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

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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 which had been confirmed by a HCW.

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 88 000 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 152 000 out of 20.7 million people[6]. An earlier study on HAIs at the Volta regional hospital in Ghana by Tagoe et al.
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 $1 \times 10^7$. 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

| Questions                          | Parameters/answers        | Response, No. (%) |
|-----------------------------------|---------------------------|-------------------|
| **Sex**                           |                           |                   |
| Male                              | 43 (60.6)                 |                   |
| Female                            | 26 (39.4)                 |                   |
| **Educational Background**        |                           |                   |
| High School                       | 9 (12.7)                  |                   |
| Diploma                           | 26 (38.6)                 |                   |
| Tertiary                          | 36 (50.7)                 |                   |
| **Position**                      |                           |                   |
| Nurse                             | 30 (42.3)                 |                   |
| Physician                         | 5 (7.0)                   |                   |
| Laboratory Personnel              | 3 (4.2)                   |                   |
| Dispenser                         | 5 (7.0)                   |                   |
| **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)                   |                   |
| Twice                             | 51 (71.8)                 |                   |
| 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 (13.3)                  |                   |
| 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                               | 21 (32.4)                 |                   |
| No                                | 48 (76.6)                 |                   |
| **If yes, How?**                  | Provision of necessary facilities | 8 (56.6) |
| **Provision of disinfectants**    | 14 (63.6)                 |                   |
| **How do you think one can protect himself/herself from HAIs?** | |                   |
| Regular disinfection of Hospital  | 11 (41.1)                 |                   |
| 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 HAI s 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 2). 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 1).

### Table 2
Frequent response to questions by patients

| Questions | Parameters/answers | Response |
|-----------|-------------------|----------|
| 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 HAI s? | Yes          | 113 (53.8) |
|           | No                | 97 (46.2)  |
| If yes, which is HAI s? | Infections acquired when in the hospital | 93 (82.3) |
|           | Other             | 20 (17.7)  |
|           | Radio             | 20 (17.7)  |
|           | Reading           | 33 (29.2)  |
| If yes, where did you hear it? | Internet | 5 (4.4)    |
|           | Health Officer    | 52 (46.0)  |
|           | Television        | 3 (2.7)    |
| Do you wash your hands within and after leaving the hospital? | Always | 97 (46.2) |
|           | Sometimes         | 65 (31.0)  |
|           | Never             | 48 (22.9)  |
| If yes, do you wash with soap? | Always | 64 (39.5)  |
|           | 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 regularly | Yes | 71 (64.9)  |
|           | Hospital is disinfected | No | 22 (19.8) |
| Hospital and health workers are neat | Yes | 18 (16.2)  |
| Besides the reception, consulting room and laboratory, do you visit other areas of the hospital such as laundry, washroom, wards etc. | Yes | 158 (75.2) |
|           | No                | 52 (24.8)  |
| Have you come to the hospital sick for treatment and left worse off than you came? | Yes | 71 (33.8)  |
|           | No                | 139 (66.2) |
| Have you ever come to the hospital with a particular illness but felt you have gotten another illness or infection after had left? | Yes | 94 (44.8)  |
|           | No                | 116 (55.2) |
| If yes, what makes you think so? | My illness worsen | 24 (25.8)  |
|           | 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 HAI s with 93 (82.3%) defining it as sickness acquired from the hospital. Of patients whom had heard of HAI s, 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 HAI s 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 HAI s and its influence on attitudes of HCWs.

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

### Table 4
Spearman’s correlation rho (r) and P–values on knowledge of HAI s and its influence on attitudes of patients.

| Knowledge                  | Rho (r) | P-value |
|----------------------------|---------|---------|
| Education levels           | 0.282   | <0.001  |
| Do you wash your hands within and after leaving the hospital? | 0.422 | <0.001  |
| If yes, do you use soap in washing your hands? | 0.422 | <0.001  |
| Do you believe the hospital is free from infections? | -0.139 | 0.044   |
| Have you ever come to the hospital with a particular illness but felt you have gotten another illness or infection after you had left? | 0.053 | 0.428   |
| 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   |

### 4. Discussion
Knowledge of HAI s 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 HAI s, 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 HAI s of which 93 (82.3%) understood what it was. Majority of patients who knew about HAI s 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[10]. 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=0.209, \( P<0.023 \)) 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[11].

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, \( P=0.835 \)) and even more so in hand washing with soap (r=0.025, \( P=0.859 \)). 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[12-14]. This is in contradiction to the several awareness programmes especially by the WHO in improving HCWs hand washing in the hospital (25.4%) and regular disinfection of hospital surfaces (21.2%) protect one from HAIs, only 53.5% washes hands with soap while 71.8% disinfect their tables and work surfaces only once a while. Cholera was the highest HAIs 44.4% followed by urinary tract infections 33.3% and pneumonia 22.2%. HCWs reported high prevalence of resistant pathogenic bacteria isolates in the same hospital makes it imperative for the hospital authorities do not protect them from HAIs (64.0%) and believing hospital authorities do not protect their from HAIs (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 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[19-21]. 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[22-23].

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 being informed by a health officer (46.0%) with 46.2% always washing their hands and 39.5% washing always with soap. Majority (53.6%) 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 instill 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 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.

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