Original article: Nurses: insights on nursing students

Healthcare associated infection: good practices, knowledge and the locus of control in heatlhcare professionals

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Abstract. *Background and aim:* The incidence of Healthcare Associated Infections (HAI) is an important indicator of the quality of care. The behaviors associated with the prevention of infections are not only supported by rational knowledge or motivation, but are mediated by social, emotional and often stereotyped behaviors. The awarness of the good practices related to HAI, may be a factor. Other studies, identify how the perception of the problem in healthcare professionals is often influenced by a tendency towards an external *Locus of Control:* the patient, the family, the other wards, other care settings. The aim of this study is to investigate the perception of healthcare professionals. In particular they have been measured their awarness of the good practices , perceptions of the potential contamination level of some commonly used objects, knowledge about the management of invasive devices, Locus of Control. *Method:* A cross-sectional correlational design was utilized. An ad hoc questionnaire was interviewed by 222 health professionals nurses and physicians in a northern hospital of Italy. *Results:* The percentage of professionals who have attended training courses over the last 5 years was quite high, both for upgrades on HAI (78.7%) and Vascular Catheters (78.8%), while the percentage of professionals who updated on bladder catheterization (59.46%) was lower. The mean score of good practice awareness towards HAI (5.06), is high. The perception of the potential level of contamination of some devices had a mean ranging from 4.62 (for the drip) to 5.26 (for the door handle). The average value of the Locus of Control (43.54) indicates that participants demonstrated a value that is midway between External and Internal. The correlation test analysis revealed no significant relationships among professionals'age, knowledge about HAI, or infection related venus catheter. Also, results revealed that there were statistically significant positive relationships between professionals' Good Practices awareness about HAI , Knowledge, and Locus of Control. *Conclusion:* The study findings demonstrated that good practice awareness towards HAI among nurse and physician was good but not completely optimal. Findings revealed that knowledge toward HAI prevention and HAI related device prevention were not completely adequate. The educational courses, according to our correlational findings, should definitely take into account the psycho-social aspects of this phenomenon.

Key words: HAI, healthcare professionals, awareness, knowledge, good practice

Introduction

The incidence of Healthcare Associated Infections (HAI) is an important indicator of the quality of care. Indeed, the relationship between behaviors / welfare practices, organization of health services and risks is undisputed.

On any given day, 5.7% of patients (one in 18 patients) in European hospitals have at least one HAI (95% confidence interval: 4.5-7.4%). This translates

to about 80,000 hospitalized patients in Europe who have at least one HAI on any given day (1).

Compared with the perception that operators have of the infectious risk, several authors (2, 3,4,5) cite the discrepancy between the knowledge of scientific evidence and the effective ability to take the right precautions. It emerges, in fact, that operators have a good perception of the infectious risk related to the assistance, but often adherence to good practices is not applied.

Several studies on the training of nursing students (6, 7) give importance to knowledge in the prevention of HAI but underline the strong influence that other factors, such as the influence the apprentice tutor exerts on students.

It can be said that most of the behaviors associated with the prevention of infections are not only supported by rational knowledge or motivation, but are mediated by social, emotional and often stereotyped behaviors.

Morrow and colleagues (8), on this topic, identify how the perception of the problem in healthcare professionals is often influenced by a tendency towards an external *Locus of Control*: the patient, the family, the other wards, other care settings. Operators therefore tend to rationalize and justify their behaviors, even if they disagree with the guidelines and organizational policies, and at the same time condemn the behavior of others. The literature also argues that younger staff are more sensitive and compliant, and suggest that there are no significant differences in perceptions of risk among practitioners with different years of professional experience (9).

The "obvious dirt" (10, 11), understood as a visible and instinctually visible dimension potentially dangerous for oneself, together with patient knowledge, play a decisive role in self-protection behaviors and consequently in the perception of the infectious risk. In the literature, the relationship between knowledge and perception of risk is not homogeneous. Moreover, it is not fully clear what the relationship is between Locus of Control and attitudes towards HAI prevention. The theme of relationships between knowledge, attitudes, perception of contamination and locus of control has not yet been studied in Italy.

Aims

The aim of this study is to investigate the perception of healthcare professionals (physicians and nurses) in a hospital in Northern Italy about the risk of Healthcare Associated Infections (HAI).

The specific aims are:
1. Investigate professionals' awarness of the good practices related to HAI;
2. Investigate professionals' perceptions of the potential contamination level of some commonly used objects;
3. Investigate the knowledge about the management of invasive devices (peripheral venous catheter, central venous catheter, and bladder catheter).
4. Investigate professionals' Locus of Control.
5. Evaluate any correlations between these variables and socio-anagraphic data.

Method

Design

A cross-sectional correlational design was utilized.

Participants

The study was undertaken in one public hospital in the North of Italy. The target population comprised all nurse or physician who met the following inclusion criteria:
- being a nurse or physician, working in the Surgical and Trauma department, Cardiovascular department, Intern department, Primary Care department, head-neck department
- Accepted to take part to the study

Instruments

The survey was conducted using a self-reportand anonymous questionnaire. The overall instrument consists of 51 total items made by:
- To assess "Awareness of good practices toward care-related infections," a scale developed by this research group in accordance with the revised literature was used. The scale consisted of 9 items, which could be answered through a 6-point Likert scale (from 1 = not at all to 6 = completely agree); thus, the total score range was from 9 to 54. Higher sco-

res indicated increased awareness of good practice in managing HAI. The reliability of the scale proved to be good (Cronbach's α = 0.779);

- To assess the "Perception of the Potential Level of Contamination of Some Objects, an ad-hoc scale was developed based on data from the literature. Participants were asked to declare the perceived level of potential contamination of 10 objects commonly used in a healthcare environment on a 6-point Likert scale (from 1 = not contaminated to 6 = highly contaminated).

- To assess the "Level of Knowledge of HAI" an ad-hoc scale was developed according to literature data. Especially on the Bundles and those that are, according to the research team's professional experience, the main criticalities that are observed in everyday practice regarding the management of these devices. The scale had 15 items, each of them to be responded to on a 6-point Likert scale (from 1 = completely disagree to 6 = completely agree), and the range of possible total scores was 15 to 90 (from 5 to 30 for any factor). A higher score indicated a higher level of knowledge about HAI. The reliability of the scale was good (Cronbach's α = 0.726). The scale assessed three areas:
  A) General knowledge about HAI (Cronbach's α = 0.673);
  B) Knowledge about the management of vascular catheters (Cronbach's α = 0.610);
  C) Knowledge about the management of the bladder catheter (Cronbach's α = 0.460).

- To assess the professionals' Locus of Control, the "Locus of Control of Behavior" scale (12) was used. It consists of 17 items with 6-point Likert scales (from 1 = do not agree to 6 = completely agree), and thus had a total score range from 17 to 102. A higher score indicates a higher level of external Locus of Control. The reliability of the scale was acceptable (Cronbach's α = 0.726).

The socio-anagraphic data, the qualification and the specific training related to the subject were also collected.

Data Analysis

Collected data was analyzed using the SPSS® 23 software. Descriptive statistics (mean and standard deviation) and Pearson's correlations between the variables were calculated.

Results

Characteristics of the Sample

A total of 226 questionnaires were distributed and 222 (98.2%) were returned and included in the analysis. The mean age of the participants was 39.23 years (SD = 8.90, range from 23 to 62) and 83.6% (n = 189) were females.

The sample consisted of 89% nurses and 10.11% physicians. The respondents had more than 11 years of professional experience. The percentage of professionals who have attended training courses over the last 5 years was quite high, both for upgrades on HAI (78.7%) and Vascular Catheters (78.8%), while the percentage of professionals who updated on bladder catheterization (59.46%) was lower.

Descriptive analysis

Good Practices Awareness towards HAI

The mean score of good practice awareness towards HAI was 5.06 (SD = 0.64) out of 6. The data shows a good knowledge of sound HAI practices. Some items are of particular interest, such as: "Hands of health workers are the vehicle for transmission of nosocomial pathogens" with the highest mean value (M = 5.70; DS = 0.772), followed by "Hand hygiene after removing gloves is an HAI control measure" with a mean of 5.3 (DS = 0.918). These values seem to confirm that the interviewed sample has an extremely high awareness of good HAI practices.

Perception of the potential level of contamination of some devices

The perception of the risk of contamination of some devices had a mean ranging from 4.62 (for the drip) to 5.26 (for the door handle) out of 6. Table 1 shows Mean and SD values for each single object being investigated.

The table shows that paricipants were highly aware of how commonly used devices (or at least the reported ones) are potentially at risk of contamination, as shown from the high mean for each objects.

Level of Knowledge of HAI

The average score of Knowledge was M = 4.78 (DS=0.72), out of 6. The used scale identifies three in-

Table 1. Perception of potential contamination of devices

Devices	N	Mean	SD
Door handle	224	5,26	1,154
Bedpan	222	5,04	1,350
Bell	224	5,02	1,185
PC keyboard	223	4,88	1,328
Tap	223	4,85	1,270
Mobile phone	224	4,62	1,419
Drip	224	4,62	1,307
Medical Record	223	4,43	1,475
EKG Machine	224	4,04	1,463
Clinic Desk	223	4,02	1,499

vestigation areas, (see table 2). The highest knowledge rate (M = 5.49; SD = 0.832) was observed for the general Knowledge of HAI.

The data seem to suggest that the sample interviewed shows greater general knowledge about HAI with respect to specific knowledge about the venous and bladder catheter.

Locus of Control of Behavior

For the Locus of Control (12) scale, the measured mean was M = 43.54 (SD= 9.86). The total score range of the scale is from 17 to 102. The mean value of the scale indicates that the participants on average have a Locus of Control that is midway between External and Internal.

Correlation between the variables

Results of Pearson correlation test analysis revealed no significant relationships among professionals' age, knowledge about HAI, or infection related venus cath-

Table 2. Mean and standard deviation of Level of Knowledge of HAI

Area	n	Mean	SD
General knowledge on HAI	224	5,4955	,832
Knowledge about the management of vascular catheters	224	4,6212	,861
Knowledge about the management of the bladder catheters	224	4,8635	,983

eter. Also, results revealed that there were statistically significant positive relationships between professionals' Good Practices awareness about HAI , Knowledge, and Locus of Control, respectively r = 0.342, 0.317, 0.254, and -0.163, p < 0.05 (see table 3).

There were statistically significant positive relationships between professionals' locus of control and knowledge about infection related to venus catheter (r = - 0,184, p < 0.05) and between knowledge about infection related bladder catheter and other knowledge in study (r = 0.291, 0.418, P < 0.05).

Also, there were statistically significant positive relationships between professionals' Perception of object contamination, Knowledge, and Good practices awareness about HAI (see table 4).

Discussion

The high score obtained by the participants shows a high awareness of good practice in HAI management, in line with the reviewed literature (13). From the analysis of the individual responses to the Awareness scale, it appears that people in health care professions are likely to already have a high level of training; participants have a level of agreement in hand hygiene items higher the importance of environmental sanitation, the awareness of the infectious risk associated with the hygiene time, and the infectious risk originated in the surgical room for infection of the surgical site. The correlation between awareness of good practices and knowledge of the infectious risk was significant. Professionals who have good awareness of hygiene practices also have higher knowledge. This data are in line with the literature in saying that high levels of knowledge predispose higher effectiveness in HAI prevention (14). It is interesting to note that the Mean score (4.78; SD = 0.72) shows a level of knowledge good but not exhaustive. This data cannot be compared with literature because an ad hoc scale was used. The correlation between good practice awareness towards HAI and locus of control was statistically significant. This result is again consistent with literature, as in Jackson, Lowton and Griffiths (10) and Morrow and Griffiths (8). In their studies, participants tended to attribute the causes of MRSA transmission to external human factors (hence not to themselves), their

Table 3. Pearson's correlation between variabless

	Pearson's corelation						
	1	2	3	4	5	6	7
1) Age	1	,100	,075	,106	-,051	,025	,259**
2) Locus of behaviour		1	-,163*	-,184**	-,101	-,184**	-,097
3) Good practices awareness about hai			1	,371**	,342**	,317**	,254**
4) Mean of knowledge				1	,527**	,921**	,713**
5) Knowledge of hai					1	,370**	,291**
6) Knowledge of venus cat.						1	,418**
7) Knowledge of bladder cat.							1

Table 4. Pearson's correlation between Devices, Good practices awareness, and Knowledge

	Pearson's corelation											
	1	2	3	4	5	6	7	8	9	10	11	12
1) Mean of knowledge	1	,371**	,100	,170*	,232**	,227**	,166*	,262**	,254**	,208**	,176**	,049
2) Good practices awareness about healthcare associated infections		1	,089	,216**	,210**	,259**	,295**	,160*	,242**	,244**	,215**	,199**
3) Bedpan			1	,211**	,251**	,139*	,248**	,150*	,228**	,169*	,125	,116
4) Mobile phone				1	,540**	,624**	,464**	,317**	,332**	,458**	,448**	,309**
5) Door handle					1	,672**	,586**	,285**	,528**	,470**	,433**	,354**
6) Pc keyboard						1	,536**	,401**	,506**	,613**	,590**	,403**
7) Bell							1	,307**	,523**	,478**	,374**	,455**
8)Ekg machine								1	,398**	,446**	,449**	,321**
9) Tap									1	,503**	,488**	,416**
10) Medical records										1	,703**	,434**
11) Desk											1	,567**
12) Drip												1

success in controlling infections to good policies and team performance, while "leakage" to situational factors, such as patient displacement and work pressure.

Coming to the perception of contamination, participants considered the door handle as the most contaminated object, frequently in contact with the hands of the operators during patient care followed by the bedpan and bell. Finally, the correlation between perception of contamination, good practice awareness, and knowledge seems to indicate a possible link between these variables. In particular, the correlation between perception of object contamination and good practice awareness is highly significant for almost all of the proposed objects, except the bedpan. This may indicate that those who show greater sensitivity to HAI management consider potentially contaminating most of the objects frequently in contact with the hands of the operators during patient care. The correlations between knowledge and objects were significant and positive, except for bedpan and drip.

This can be considered in line with Jackson, Lowton, Griffiths (10) and Jackson, Griffiths (11) that identify sd

"obvious dirt" a tendency of the operators to increase the perception of the infectious risk. It still looks strange that there were not significant correlations between bedpan, knowledge, and good practices awareness.

Conclusion

This study lead to interesting findings, even though it has many limitations.

The main study limitation is that it was carried out only in one hospital in the North of Italy, using non validated scales, aside from the Locus of Control of Behavior scale. This does not allow a comparison and a generalization of the results.

The study also took into consideration a sample of health professionals with non-homogeneous characteristics. The limited number of male and female professionals did not allow for evaluation of gender differences. It would be really interesting to extend the research to other Italian centers and to evaluate the possible adherence to HAI prevention practices with ethnographic techniques.

The study findings demonstrated that good practice awareness towards HAI among nurse and physician was good but not completely optimal. Findings revealed that knowledge toward HAI prevention and HAI related device prevention were not completely adequate. The significant correlation between good practice awareness, knowledge, locus of control behavior and object contamination perception should be investigated in depth. Appropriate educational training may be important to improve the professional competence dealing with infection control issues and limiting the transmission of diseases in the clinical practice settings. These educational courses, according to our correlational findings, should definitely take into account the psychosocial aspects of this phenomenon.

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