide for managers of every key cadre. Both qualitative and quantitative data collected were cleaned, coded, sorted, and analyzed using the statistical package for social sciences (SPSS) version 21. The data collected was presented in frequencies, pie charts, graphs, proportions, and tables. The associations of variables were tested using the Chi-square test, bivariate and multivariate. An association was considered significant when the p-value is less than 0.05 ($p<0.05$) with a confidence interval of 95% (CI 95).

Findings: The study revealed a shorter duration of experience 1 to 3 years and a shorter training session 1 to 2 days had higher odds of 2.3 and 2.1 ($p = 0.03$) and $p=0.04$) respectively to report correct practice in the management of COVID-19, and was statistically significant. Furthermore, knowledge of five moments of hand hygiene ($p=0.007$), and audit ($p=0.004$) were statistically significant to report correct practice in the management of the pandemic. In addition, the availability of gloves, face masks, thermogun, screening checklist, and the designated focal person at triage reported higher odds >2.5 with $p>0.05$ to facilitate correct practice in the management of COVID-19. Respondents who reported the existence of an infection prevention and control committee had 5.2 odds with $p=0.03$ to adhere to correct practice in pandemic management.

Unique contribution to theory, practice, and policy: The study revealed that updated policy documents, knowledge, skills, and Health Products and Technologies on the management of COVID-19 were paramount in the fight against the pandemic.

Keywords: *SARSCOV2; COVID-19; Hand hygiene; Personal Protective Equipment*

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INTRODUCTION

Healthcare providers (HCPs) spearhead the fight against the coronavirus disease (COVID-19) pandemic. Therefore, their knowledge, attitude, and practice (KAP) toward Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-COV-2) are considered critical to the success of the current COVID-19 response efforts (Kanu, 2021; Yuen, 2020). Since the first transmission from animals to humans, all subsequent cases were spread from human to human through droplet infection (Hope, 2020). By 30th January 2020, World Health Organization declared it a Public Health Emergency of International Concern (Tripathi, 2020). SARS-CoV-2 was declared a pandemic on 11th March 2020 (WHO, 2020). Nine days later (20th March 2020), The President of the Republic of Kenya declared it a pandemic (Hope, 2020). None of the Countries had adequate resources to manage the pandemic both technical and material resources. The WHO recommended key preventive measures such as adherence to appropriate hand hygiene practices, use of personal protective equipment such as face mask, observing of 1.5 meters social distance, and vaccination (Astra Zeneca), geared to curb the SARS-CoV-2 spread (W.H.O, 2020). This followed information from the taxonomists and epidemiologists who clarifies COVID-19 sequencing and mode of transmission (WHO 2020). Despite the directive from WHO, healthcare providers in a Slovenian study, managed COVID-19 patients without adequate Personal Protective Equipment, due to a lack of health products and technologies compromising skills (Leskovic, 2020). Constrained resources: the Intensive care nurses and pharmacists confessed having inadequate Health Products and Technologies supplies compromised healthcare service delivery in the management of COVID-19 (Moradi, 2021; Zeenny *et al.*, 2020). Due to the aforementioned scenario, it was paramount to carry out the study on the assessment of COVID-19 management by Healthcare Providers in Busia Referral Hospital, Busia County, Kenya. To provide insights on gaps to be worked on or areas to strengthen and maintained.

Problem statement

No Country was prepared technically with apt knowledge and adequate resources to handle the rapidly spreading COVID-19 pandemic. Wuhan City in China, Hubei Province in mainland China was the epicenter of SARS-COV2 initially, but since then, the infection had spread worldwide, and in the community with escalating human infections. Different Countries had instituted varied measures to curb the spread. However, they were marred with several implementation challenges and devastating consequences for health systems, economies, healthcare providers, and patients (Elhadi, 2020).

Globally as of 16th January 2021, the infected population was 94,315,331 out of whom 71.4% (67,346,640) had recovered and 2.1% (2,017,913) died. The socio-economic study in four European Countries (France, Germany, Spain, and United Kingdom) revealed an increase in trust in domestic institutions. Laced with the trust, was an increase in economic insecurity, loneliness, and acceptance of authoritarianism with decreased support from globalization during the lockdown and social distancing (Arina, 2021).

Front-line healthcare provider lost their lives in the line of duty, especially in circumstances where there had short or inadequate Health Products and Technology supplies (O. Bandiera, 2019). By 22nd September 2020, Kenya ranked the 6th in Africa and 1st in East Africa with an infected

population of 37,218 cases, out of which 2.6% (970) were healthcare providers and 1.8% (659) deaths were reported (W.H.O, 2020). These affected the Country's Gross Domestic Product. The hospitality industry at Coast recorded a below 10% occupancy rate, and agriculture, manufacturing, health, education, transport, retail, and other services were equally not spared employees were sent on compulsory leave (W.H.O, 2020).

Busia, the gateway to East Central Africa with Malaba and Busia official borders and numerous porous borders was highly predisposed to COVID-19 infection from long-distance truck drivers. For 5 months consecutively from July 2020, the County was among the first five counties with high numbers of COVID-19 infections. As of July 2020, it had recorded 693 COVID-19 infections, with an attack rate of 77% for both local and imported cases; following Nairobi (10,249), Mombasa (1952), Kiambu (1,131) Kajiado (1,018) (MOH, 2020).

Most Counties had challenges accessing adequate supplies of Health Products and Technologies including personal protective equipment, exposing healthcare workers to occupational health hazards emanating from COVID-19. The inadequacy prompted a Countrywide industrial strike by medical personnel: Nurses, Medical Officers, Clinical Officers, and laboratory staff as per the 5th issue on the nationwide strike notice NBI/KNUN/MOH/VOL.IV.16/673/20 and press release by the Cabinet Secretary Ministry of Labour and Social Protection on 3rd December 2020.

By 16th January 2021, the county had a cumulative confirmed 130 COVID-19-infected healthcare workers, and seven (7) reported deaths, out of whom, two (2) were senior medical personnel in Busia County - Senior Orthopedic Surgeon at Busia County Referral Hospital and Senior Registered Nurse in Teso South Sub County working as reproductive health coordinator (Department of Health and Sanitation, 2021). As of 11th June 2021, the County had a cumulative of 3,982 infected individuals, out of whom 157 were healthcare providers across all cadres, with a positivity rate of 3.9%. Busia County Referral Hospital accounted for 30% of all healthcare providers infections in the whole county comprising Seven Sub Counties (E.O.C., 2021).

By 30th July 2021, Matayos Sub County which encompasses Busia County Referral Hospital was ranked highest with a COVID-19 attack rate of 1,821.7/100,000 among the seven Sub Counties (EOC, 2021). Due to the aforementioned scenario, this study aims to assess COVID-19 management by healthcare providers in Busia Referral Hospital, Busia County, Kenya.

Specific objective

To determine the mitigation strategies put in place to manage COVID-19 infection by healthcare providers at Busia County Referral Hospital, in Busia, Kenya.

Research question

What mitigation strategic measures have been put in place to manage COVID-19 infection at Busia County Referral Hospital?

Hypothesis

There is no relationship between knowledge and Health Products and Technologies in the management of COVID-19 at Busia County Referral Hospital.

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LITERATURE REVIEW

Mitigation measures/strategies put in place to manage COVID-19 infection

Healthcare providers were irreplaceable resources in the fight against COVID-19. However, thousands had been infected with SARS-CoV-2 globally and hundred had died in the line of duty. This escalated the fear and stress among the health workforce compromising their confidence level in adherence to the COVID-19 best practices.

Globally and in Africa Region being among resource-limited Continents developed strategic approaches for the pandemic. The tool managed to identify core strategies and budget for them in an effort to curb the menace and categorized them into 11 pillars to include: pillar 1: Coordination, planning, financing, and monitoring; pillar 2: Risk communication, community engagement, and infodemic management; pillar 3: Surveillance, outbreak investigation, and calibration of public health and social measures; pillar 4: Point of entry, international travel transport, and mass gatherings; pillar 5: Laboratory and diagnostics; pillar 6: infection prevention and control and protection of the health workforce; pillar 7: Case management, clinical operations, and therapeutics; pillar 8: operation support, logistics and supply chains; pillar 9: Strengthening essential services and systems; pillar 10: Vaccination and pillar 11: Innovation and evidence (W.H.O., 2021), (Basu, 2020) and (W.H.O, 2020). This was meant to slow down the transmission of the virus and prevent associated illnesses and deaths.

The tool was adopted in Edo State in Nigeria as a mitigation strategy to assess 252 health facilities' readiness for COVID-19 management. Comprising hospitals/clinics, laboratories, and pharmacies. It revealed an overall low performance of 34.2% for hospitals, 3.2% for pharmacies, and 4.9% for laboratories; which was below the 70% considered to be ready for COVID-19 interventions and management (Obaseki *et al.*, 2020).

The pandemic in Wuhan - China provided the opportunity for many countries to learn. Countries with a centralized system of governance such as China, were efficient in managing the COVID-19 crisis, unlike the decentralized system of governance such as most of the developing countries like Kenya and Indonesia which had extraordinary challenges in coordination with the local government, more so when an imbalance in local government capacity and resources occurs (Kamradt *et al.*, 2011).

Data required to make an informed decision must be complete and conforms to the data set, be consistent, nil of duplication, and of high integrity and accuracy. Being a health system, data elements were derived from the following areas: clinical, human resources, logistics, and finance. The data/information flows from the Community, Dispensaries, Health Centers, Sub County hospitals, County Referral hospitals, and National Teaching and Referral hospitals (MOH, 2014) as per International Organization for Standardization (ISO).

Between March and April 2020, both Kenya and Thailand instituted measures to curb the spread of the pandemic by declaring it a national state of emergency and imposing a night-time curfew based on valid and reliable statistics. A mandatory 14-day quarantine for persons arriving from abroad, domestic and international travel restrictions, social distancing regulations in public spaces, and closure of schools, universities, shopping centers, and nightclubs. The quick mobilization and training of CHWs on preventive techniques that were used to educate local

citizens about transmission-based precautions by the national governments in Kenya and Thailand, reduced the number of infected individuals drastically (Sudhipongpracha, 2021).

The front-line Healthcare providers were compelled to adhere to the transmission-based precautions for COVID-19, which culminated in a high risk of depression, psychological distress, burnout, emotional exhaustion, anxiety, fear, insomnia, and somatic symptoms. A study done in Qatar using Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) revealed that nurses had a higher risk of mental illness than other cadres in health. Furthermore, approximately 17.4% of participants had well-being scores of less than 45, indicating sub-optimal well-being and a high risk of depression and psychological distress (Wadoo *et al.,* 2021). The findings were echoed by a systematic review and meta-analysis on the prevalence of depression, anxiety, and insomnia during the COVID-19 pandemic which indicates a prevalence of 22.8% for depression, 23.2% for anxiety, and 38.9% for insomnia experienced by front-line Healthcare providers (Pappa *et al.,* 2020). It was imperative for the policy and decision-makers in the healthcare system to monitor the psychological impact on its workforce and put appropriate mitigation strategies in place such as a gadget to promote virtual consultation in isolation Centre's to minimize anxiety (Wadoo *et al.,* 2021).

Despite the challenges, in a comparative study between Kenya and Thailand, the decentralized public health system in Kenya outperformed the centralized system of Thailand in enabling CHWs to respond to a large-scale crisis like the COVID-19 pandemic and in motivating them to serve the needs of the vulnerable populations. The decentralized system promotes a more conducive environment for the front-line workers' autonomy and collaboration with the private and nonprofit sectors. This helped to bridge the gap between government and citizens during the pandemic. The findings indicate that there were solid and sustainable ways public managers and decision-makers could consider integrating citizens and communities in their responses to the pandemic (Sudhipongpracha, 2021). However, for efficient and effective execution of the services, it required financial resources that were arbitrated in parliament by politicians. Therefore, politics become an integral component to determine the impact that occurred during and after the pandemic. The transmission of COVID-19 was challenging for governments worldwide to control, without causing an economic impact on their respective budget. The pandemic handling system must be structured using power and strength to enforce rational policies (Supriyadi *et al.,* 2021). There had to be consultation and collaboration between the national/central governments and regional/local governments, and accommodate local wisdom to manage any crisis/pandemic. This was the spirit of the Constitution of Kenya that outlines relationships between the two levels of government (National and 47 Counties) to consult, support, assist, exchange information, administration, coordinate policies, and enhance capacity, (GOK, 2010).

For any government to restore economic growth and hasten recovery, it must prevent mass deaths from the pandemic and suppress conflicts of interest among individuals (Supriyadi *et al.,* 2021). This can be enhanced by inviting the public to cooperate and be involved through risk communication or public communication carried out by the government and consistent enforcement of regulations. This was observed in Great Britain when the government delayed taking appropriate actions or did nothing during the pandemic, the critical bed occupancy reached the highest peak, and when the actions were considered: isolation of cases, home quarantine and

social distancing the curve shifted to the lowest peak of critical bed occupancy (Supriyadi *et al.*, 2021).

Implementation of interventions to manage COVID-19 had bearing on the Ministry of Health policies strategic objectives such as: reduce the burden of communicable disease like COVID-19, halt and reverse the burden of non-communicable disease i.e. psychological trauma and stigma associated with COVID-19 infected persons, provide essential healthcare services including primary health care i.e. management of COVID-19 in holding and isolation wards, minimize exposure to health risk factors by adherence to public health measures (social distance 1.5meters, appropriate use of face mask and hand hygiene, strengthening collaboration with health-related sectors i.e. formation of County Antimicrobial Stewardship Committee that brought together line ministries and department such as Ministry of Health, Ministry of National and interior coordination, department of natural resources and environment, department of agriculture, livestock and fisheries, agro-business community and Emergency Operation Centre (Kibui *et al.*, 2015). COVID-19 had no specific treatment; patients were managed symptomatically with a lot of emphasis on prevention strategies that were better than cure. However, healthcare providers expressed dissatisfaction with the government response especially with lack of well-coordinated health systems, unified response, inadequate government funding decisions and failure to follow evidence-based approach to policy making. Most of the government responses and support structures kept changing based on scientific studies and reports. This was perceived as confusing, chaotic and contradicting by healthcare providers, putting them in medicolegal dilemmas (Chemali S, 2022) compromising implementation of mitigation strategies. Hence necessitates the study.

Summary

COVID-19 infection started in November 2019 in Wuhan in the Republic of China. The Country had to make serious budgetary adjustments to accommodate amendments to manage the infection that was rapidly spreading. The same was replicated across all other Countries globally, Kenya included and Busia County was equally not left behind by such restructuring. Of essence was to identify the causative organism and the mode of transmission, and how to curb it. W.H.O. issued guidelines on adherence to standard and transmission-based precautions: observe the social distance, appropriate use of personal protective equipment such as face mask, adherence to hand hygiene by all, and lockdown. Studies done were in sync that a critical mass of knowledgeable healthcare providers, when provided with appropriate Health Products and Technologies they were optimistic to manage COVID-19 amicably. This was backed with policies to guide the implementation of researched approaches to fight the menace. Failure to which, psychological challenges manifest, morbidities and mortalities escalate. The information acquired from various studies and documents was deployed to improve or strengthen the management of COVID-19 infection to reduce the incidences of morbidities and mortalities.

METHODOLOGY

Study design

The study adopted descriptive cross-sectional study designs which ensure that all relevant healthcare providers had equal opportunity to participate in the study to improve the confidence interval. The study collected both qualitative and quantitative data.

Study area

The study was conducted at the Busia County Referral Hospital, within Matayos Sub County, which forms part of the seven Sub Counties in Busia County: Bunyala, Samia, Butula, Nambale, Teso North, and Teso South. It was the referral hospital for all the 177 health facilities within Busia County (98 – G.O.K, 13 – FBOs, and 66 privately owned) and had a workforce of about 450 staff both technical and non-technical staff. It was the highly staffed health facility within the County. The facility had a bed capacity of 250.

Study population

The target population includes 10 medical officers, 28 clinical officers, 26 laboratory staff 122 nursing staff, and 4 morticians, a total of 190 study subjects who have a high possibility of direct contact with COVID-19 patients/bodies (Hospital, 2021/22).

Inclusion criteria

All healthcare providers who are directly and actively involved in the management of COVID-19 patients in Busia County Referral Hospital.

Exclusion criteria

1. Healthcare are providers who did not consent to participate in the study.
2. Healthcare providers who had active comorbidity like diabetes, TB
3. Healthcare are providers infected with COVID-19.
4. Expectant Healthcare providers.

Sample size determination:

The sample size was calculated using W.G.Cochran, 1963, from the target population of 190 clustered by cadres, that were directly involved in COVID-19 patient care and care of the body. A total of 153 study subjects were identified with a confidence level of 95% plus 20% contingency to carter for drop out/ refusals.

Sampling procedure

The study population was drawn from cadres of healthcare providers who had a high probability of being directly involved in COVID-19 patient/body care. The cadres were clustered and a simple random sampling method was deployed to identify real study subjects that included: 98 nursing staff, 8 medical officers, 23 clinical officers, 21 laboratory staff, and 3 morticians.

Cadre	Total	% Contribution	Proportion	Population
Nursing	122	64.2	98.2	98
Medical officers	10	5.2	7.9	8
Clinical officers	28	14.7	22.5	23
Laboratory staff	26	13.7	20.96	21
Mortician	4	2.1	3.2	3
Total	190			153

Data collection tools

Structured questionnaires, Key informant interviews, and an observational checklist.

Data analysis

Both qualitative and quantitative data was cleaned, coded, sorted, entered into computer, and analyzed using the statistical package for social sciences (SPSS) version 21. Descriptive statistics performed include determining the means, medians, standard deviations (SD), and range, and presented in frequencies, graphs, proportions, and tables. Associations of variables were tested using bivariate logistic regression. The Odds Ratio (OR) was used to test the strength of the association between independent variables and the mitigations to foster correct practice in the management of COVID-19. The null hypothesis of no association was to be rejected if the p-value ≤ 0.05) was at 95% CI. Responses from observations, open-ended questions, and key informants were analyzed qualitatively according to emerging themes and then used to supplement, explain and interpret quantitative data.

Ethical consideration

After approval from the research and ethics committee and National Commission of Science and Technology Institute, and accessing authorization from the Department of Health and Sanitation Busia County. The pilot study was conducted at Holy Family Hospital Nangina, and the study was done at Busia County Referral Hospital, Kenya. Respondents gave informed consent to participate in the study. The data collected was stored in the lockable cabinet while the soft copies had passwords known to the researcher alone. The information was generated for sharing with the beneficiaries.

RESULT

Association between healthcare provider socio-demographic and work-related characteristics and COVID-19 pandemic implementation of mitigation practices

A total of 153 respondents took part in the study which scientifically represents a 95% response rate. Most of the participants were females (59.5%). More than half (57.5%) were aged 25 – 35 years and the majority were Christians (98.7%). The most common cadre was nurses (60.8%). The units that had most of the respondents were in-patient medical wards (28.1%), outpatient (23.5%), maternity (18.5%) laboratory (15.7%).

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When binary logic regression was used, the respondents who had worked in service delivery for between 1 -3 years and trained/sensitized for 1-2 days had 2.3 and 2.1 higher odds respectively of reporting the correct practice than their counterparts, results being statistically significant.

The younger age group (25 – 35) compared to the older counterparts, were up to 3-fold more likely to have reported correct practice (OR: 1.5; 95% CI: 0.7 – 3.1; p = 0.28) although the relationship was not statistically significant.

Table 1 Association between healthcare provider socio-demographic and work-related characteristics and COVID-19 pandemic implementation of mitigation practices

Independent variable	Categories	N	Mitigation practices		OR	95% CI	P value
			Good ≥ 60%	Poor < 60%			
Gender	Male	50	68.0	32.0	1.2	0.5 – 2.5	0.68
	Female	76	64.5	35.5			
Age group in years	25 – 35	67	70.1	29.9	1.5	0.7 – 3.1	0.28
	≥ 36	59	61.0	39.0			
Cadre	Nurses	75	64.0	36.0	0.8	0.4 – 1.7	0.59
	Other healthcare providers	51	68.6	31.4			
Service delivery point	Inpatient Ward	40	70.0	30.0	1.3	0.6 – 2.9	0.51
	Other departments	86	63.9	36.1			
Duration in service delivery in years	1 – 3	70	74.3	25.7	2.3	1.1 – 4.9	**0.03**
	≥ 4	56	55.4	44.6			
Trained/Sensitized on recognition of COVID-19 Symptoms	Yes	113	67.3	32.7	1.8	0.6 – 5.6	0.36
	No	13	53.9	46.1			
Length of training/sensitization in days	1 – 2	74	73.0	27.0	2.1	1.0 – 4.5	**0.04**
	≥ 3	52	55.8	44.2			

Association between knowledge of the COVID-19 pandemic and mitigation practices

To determine the association between knowledge of signs/symptoms, Five Moments of Hand Hygiene, management of COVID-19 patients and PPEs, and waste and correct practices, correct responses on knowledge were scored as 1 (one) and wrong responses scored as 0 (zero). The scores for each of the four knowledge sub-domains were added for each respondent and expressed as a percentage. Overall scores of 60% and above were considered as knowledgeable and less than 60% as not knowledgeable (E. Nyangena, 2013), University of Nairobi examination guide II accords credit to 60% and above and upper class honors the same is acknowledged by the Nursing Council of Kenya.

From the results presented in Table 2, only the knowledge sub-domain on Five Moments of Hand Hygiene was statistically significantly associated with good practice (OR: 2.9; 95% CI: 1.3 – 6.3; p = 0.007) Respondents with knowledge of signs/symptoms had 1.3 higher odds than their counterparts although results were not statistically significant (OR: 1.3; 95% CI 0.6 – 3.0; p = 0.50).

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Table 2 Association between knowledge of the COVID-19 pandemic and mitigation practices

Independent variable	Categories	N	Mitigation practices		OR	95% CI	P value
			Good ≥ 60%	Poor < 60%			
Knowledge of signs and symptoms of COVID-19	Yes	37	70.3	29.7	1.3	0.6 – 3.0	0.50
	No	89	64.0	36.0			
Knowledge on the management of COVID-19	Yes	19	57.9	42.1	0.7	0.2 – 1.8	0.43
	No	107	67.3	32.7			
Knowledge of Five Moments	Yes	59	78.0	22.0	2.9	1.3 – 6.3	**0.007**
	No	67	55.2	44.8			
Knowledge of PPEs and waste management	Yes	55	61.8	38.2	0.7	0.3 – 1.5	0.40
	No	71	69.0	31.0			

Association between Skills of COVID-19 Pandemic Prevention and Mitigation Practices

Bivariate analysis was done on independent variables with the outcome being correct mitigation practices during the COVID-19 pandemic using data from the 126 respondents who had interacted with COVID-19 patients (Figure 1). Eleven practice areas were examined on the frequency in which the following were practiced single-use gloves, medical masks, face shields, or goggles/protective glasses, among others. The correct practice was considered as "always as recommended" and scored as 1 while the wrong practice was scored as zero. The scores were added for each respondent and expressed as a percentage. Overall scores of 60% and above were considered good practice and less than 60% as wrong practice (E. Nyangena, 2013). All the respondents reported correct practice in skill for hand hygiene more than 60%. The same was replicated in the appropriate use of a face mask and gloves. However, face shield and the use of disposable gown was list reported by less than 8.7%.

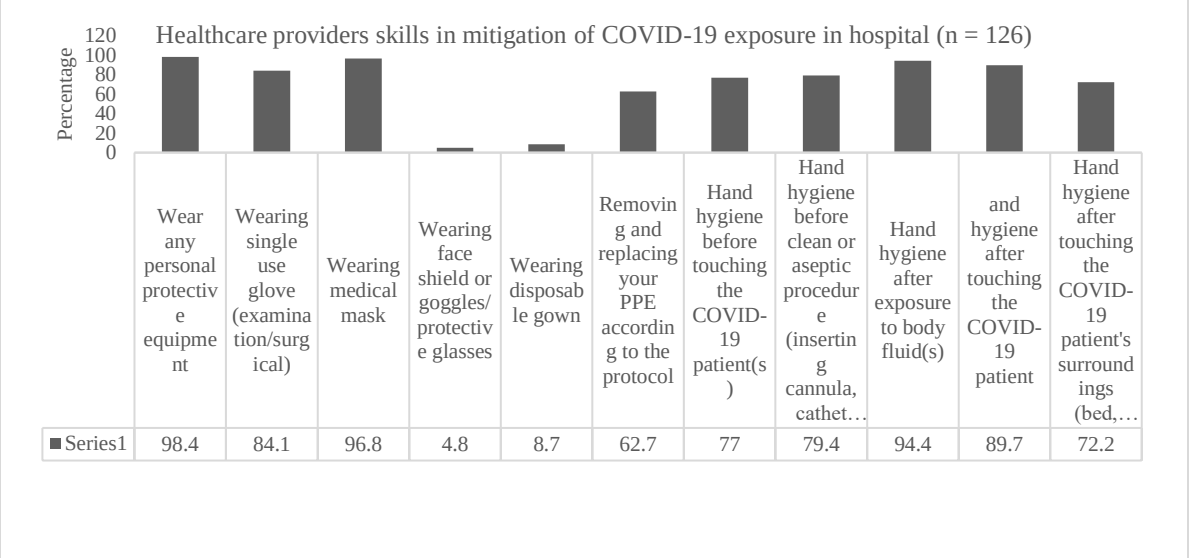

Figure 1 Healthcare providers' skills in mitigation of COVID-19 exposure in hospitals.

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4.4 Association between the availability of critical COVID-19-related Health Products and Technology to last for two months and the implementation of mitigation practices

Table 3 shows study findings on the association between the availability of COVID-19-related health products in the last two months and mitigation practices. Five factors were statistically significantly associated with respondents who reported good practice. Respondents who confirmed that gloves (OR: 2.5; 95% CI: 1.0 – 6.3; p = 0.05), surgical face masks (OR: 3.8; 95% CI: 1.1 – 13.9; p = 0.04), thermo-gun (OR: 3.8; 95% CI: 1.1 – 13.9; p = 0.04), there was designated person at triage (OR: 6.1; 95% CI: 1.5 – 24.3; p = 0.008) or that there is screening checklist at the triage (OR: 3.2; 95% CI: 1.2 – 8.3; p = 0.01) had higher odds of reporting good practice as opposed to their counterparts.

> "We get our supplies from Kenya Essential Medical Supplies Authority after a long lead time, and donations, at times Healthcare Providers, buy Personal Protective Equipment for their own protection, the same applies to patients at times they buy gloves" (Medical Supplies Logistician).
>
> "Some of the supplies required depended on the patient's presentation, we may need oxygen supply, steroids, nutritional supplements, and specialized treatment that may not be available in Busia County Referral Hospital" (Clinical Officer in Charge).

Table 3 Association between the availability of COVID-19-related Health Products and Technology to last for two months and mitigation practices

Independent variable	Categories	n	Mitigation practices		OR	95% CI	P value
			Good ≥ 60%	Poor < 60%			
Gloves	Yes	34	79.4	20.6	2.5	1.0 – 6.3	**0.05**
	No	92	60.9	39.1			
Gown	Yes	78	67.9	32.1	1.3	0.6 – 2.7	0.53
	No	48	62.5	37.5			
Apron	Yes	63	63.5	36.5	0.8	0.4 – 1.7	0.57
	No	63	68.3	31.7			
Goggles	Yes	44	65.9	34.1	1.0	0.5 – 2.2	0.99
	No	82	65.9	34.1			
Surgical face mask	Yes	115	68.7	31.3	3.8	1.1 – 13.9	**0.04**
	No	11	36.4	63.6			
Sanitizer	Yes	115	67.6	32.4	1.8	0.6 – 5.4	0.27
	No	11	53.3	46.7			
Liquid soap	Yes	107	67.3	32.7	1.5	0.6 – 4.1	0.43
	No	19	57.9	42.1			
Jik	Yes	111	68.5	31.5	2.5	0.8 – 7.4	0.09
	No	15	46.7	53.3			
Thermo-gun	Yes	115	68.7	31.3	3.8	1.1 – 13.9	**0.04**
	No	11	36.4	63.6			
Screening triage	Yes	120	67.5	32.5	4.1	0.7 – 23.7	0.18
	No	6	33.3	66.7			
The designated person at triage	Yes	115	69.6	30.4	6.1	1.5 – 24.3	**0.008**
	No	11	27.3	72.7			
Screening checklist at the triage	Yes	105	70.5	29.5	3.2	1.2 – 8.3	**0.01**
	No	21	42.9	57.1			

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4.5 Association between mitigation strategies adopted by the hospital and implementation of standard practices

Table 4 presents the results of bivariate analysis on the association between mitigation practices adopted by the hospital and the mitigation practices. Two strategies with statistically significant association with good practice were; the facility having an infection prevention and control (IPC) committee in place (OR: 5.2; 95% CI: 1.3 – 21.2; p = 0.03) and the availability of N95.FFP2 or equivalent respirator to last for two months (OR: 0.3; 95% CI: 0.1 – 1.0; p = 0.05). Respondents who stated that the facility had an IPC committee were five times more likely to have reported good practice as opposed to those who expressed a lack of such a committee. Respondents who confirmed that patients in the unit/department were screened for COVID-19 had higher odds 7.4 to report correct practice with (p = 0.09) results were not statistically significant.

Table 4 Association between mitigation strategies adopted by the hospital and implementation of standard practices

Independent variable	Categories	N	Mitigation practices		OR	95% CI	P value
			Good ≥ 60%	Poor < 60%			
The facility has an Infection Prevention and Control committee in place	Yes	116	69.0	31.0	5.2	1.3 – 21.2	**0.03**
	No	10	30.0	70.0			
The facility has an emergency response plan for COVID-19 or other respiratory pathogens in place	Yes	107	68.2	31.8	1.9	0.7 – 5.2	0.19
	No	19	52.6	47.4			
The facility has a COVID-19 emergency committee	Yes	105	68.6	31.4	2.0	0.8 – 5.1	0.15
	No	21	52.4	47.6			
Have filled an attestation form in the unit/department	Yes	40	72.5	27.5	1.6	0.7 – 3.5	0.28
	No	86	62.8	37.2			
Patients in the unit/department screened for COVID-19	Yes	111	68.5	31.5	2.5	0.8 – 7.4	0.09
	No	15	46.7	53.3			
Availability of N95.FFP2 or equivalent respirator to last for 2 months	Yes	11	90.9	9.1	5.7	0.7 – 46.5	0.10
	No	115	63.5	36.5			

DISCUSSION

Association between healthcare provider socio-demographic and work-related characteristics and COVID-19 pandemic implementation of mitigation practices

The study revealed that Healthcare providers who had worked for a shorter time 1 to 3 years, and trained for a shorter period 1 to 2 days had higher odds to report correct practice in the management of COVID-19 infection. This could be attributed to the enthusiastic nature of new staff who wants to learn and implement the concepts geared towards breaking the chain of disease transmission.

Association between knowledge of the COVID-19 pandemic and mitigation practices

In WHO multimodal improvement strategy, you must know what you want to prepare and sustain the execution process. For anyone to execute their mandate they ought to have knowledge attained

either formally or informally and be aware of the resources within the hospital environment. Hence, it forms a critical component in the management of the COVID-19 pandemic, just like in China, after the realization of the disease, the staff had to be trained on the clinical manifestations, mode of transmission, and prevention of the pandemic to minimize and contain the spread. Fewer CDC and Primary Healthcare Institutions (PHI) staff were utilizing standard precautions measures but later 47.6% of CDC and 52.3% of PHI were trained for 16 hours to improve their knowledge on the fight against the COVID-19 infection from 78% to 87% (Li, 2021). The findings in the study also confirm that after the training more than 60% of staff in Busia County Referral Hospital were able to identify cardinal clinical manifestations at the triage and five moments of hand hygiene that were paramount in the detection of COVID-19 cases and breaking its chain of transmission respectively. In Siera Leone, 72.7% were knowledgeable about COVID-19, and it was from this that 77.5% acknowledged that their facilities were ill-prepared to respond to the outbreak and requested the policy maker and health authorities to provide the necessary essential supplies (Kanu *et al.,* 2021). Having knowledge of the mode of transmission, doctors and nurses in Libya had to buy personal protective equipment for use at the workplace because 86.6% of the staff perceived the hospital was constrained to provide PPEs, and an epicenter precursor for COVID-19 Healthcare Associated Infection. (Elhadi *et al.,* 2020). More than 83% of respondents in Busia County Referral Hospital had knowledge of the critical Health Products and Technologies required to manage COVID-19. Therefore, they had a high probability to request them.

This cleared the infodemics among the frontline Healthcare providers. In early 2020, mask use was not mandatory, it was unclear how long a suspected COVID-19 patient should stay in quarantine and Healthcare providers used azithromycin an antibiotic to treat and manage COVID-19 which was a virus infection. Later, updated knowledge enforced the mandatory use of face masks by all persons', suspected individuals were quarantined for 10 to 14 days and azithromycin was stopped in COVID-19 infection treatment, because it may lead to antimicrobial resistant gene traits (Albahri *et al.,* 2020).

Hand hygiene was the cornerstone in the fight against all infectious and communicable diseases globally. Meta-analysis of eight studies reported a 6% to 44% reduction of respiratory infections for Asian flu (H5N1) and severe acute respiratory syndrome (SARS) by adherence to hand hygiene with soap and running water (Rabie & Curtis, 2006). In the study, HCPs with knowledge of five moments of hand hygiene reported correct practice although the significance level was marginal (p-value = 0.07). Furthermore, those with knowledge of COVID-19 clinical manifestation were 3 times more likely to have correct practice in the detection and management. This study was in congruence with the South West Saudi Arabia study, where 97.7% were knowledgeable on the mode of transmission and 92.3% adhered to transmission-based precautions that reduced the number of infections in the population drastically (Tripathi *et al.,* 2020). In Siera Leone, the knowledge decay phenomenon had set in, after successfully winning the battle against the Ebola epidemic in 2014. The same concept was required in the management of COVID-19. Therefore, the government had to conduct refresher training programs for its front-line health workforce in the fight against COVID-19 (Kanu *et al.,* 2021) to keep abreast with the current correct practice. In Malaysia, 83.4% of people who were knowledgeable about the COVID-19 mode of transmission and prevention modalities avoided crowded places, 87.8% practiced proper hand hygiene and 51.2% wore face masks (Azlan *et al.,* 2021) to contained the pandemic. Adherence to

correct hand hygiene practice has the ability to reduce the spread of infections at the portals of exit from the reservoirs, mode of transmission, and portals of entry to the susceptible host that accounts for 50% of mechanisms in breaking the chain of transmission for all infections, (W.H.O., 2021).

Association between the availability of COVID-19-related health products in the last two months and the implementation of mitigation practices

Health Products and Technologies are essential additives to correct practice. Without which the standards of health care services stand to be compromised. Key resources required to manage COVID-19 include the following personal protective equipment: hand washing facilities, gown, eye protector, N95, surgical mask, and gloves. Diagnostics: pulse oximeter, Arterial Blood Gas, radiological studies especially chest x-ray and ultrasound. Treatment: oxygen (MoH, 2020).

In this study, the respondents who confirmed that gloves, surgical face masks, thermo-gun, having a designated person at triage, or having a screening checklist at the triage were available had higher odds of reporting correct practice as opposed to their counterparts. These were some of the essential supplies that were required to screen all persons entering the hospital to seek services and/or offer services. The supplies were to promote standard-based precautions and transmission-based precautions by preventing nosocomial infections among healthcare providers and patients. In Lebanon and Libya, these Health Products and Technologies (HPTs) supplies were inadequately provided by the employer to the Healthcare providers. Therefore, being highly exposed to healthcare-associated infection at the workplace, the healthcare providers had to buy personal protective equipment for their personal use to curb the spread from patients to healthcare providers and vice versa (Zeenny *et al.*, 2020) resulting in incorrect practice. Despite having trained 47.3% of doctors and 54.7% of nurses in the management of COVID-19, while 43.2% are knowledgeable on hand hygiene in Libya, they could still pose the threat of spreading the infection, if HPTs were not provided perpetuating poor practice (Elhadi *et al.*, 2020). It is therefore imperative that apart from the knowledge achieved through various methods of capacity building, essential Health Products and Technologies ought to be availed and healthcare providers informed of their availability, to promote correct practice in curbing healthcare-associated infections in the facility.

The chain of transmission can be broken by adherence to the appropriate use of face masks, hand hygiene, and observing physical distancing. This can be actualized with the availability of HPTs. More than 83% of respondents affirmed the study site had the following crucial supplies for efficiency and effective utilization to curb the menace: face masks (91.5%), alcohol-based hand rub (87.6%), liquid soap (83.7%), hospital-grade disinfectants (86.9%), colour coded waste bin buckets (94.8%), thermo-gun (90.9%), screening or triage area for COVID-19 (95.4%), a designated person to work at the screening or triage area in (95.4%), a screening or triage area for COVID-19 (91.5%), safety boxes (98.7%) and a screening checklist at the triage (85.0%).

Less than half confirmed the availability of utility gloves (28.1%), eye protection gadgets (face shields or goggles) (35.3%), N95, FFP2, or equivalent respirators (7.8%), and paper towels (3.9%). It was clear that those who were aware of the HPTs availability had 3 folds probability to report correct practice.

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Association between mitigation strategies adopted by the hospital and implementation of standard practices

The W.H.O., (2019) and Basu, (2020) identified 8 to 10 standard thematic areas that each health facility ought to consider in dealing with the pandemic. For an effective and efficient provision of essential health services to curb the escalating COVID-19 infection, the hospital management requires prioritization and well coordination of interventions, with clear and accurate internal and external communication strategies. It must have the ability to seamlessly adapt to the increasing demands, and prudently utilize the scarce resources in a safe environment for health care providers (Gul & Yucesan, 2021). The respondents who acknowledged the presence of the IPC committee to coordinate the prevention of communicable diseases like COVID-19 had $p = 0.03$, availability of masks to prevent droplet infection which was the main mode of transmission between human beings had $p = 0.05$, and filled the self-attestation forms to screen themselves against the infection, had 7.4 probabilities to report good practice. The study was in sync with other studies conducted in Wuhan, China that reported 31 infected HCPs in the general ward, 17.5% in the emergency department, and 5% in the Intensive Care Unit (ICU) in a non-communicable disease health facility, during the initial outbreak (Wang *et al.*, 2020).

Good prioritization and coordination required the facility to have an Infection Prevention and Control (IPC) and Emergency Rapid Response Committee with its plan in place to ease execution. Edo health facilities in Nigeria were subjected to a standard assessment tool to check on conformity mitigation standards required in readiness to manage COVID-19, and 34.2% of the hospital complied (Obaseki *et al.*, 2020). In this study, the healthcare providers who filled out the attestation form 72.5%, while 68.5% of patients were screened using the COVID-19 checklist at the entrance to detect the infection early and prevent subsequent transmission. Therefore, leadership and governance, health financing, health product, and technologies are some of the W.H.O. building blocks that ought to synergy to foster correct practice.

In Henan, China, Healthcare Providers (HCP) with knowledge of COVID-19 proposed that visitors with significant risk factors ought to be screened at the triage (Zhang *et al.*, 2020). Despite the fact that microorganisms do not walk, we facilitate their transmission across the globe. They can infect anybody irrespective of their social status whether patients, visitors, or healthcare providers once infection prevention and control measures are not adhered to. Therefore, it was imperative that all persons entering the hospital must be screened for COVID-19 at the triage and/or fill out self-attestation forms at their respective service delivery points to declare their health status before engaging in the day's activities at the workplace. This was confirmed during the key informant interview.

> "When someone comes s/he must put on mask, then they are directed by the security guard at the main gate, to the triage desk under a tent for COVID-19 screening. Those who have respiratory symptoms were set aside in the respiratory waiting area under a tent for further examination by the clinician and samples were collected for investigation. Those who turn out positive for COVID-19 are admitted or sent home for home-based care" (Hospital IPC Focal Person).

Understanding Healthcare Providers' knowledge, attitudes, and practices (KAPs) and possible risk factors help to predict the outcomes of planned behavior. However, knowledge does not necessarily translate to practice even with the right attitude. A study done in Silte Zone in Southern Ethiopia confirmed the sentiment where 74.9% were knowledgeable while 84.2% had the right attitude towards COVID-19 interventions but only 68.9% demonstrated good practice (Yesse *et al.*, 2021). The same was replicated in the Uganda study, where 83.9% were knowledgeable, 78.4 had a positive attitude but only 37.0% had reported correct practice as a mitigation measure on the pandemic (Kamacooko & Kitonsa, 2021). Therefore, Healthcare providers in Busia, Ethiopia, and Uganda were well informed, with a positive attitude but a wanting practice that was attributed to inadequate supplies of Health Products and Technologies essential to contain COVID-19. Those Health Care Providers (HCPs) had a good grasp of what, when, and how to use relevant PPEs and curtailed nosocomial infection in the healthcare setting.

Conclusion and recommendation

Conclusion

The study revealed that knowledge of signs and symptoms, management of COVID-19, the five moments of hand hygiene, personal protective equipment, and availability of essential health products and technology was paramount with higher odds to improve skills in adherence to mitigation measures in the fight against COVID-19 pandemic infection.

Therefore, the study adopted the alternative hypothesis that there was a relationship between knowledge and Health Products and Technologies in the management of COVID-19 in Busia County Referral Hospital.

Recommendation

From the foregoing conclusion, the study recommends that the National team at the Ministry of Health should train healthcare providers on the promotion, prevention, and management of the current evidence-based approaches in the fight against COVID-19, to improve skills.

The Ministry of Health should develop a checklist of key critical and essential Health Products and Technologies required in the management of COVID-19 and disseminate it to all the Counties, as a guide to subsequent interventions in case of emergency and re-emerging conditions.

There was a need to conduct studies at the National and County to establish respective antibiograms to prevent antibiotic resistance.

The Department of Health and Sanitation, and the facility need to strengthen policy on regulation and establish Standard Operating Procedures (SOPs) for sharing Health Products and Technologies (HPTs) stock status on a daily and/or weekly basis, to facilitate prompt informed decision-making process and promote correct practice in the management of COVID-19.

The Ministry of Health and Department of Health and Sanitation should strengthen the operationalization of the coordination structures in the management of COVID-19 such as; infection prevention and control, rapid emergency response team, attestation forms, screening of patients and Healthcare providers, communication structures and availability of Health Products and Technologies to promote correct practice in the management of COVID-19.

The Ministry of Health and the Department of Health and Sanitation should customize and disseminate the COVID-19 policy documents and guidelines to suit facility needs to ease implementation at the facility.

A further in-depth study on the impact of mitigation strategies employed to fight COVID-19.

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