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# Knowledge and attitude of healthcare workers and patients on healthcare associated infections in a regional hospital in Ghana

Irene Ocran<sup>1,2</sup>, Daniel Nii Aryee Tagoe<sup>1,2\*</sup><sup>1</sup>Department of Laboratory Technology, College of Science, University of Cape Coast, Cape Coast, Ghana<sup>2</sup>Medical Laboratory Section, College of Science, University of Cape Coast, Cape Coast, Ghana

## PEER REVIEW

**Peer reviewer**

Kingsley Badu, Post-Doctoral Research Fellow, Noguchi Memorial Institute for Medical Research, College of Health Science, University of Ghana, P.O. Box LG 581, Legon – Accra, Ghana.

Tel: +233 (0) 265012563

E-mail: [kbadu@noguchi.ug.edu.gh](mailto:kbadu@noguchi.ug.edu.gh)**Comments**

The paper addresses a critical issue that is relevant globally and more so in the African context. Given that it constitutes a follow up to a previous study from the same hospital where laboratory evidence of the prevalence of HAIs was provided, the conclusions are valid and the article provides relevant piece of evidence that completes the puzzle.

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## ABSTRACT

**Objective:** To assess knowledge and attitude of healthcare workers (HCWs) and patients on healthcare associated infections (HAIs) in the central regional hospital in Ghana.

**Methods:** The purposive random sampling method was used to administer questionnaires over a period of 6 months to HCWs and patients visiting the hospital.

**Results:** A total of 210 patients and 71 HCWs were sampled. One hundred and three (53.8%) patients had some knowledge of HAIs with 52 (28.4%) being informed by a HCW compared with 63 (88.7%) of HCWs who were well informed about HAIs. Ninety-seven (46.2%) responding patient always washed their hands while 65 (31%) and 48 (22.9%) respectively sometimes or never washed their hands within or after leaving the hospital. Out of those who washed their hands, 64 (39.5%) always washed with soap while 46 (28.4%) did sometimes. This positively and significantly correlated ( $r=0.440$ ,  $P<0.001$ ) with knowledge on HAIs which was however insignificant in HCWs ( $r=0.025$ ,  $P=0.835$ ). As many as 48 (67.6%) of HCWs believed that authorities in the hospital had done little to prevent HAIs with the main reason being that the hospital was unclean. Whereas, 112 (53.3%) of patients considered the hospital clean. Twenty-seven (38%) of HCWs had had confirmed HAIs of which cholera made up 12 (16.9%) while 94 (44.8%) of patients believed they had had unconfirmed HAIs.

**Conclusions:** Although knowledge on HAIs is adequate, low compliance on preventive techniques resulting in high HAIs indicates attitudinal change is the best means of prevention.

## KEYWORDS

Healthcare workers, Healthcare associated infections, Patients, Knowledge, Attitude

## 1. Introduction

Nosocomial infections also known as hospital acquired infections (HAIs) are infections acquired in hospitals by patients who are admitted for a reason other than that infection first appear 48 h or more after hospital admission or within 30 d after discharge. A prevalent survey in 2002 conducted under the auspices of the World Health Organization (WHO) in 55 hospitals of 14 countries representing 4 WHO regions (Europe, Eastern Mediterranean, South-East Asia and Western Pacific) showed an average of 8.7% of hospital patients had HAIs[1]. Estimate of the annual cost of treatment for HAIs ranges from \$4.5 billion to \$11

billion and upwards contributed to 88000 deaths in the U.S. in 1995[2–4]. HAIs add to the imbalance between resource allocation for primary and secondary healthcare by directing scarce funds to the management of potentially preventable conditions. This is particularly important in developing countries where very little amount of resources are available for use for an unbearable number of patients. It is believed that one third of nosocomial infections are considered preventable and that as many as 92% of deaths from hospital infections could be prevented[5]. It is extrapolated that the rate of incidence of HAIs in Ghana is approximately 152000 out of 20.7 million people[6]. An earlier study on HAIs at the Volta regional hospital in Ghana by Tagoe *et al.*

\*Corresponding author: Miss Irene Ocran, Department of Laboratory Technology, Medical Laboratory Section, College of Science, University of Cape Coast, Cape Coast, Ghana.

Tel: 0044 (0) 743 205 0333

E-mail: [dntagoe@gmail.com](mailto:dntagoe@gmail.com)

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isolated a total of 187 (85.8%) bacteria (made up of 55.5% non-pathogenic and 30.3% pathogenic organisms from fomites in the Volta regional hospital, Volta Region, Ghana)[7]. A recent investigation on the potential sources of transmission of HAIs in the central regional hospital, cape coast, Ghana showed very high bacterial isolates with a mean count of  $1 \times 10^{11}$ . On all sampled surfaces, 46.1% pathogenic bacterial isolates showed extensive resistant profile to commonly prescribed antibiotics[8]. This suggests a high potential of HAIs, thus assessing knowledge and attitude of workers and users of these facilities on HAIs is needed.

The objectives of this current study were to assess the knowledge of both healthcare workers (HCWs) and patients on HAIs, sources of knowledge of these infections, sources of these infections and their attitude to prevent these infections. Those will help hospital authorities and information services improve information dissemination as well as adopt more pragmatic approach in helping reduce such infections.

## 2. Materials and methods

### 2.1. Study area and design

The study was undertaken at the regional hospital, central region, Ghana, a referral hospital that served the people of Cape Coast and the entire central and satellite areas of the western regions in Ghana for 6 months. Purposive random sampling of patients visiting the hospital and HCWs were undertaken in the hospital within the study period.

### 2.2. Ethical considerations

The Department of Laboratory Technology, University of Cape Coast and the Regional Hospital, Central Region, Ghana approved the study. Informed consent was obtained from all study participants and duly acknowledged by participants in agreement to the study. All procedures followed were in accordance with the ethical standards of the Ghanaian Ministry of Health as well as the Helsinki Declaration of 1975[9].

### 2.3. Sampling

Questionnaire was administered to each study participant seeking information on educational levels of patients, knowledge and information on HAIs and preventive techniques by patients, HCWs and authorities, possible HAIs etc. The questionnaire was completed by the subjects or for illiterates by the interviewer in the same study period after consenting to their involvement in the study.

### 2.4. Data analysis

Data analysis was performed to use SPSS 16.0 software. Descriptive analysis was done while Spearman's Rank Correlation ( $r$ ) was used to determine coefficient's as well as double-tailed paired means comparison.  $P \leq 0.05$  was significant.

## 3. Results

A total of 210 patients and 71 HCWs were sampled by

administering questionnaires to participants in the hospital within the study period. There was 100% response to questionnaire since only patients and HCWs were randomly sampled.

The respondents of HCWs were made up of 43 (60.6%) males and 28 (39.4%) female of which the majority were nurses 30 (42.3%) and the least were laboratory technologists 3 (4.2%). Sixty-three (88.7%) of HCWs have heard of HAIs out of which all (100%) defined it as infections acquired in the hospital. Just above half 39 (54.9%) always washed their hands frequently while on duties in the hospital and after work 32 (45.1%) washed sometimes (Table 1).

**Table 1**

Frequent response to questions by HCWs.

Questions	Parameters/answers	Response No. (%)
Sex	Male	43 (60.6)
	Female	28 (39.4)
Educational Background	High School	9 (12.7)
	Diploma	26 (36.6)
	Tertiary	36 (50.7)
Position	Nurse	30 (42.3)
	Physician	5 (7.0)
	Laboratory Personnel	3 (4.2)
	Dispenser	5 (7.0)
	Health Aid	19 (26.8)
	Student on Practical Attachment	9 (12.7)
Have you heard of HAIs?	Yes	63 (88.7)
	No	8 (11.3)
If yes, what is HAIs?	Infections acquire in the hospital	63 (100)
	Other	0 (0)
Do you frequently wash your hands while on duties in the hospital and after work?	Always	39 (54.9)
	Sometimes	32 (45.1)
	Never	0 (0)
If yes, do you wash with soap?	Always	38 (53.5)
	Sometimes	33 (46.5)
	Never	0 (0)
Do patients come in contact with your work surfaces, benches etc.	Yes	65 (91.5)
	No	6 (8.5)
How often do you disinfect your work surfaces, benches etc.	Once a while	7 (9.9)
	Once	51 (71.8)
	Twice	7 (9.9)
	Thrice	3 (4.2)
	> thrice	3 (4.2)
Have you ever had HAIs?	Yes	27 (38.0)
	No	44 (62.0)
If yes what was the infection?	Urinary Tract Infections	9 (33.3)
	Cholera	6 (22.2)
	Pneumonia	12 (44.4)
Was it confirmed?	Yes	24 (88.9)
	No	3 (11.1)
Who confirmed it?	Doctor	20 (74.1)
	Nurse	5 (18.5)
	Laboratory Personnel	2 (7.4)
Do you believe hospital authorities protect you from HAIs?	Yes	23 (32.4)
	No	48 (67.6)
If yes, How?	Provision of necessary facilities	8 (36.4)
	Provision of disinfectants	14 (63.6)
How do you think one can protect him/herself from HAIs?	Regular disinfection of Hospital	11 (17.5)
	Washing of hands with soap	36 (57.1)
	Following hospital safety rules	16 (25.4)

About 38 (53.5%) always washed with soap while 33 (46.5%) washed sometimes with soap. None ever washed without soap. Twenty-seven (38.0%) of HCWs said they had had HAIs out of which 24 (88.9%) was confirmed by a health officer with 20 (74.1%) being confirmed by a physician. Cholera made up the highest of these infections 12 (44.4%) followed by urinary tract infections 9 (33.3%) and pneumonia 6 (22.2%). Some

HCWs 23 (32.4%) believed hospital authority did not protect them from HAIs but believed one can protect himself/herself by washing hands with soap 36 (57.1%), following safety rules in the hospital 16 (25.4%) regularly disinfecting the hospital and medical instruments 11 (17.5%) (Table 1).

The majority of responding patients were males [111 (52.9%)] and ranges between the ages 25–30 years [116 (55.2%)], with the least age range of >51 years [15 (7.1%)] (Table 2).

**Table 2**

Frequent response to questions by patients

Questions	Parameters/answers	Response No. (%)
Sex	Male	111 (52.9)
	Female	99 (47.1)
Age	25–30 yrs	116 (55.2)
	31–35 yrs	20 (9.5)
	36–40 yrs	20 (9.5)
	41–45 yrs	30 (14.3)
	46–50 yrs	9 (4.3)
	> 51 yrs	15 (7.1)
	Illiterate	7 (3.3)
Educational Background	High School	89 (42.2)
	Diploma	67 (31.9)
	Tertiary	47 (22.4)
Have you heard of HAIs?	Yes	113 (53.8)
	No	97 (46.2)
If yes, what is HAIs?	Infections acquired when in the hospital	93 (82.3)
	Other	20 (17.7)
	Radio	20 (17.7)
	Reading	33 (29.2)
	Internet	5 (4.4)
If yes, where did you hear it?	Health Officer	52 (46.0)
	Television	3 (2.7)
	Always	97 (46.2)
Do you wash your hands within and after leaving the hospital?	Sometimes	65 (31.0)
	Never	48 (22.9)
	Always	64 (39.5)
If yes, do you wash with soap?	Sometimes	46 (28.4)
	Never	52 (32.1)
Do you believe the hospital is free from infections?	Yes	112 (53.3)
	No	98 (46.7)
	Hospital is nice and neat	71 (64.0)
	Hospital is disinfected regularly	22 (19.8)
If yes, what made you believe that?	Hospital and health workers are neat	18 (16.2)
	Yes	158 (75.2)
Besides the reception, consulting room and laboratory, do you visit other areas of the hospital such as laundry, washroom, wards etc.	No	52 (24.8)
	Yes	71 (33.8)
Have you come to the hospital sick for treatment and left worse off than you came?	No	139 (66.2)
	Yes	94 (44.8)
Have you ever come to the hospital with a particular illness but felt you have gotten another illness or infection after had left?	No	116 (55.2)
	My illness worsen	24 (25.8)
If yes, what makes you think so?	The symptoms of my illness did not change	12 (12.9)
	I suffered another illness	57 (61.3)

As many as 89 (42.2%) patient respondents have had high

school to tertiary education [47 (22.4%)], while HCWs 36 (50.7%) had tertiary education, and the least educational level of 9 (12.7%) were high school. One hundred and thirteen (53%) of patients had heard of HAIs with 93 (82.3%) defining it as sickness acquired from the hospital. Of patients whom had heard of HAIs, 52 (46.0%) were informed by a health officer, and 33 (29.0%) by reading healthy materials. Out of the patients sampled, 97 (46.2%) always washed their hands within or after leaving the hospital, 65 (31.0%) washed sometimes and 48 (22.9%) never washed hands. Of those who washed hands, 64 (39.5%) always washed with soap, 46 (28.4%) sometimes washed with soap while 52 (32.1%) never wash with soap. Ninety-four (44.8%) said they had come to the hospital with a particular illness but felt they had gotten another illness or infections after leaving the hospital (Table 2).

Spearman's correlation ( $r$ ) and  $P$ -values on knowledge of HAIs and its influence on attitudes of HCWs and patients are shown in Tables 3 and 4.

**Table 3**

Spearman's correlation ( $r$ ) and  $P$ -values on knowledge of HAIs and its influence on attitudes of HCWs.

Questions	Knowledge	
	Rho ( $r$ )	$P$
Education levels	0.269 <sup>*</sup>	0.023 <sup>a</sup>
Do you frequently wash your hands whilst on duties in the hospital and after work?	0.125 <sup>*</sup>	0.300
If yes, do you use soap in washing your hands?	0.025 <sup>*</sup>	0.835
Do you believe hospital authorities protect you from HAIs?	0.151 <sup>*</sup>	0.207
Have you ever had HAIs?	-0.088	0.466
How often do you disinfect your work surfaces?	0.299 <sup>*</sup>	0.011 <sup>a</sup>

<sup>\*</sup>=Positive correlation; <sup>a</sup> $P$ <0.05, <sup>b</sup> $P$ <0.001.

**Table 4**

Spearman's correlation rho ( $r$ ) and  $P$ -values on knowledge of HAIs and its influence on attitudes of patients.

Questions	Knowledge	
	Rho ( $r$ )	$P$ -value
Education levels	0.282 <sup>*</sup>	<0.001 <sup>b</sup>
Do you wash your hands within and after leaving the hospital?	0.422 <sup>*</sup>	<0.001 <sup>b</sup>
If yes, do you use soap in washing your hands?	0.422 <sup>*</sup>	<0.001 <sup>b</sup>
Do you believe the hospital is free from infections?	-0.139	0.044 <sup>a</sup>
Have you ever come to the hospital with a particular illness but felt you have gotten another illness or infection after you had left?	0.055 <sup>*</sup>	0.429
Besides the reception, consulting room and laboratory, do you visit other areas of the hospital such as laundry, washroom, wards etc.	-0.047	0.498

<sup>\*</sup>=Positive correlation; <sup>a</sup> $P$ <0.05, <sup>b</sup> $P$ <0.001.

## 4. Discussion

Knowledge of HAIs and compliance to methods in preventing them such as proper practice of aseptic precautions could lead to reductions in healthcare associated infections in the hospital. Results from the study indicated that majority 88.7% of HCWs have heard of HAIs, 63 (100%) understood what it was and had the requisite knowledge on how it can be prevented through hand washing with soap 5 (0.7%), following safety rules (25.4%) and regular disinfection (17.1%). Comparatively, 53.8% of patients have heard of HAIs of which 93 (82.3%) understood what it was. Majority of patients who knew about HAIs had obtained information from health officers (46.0%), reading (29.2%) and radio (17.7%). This is consistent with work done by Parmeggiani *et al.* who noted that knowledge about hospital infection from trained HCWs such as nurses, doctors, and biomedical scientists

was generally high and consistent with current scientific evidence<sup>[10]</sup>. Educational levels of both HCWs and patients were high with tertiary education 50.7% and 22.4% in HCWs and patients respectively and high school education 42.4% in patients resulting in a positive and significant correlation of knowledge of HAIs and educational levels of respondents for HCWs ( $r=0.269$ ,  $P=0.023$ ) and patients ( $r=0.282$ ,  $P<0.001$ ). Research by Suchitra and Lakshmi concluded that education has a positive impact on retention of knowledge, attitudes and practices in HAIs<sup>[11]</sup>.

Information of HAIs also correlated positively and significantly to hand washing in patients since majority 46.2% and 31.0% tend to wash their hands always and sometimes respectively within and after leaving the hospital ( $r=0.422$ ,  $P<0.001$ ) and 39.5% and 28.4% washes hands with soap always and sometimes respectively ( $r=0.440$ ,  $P<0.001$ ). However, in HCWs, knowledge of HAIs did not significantly correlate with hand washing ( $r=0.125$ ,  $P=0.300$ ) and even more so in hand washing with soap ( $r=0.025$ ,  $P=0.835$ ). This confirms earlier studies that indicated that HCWs have multiple reasons for non-compliance to hand washing such as dryness of skin due to frequent use of skin disinfectants, being too busy, wards being full and understaffing<sup>[12-14]</sup>. This is in contradiction to the several awareness programmes especially by the WHO in improving HCWs hand washing compliance<sup>[15]</sup>. About half of responding patients 53.3% believe the hospital is free from infections which negatively and significantly correlated with information on HAIs ( $r=-0.139$ ,  $P=0.044$ ) implying that this believe is not necessary translated into negligence in proper aseptic techniques. Majority of patients believe the hospital is free from infections because it is nice and neat (64.0%), disinfected regularly (19.8%) and the hospital and HCWs are neat (16.2%). This belief could also lead to majority of the patients 75.2% visiting several areas of the hospital besides the out-patient department which will result in increased exposure to HAIs. Majority of HCWs (91.5%) had patients coming in contact with their working surfaces. This resulted in a significant number of them disinfecting their work surfaces and areas at least once daily (71.8%), which correlated positively with knowledge on HAIs ( $r=0.299$ ,  $P=0.011$ ). Earlier studies showed that HCWs had different levels of compliance to universal precautions<sup>[16-18]</sup>. Most HCWs (67.6%) believe that hospital authorities do not protect them from HAIs resulting in as much as (38.0%) indicating that they had had HAIs of which 88.9% was confirmed and 74.1% by a physician. This correlated negatively and insignificantly with knowledge on HAIs ( $r=-0.088$ ,  $P=0.466$ ) indicating that the high knowledge levels did not translate into observing HAIs prevention methods. This is because although majority of HCWs (50.7%) know that hand-washing with soap, following safety rules in the hospital (25.4%) and regular disinfection of hospital and equipment (17.1%) protect one from HAIs, only 53.5% always washes hands with soap while 71.8% disinfect their tables and work surfaces only once a day while 9.9% do it once a while. Cholera was the highest HAIs 44.4% followed by urinary tract infections 33.3% and pneumonia 22.2%. HCWs had been known to get infected during disease outbreaks and pandemics such as the severe acute respiratory syndrome outbreak as well as the influenza pandemics<sup>[19-21]</sup>. The high incidence of HAIs could be as a result of the sporadic outbreak of diseases that places additional pressure on already understaffed HCWs resulting in poor safety compliance and thus HAIs.

There was a positive but insignificant correlation of patients who believe they had HAIs 44.8% with knowledge on HAIs ( $r=0.123$ ,  $P=0.075$ ), though this number could be considerably lower since their conditions were not confirmed. Majority of patients 28.4% who knew about HAIs were informed by a HCW. However, HCWs themselves have poor compliance to HAIs prevention. This could be as a result of high work load and other perceived factors that deter people from practicing handwashing either due to skin irritation or dryness of the skin, being too busy, inconvenient location of sinks, lack of institutional guidelines, lack of knowledge or experience, lack of a role model and lack of rewards<sup>[22-23]</sup>.

In conclusion, majority of HCWs (88.7%) have knowledge and understanding of HAIs' preventive methods *i.e.* washing of hands with soap (50.7%), following safety rules of hospital (25.4%) and believing hospital authorities do not protect them from HAIs (67.6%). However, implementation of these knowledge through compliance of preventive methods were poor, resulting in 54.9% washing hands always, 53.5% washing always with soap and 71.9% disinfecting work surfaces only once leading to 38.0% having had HAIs. More than half of patients (53.8%) have some information on HAIs having been informed by a health officer (46.0%) with 46.2% always washing their hands and 39.5% washing always with soap. Majority (53.3%) believe the hospital is free from infection with 44.8% believing they had had HAIs. Thus in patients, increased information on HAIs will lead to a reduction whereas in HCWs strict adherence and monitoring of compliance to hospital regulations on HAIs will instil the desired attitudinal change that will result in reduction in HAIs.

### Conflict of interest statement

We declare that we have no conflict of interest.

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### Comments

#### Background

Hospital acquired infections are important cause of morbidity and mortality as well as additional costs due to prolonged hospitalization. The authors having previously reported high prevalence of resistant pathogenic bacteria isolates in the same hospital makes it imperative for the knowledge and attitude of workers and users of these facilities on HAIs to be studied.

#### Research frontiers

In the last couple of decades, nosocomial infections have been recognized as a serious public health threat in most

hospitals in Africa–South of the Sahara. Although attempts have been made to characterize the common infections, the knowledge and attitudes of HCW and patients towards adhering to basic safety precautions has been largely ignored.

### Related reports

Research on hospital–acquired infections (HAIs) requires the highest methodological standards to minimize the risk of bias and to avoid misleading interpretation (Schumacher *et al.* 2013). The authors used descriptive statistics, Spearman’s Correlation and a two–tailed paired means comparison. This simple tool gives the findings direct inference and reduces ambiguity.

### Innovations & breakthroughs

This article uses a rather simple descriptive analysis to decipher a complex problem as HAIs and identifies salient causative factors that will influence surveillance and policy. Given that the same group has previously reported evidence of sources of pathogenic bacteria prevalence on fomites in the same hospital makes it genuine innovation in itself.

### Applications

The quality of healthcare delivery system of every nation is very fundamental to its fortunes: it imparts on its productivity, its wealth, gross domestic product, among others. It is hoped that the findings and recommendations in this article will influence and drive policy change towards a routine surveillance of HAIs.

### Peer review

The paper addresses a critical issue that is relevant globally and more so in the African context. Given that it constitutes a follow up to a previous study from the same hospital where laboratory evidence of the prevalence of HAIs was provided, the conclusions are valid and the article provides relevant piece of evidence that completes the puzzle.

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