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**Written versus verbal information for patients' education on Healthcare-Associated Infections: a cross-sectional study.**

Marco BO<sup>1</sup>, Viola AMPRINO<sup>1</sup>, Paola DALMASSO<sup>1</sup>, Pier Angelo ARGENTERO<sup>2</sup>, Carla Maria ZOTTI<sup>1</sup>

<sup>1</sup>Department of Public Health and Pediatrics, University of Turin, Turin, Italy; <sup>2</sup>Infection Control Unit, TO3 Healthcare Trust, Rivoli, Italy

**Corresponding author**

Carla Maria Zotti

Department of Public Health and Pediatrics, University of Turin,

via Santena 5 bis, 10126 TURIN, ITALY

Tel: 0039.011670.5840; FAX: 0039.011.670.5881

e-mail: [carla.zotti@unito.it](mailto:carla.zotti@unito.it)

**Running title:** Written versus verbal information on HAI

## SUMMARY

In 2008, Piedmont region (Italy) recommended delivering written information on Healthcare Associated Infections (HAI) to every patient admitted to hospitals. We interviewed 363 patients admitted to 5 hospitals to evaluate whether patients who received written information were more informed about HAI than the other patients. We found no statistically significant differences in patient knowledge on HAI between those who received written information and those who only received verbal information. On the contrary, we observed that the knowledge of HAI was significantly lower among women and significantly higher among patients with higher education and among those admitted to a surgical ward.

KEYWORDS: cross-infection, patient education handout, disclosure

## INTRODUCTION

Recent studies conducted in France and Italy showed that most patients have little knowledge of HAI and do not recall receiving any information on HAI during recovery.<sup>1-3</sup> The data may be explained in different ways. Merle et coll. found that healthcare workers presented a limited inclination to give information on HAI to patients.<sup>4</sup> Concurrently, two studies conducted among patients isolated because of Methicillin-Resistant Staphylococcus Aureus infection and among surgical patients showed that patients who received written information on infection risk retained a limited amount of that information.<sup>5-6</sup>

In 2009, the Council of Europe recommended the dissemination of objective and understandable information about HAI risk, the preventive measures implemented by the healthcare institution and how patients can help prevent HAI.<sup>7</sup>

During that same period, there was a recommendation to deliver written information on HAI to every patient admitted to the regional hospitals in Piedmont (Italy).<sup>8</sup> A standardized format for the educational

leaflet was provided, and the availability of written material on HAI was also added to the list of regional indicators for the prevention and control of HAI.

Every regional Healthcare Trust has developed a policy to inform patients about HAI. In some of the Healthcare Trusts, educational leaflets have been distributed to every patient at hospital admission. In others, information about HAI is included in special admission guidebooks, which describe the rules and the services offered to patients during their hospital stay. Finally, some of the Trusts have not produced written documents on HAI and prefer that nurses provide information about HAI verbally.

This cross-sectional study was conducted three years after the launch of the regional policy, to describe whether any differences exist in the knowledge of HAI between patients who received information in a written or verbal format.

## METHODS

The survey was conducted in 5 hospitals (2 acute hospital with 138-251 beds and 3 major acute hospitals with 286-923 beds) in Piedmont from October 2011 to October 2012. Nurses delivered information on HAI through an educational leaflet at two of the hospitals and through a recovery guidebook in one. Even if presenting some differences, the main content of each document was consistent to the standardized regional format. At the remaining 2 hospitals, nurses only provided verbal information about HAI. Four to six wards were identified at every hospital, selected from internal medicine, specialized medicine (cardiology, oncology, hematology, respiratory disease and gastroenterology) and surgery units. All inpatients who were present in every ward during the study period were included and interviewed by 2 resident doctors. The exclusion criteria were: a) mental illnesses that impaired a patients' ability to answer questions; b) an insufficient knowledge of the Italian language for answering questions; c) discomfort due to immediate post-intervention in surgical patients and d) inability to read or understand written material due to visual impairment, clinical conditions or drugs assumption.

A 10-item questionnaire was developed to evaluate patient knowledge of HAI and its prevention strategies. Five of the questions were adapted from questions used in a previous survey,<sup>6</sup> while the others were tailored to investigate whether patients retain some of the information conveyed by educational leaflets and guidebooks.

Every questionnaire was scored from 0 to 6 depending on the sum of the scores obtained by every interviewed patient on key questions regarding knowledge of HAI risk and control. One point was given for every correct answer and zero points were given for every incorrect answer. A dichotomous variable was created to identify patients with an “acceptable” level of information (patients who correctly answered almost 4 of the key questions included in the questionnaire).

The study was approved by the Ethical Committee of the University of Torino. An information leaflet explaining the objective and the characteristics of the study was given to every participant. All participants gave their written consent to participate to the study.

#### Statistical Analysis

Data were expressed as counts and percentages for categorical variables and as means ( $\pm$  standard deviation) for continuous variables.

Univariate analysis was performed using a chi-squared test or a Fisher exact test, as appropriate, to verify the existence of significant differences by gender, nationality and education levels among patients exposed to different types of information (verbal vs written information) and among the patients admitted at different hospitals and wards. A Student t-test was used to verify the existence of significant differences in age distribution between the two groups.

A Mann-Whitney U-test was performed to verify the presence of significant differences in the scores obtained by patients exposed to different types of information (verbal vs written information).

Simple and multivariable logistic regression were performed to evaluate the probability of achieving an “acceptable” level of information on HAI (score  $\geq 4$ ) according to gender, age, level of education, admitting ward and hospital and having received written information.

All tests were two-tailed and the statistical significance level was set at 0.05.

All the analysis were performed using Stata SE 13.

## RESULTS

We interviewed 363 patients admitted to 24 wards of 5 hospitals in Piedmont. One hundred eighty-two (50.1%) patients were males, 173 (47.7%) admitted to a surgery ward, 101 (27.8%) to a specialized medicine ward and 89 (24.5%) to an internal medicine ward. The mean age was  $63.4 \pm 16.7$ , higher for those admitted to internal medicine wards ( $70.7 \pm 16.6$ ) than for those admitted to specialized medicine ( $60.7 \pm 15.9$ ) or surgical ( $61.5 \pm 16.2$ ) wards ( $P < 0.001$ ). One hundred twenty-three (33.9%) patients had high school or university education and the proportion of people with an higher education level was lower in patients more than 50 years of age ( $P = 0.0001$ ).

Two hundred twenty-three patients admitted to 3 of the hospitals received written information on HAI, while 140 received verbal information. Univariate analysis showed statistically significant differences in educational level and in the distribution of patients per type of ward among patients who received written and verbal information (Table I). The mean scores obtained by the questionnaires were  $4.1 \pm 1.09$ , comparably high in both the patients who had received written or verbal information ( $4.0 \pm 1.1$  and  $4.2 \pm 1.1$ , respectively). The scores did not vary significantly at univariate analysis ( $P = 0.18$ ).

Univariate analysis also showed that the probability of retaining most of information given about HAI was 24% higher in patients who received written information, but the difference was not statistically significant

(OR=1.24; 95%CI: 0.80-1.92; P=0.33). The probability of retaining most of information was also higher in patients admitted to a surgery ward (OR 2.28, 95% CI: 1.29-4.01, P=0.003) or to a specialized medicine ward (OR 2.13, 95% CI: 1.14-3.97, P=0.02) and in patients with at least a secondary education (OR 1.94, 95% CI: 1.24-3.03, P=0.003). While this probability decreased with increased age (Table II).

In multivariable analysis, the probability of retaining most of the information given about HAI was 37% lower in females (P=0.04), 67% higher in patients with at least a secondary education (P=0.04) and 2.5 times higher in patients admitted to surgical wards (P=0.004). Although the probability of retaining most of the information given about HAI also decreased with increasing age in multivariable analysis, these results were not statistically significant (Table II).

## DISCUSSION

This study discusses the degree of knowledge of patients admitted to both medical and surgical units who received written or oral information on HAI.

We did not find any statistically significant differences in patient knowledge between those who received written information and those who only received verbal information, even if the proportion of patients with an higher level of information on HAI was greater among those who received written information. This result is in line with those reported in previous studies.<sup>5-6</sup> Despite a limited sample size, Newton et al. reported no clear understanding of isolation practice and of the nature of the infection in patients who were isolated due to MRSA infection and who had received both verbal and written information from nurses.<sup>5</sup> More recently Merle et al. conducted a randomized control trial to evaluate the effect of delivering written information on Surgical Site Infections (SSI) to surgical patients.<sup>6</sup> In that study, even though written material was provided that was tailored to SSI and corrected for readability, the authors found that delivering written material increased patients' satisfaction, but did not increase their knowledge

of SSI. As reported by Merle, many patients may not be able to recall the delivery of informational material.<sup>2,6</sup>

Contrary to Merle, in our sample the amount of information retained by patients was influenced by level of education, whether the patients were admitted to a surgical ward and by gender.<sup>6</sup> In a way, these results are reasonable.

A higher education level may positively influence both patient health education and their ability to pay attention to and understand written materials. In this study, only about half of the patients admitted to hospitals where written information material was available, recalled receiving it. Further, patients' education varied in relation to age, with a lower proportion of people with higher education levels in older patients and the patients admitted to internal medicine wards were older than those admitted to specialized medicine or surgical wards.

Moreover, patients who may perceive to be at higher risk of infection – such as those waiting for a surgical intervention – may pay more attention to information on HAI. Infections are a risk of surgery, and information about infection should be discussed with patients before asking consent for treatment; thus, information received upon admission may have been reinforced by surgeons during clinical conversations.

Also, mean age and education level were comparable in women and men, but we interviewed less women than men in surgical units. This fact might explain the differences we observed among genders.

Our results might also have been influenced by the readability of the information leaflets used in this survey. The materials distributed at the regional hospitals were not specifically designed for this survey, but they derived from a regional template. Thus, we analyzed educational leaflets with Gulpease, an Italian language readability index.<sup>9</sup> The test showed that each of the written documents tested in this survey could be considered difficult to read by people with a senior high school education and very difficult to read by people with a junior high school education. Although the score obtained by Gulpease only provides an indication of the readability of documents, it is reasonable to assume that the educational leaflets delivered to patients throughout our region might not be simple to understand for patients. The poor readability of



written materials delivered to inpatients may have influenced our results and it may contribute to explain why the patients who received written information on HAI were not significantly more informed than the ones who received only verbal information in our sample.

Finally, as reported by Johnson et al., it is the standardization of both the content and the methods used to educate patients that improves patient's knowledge.<sup>10</sup> In Piedmont, the regional policy recommended the delivery of standardised written information on HAI to all inpatients, a simple promotion measure that does not require a relatively high amount of time or personal resources to implement. On the contrary, it did not include a special training to standardize the methods used by healthcare professionals to educate patients about HAI risk. This strategy alone may not be sufficient to achieve the goal of significantly improving patient knowledge and awareness of the risk of acquiring an HAI during recovery.

To improve patients' knowledge on HAI, healthcare organizations should provide specific educational training programs to set up teams of healthcare workers prepared to inform patients on HAI. Additionally, special attention should be paid to the readability of written information materials before they are introduced. Delivering information which people having low levels of education may not be able to understand introduces additional inequalities that could negatively impact more vulnerable individuals. On this point, healthcare organizations should involve both patients and communication experts, who may give useful suggestions to enhance the readability of the written material.

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Table I. Characteristics of the subjects.

	VERBAL INFORMATION (n=140)	WRITTEN INFORMATION (n=223)	P
Male	66 (47.1)	116 (52.0)	0.37
Age (years)	63.4 ± 18.0	63.4±15.8	0.99
Italian nationality	133 (95.0)	216 (96.9)	0.54
Education			
elementary/junior high school	102 (72.9)	138 (61.9)	0.03
senior high school/university	38 (27.1)	85 (38.1)	
Ward			
Internal Medicine	30 (21.4)	59 (26.5)	0.001
Specialized Medicine	27 (19.3)	74 (32.2)	
Surgery	83 (59.3)	90 (40.3)	
Score *	4.0±1.1 4 (3-5)	4.2±1.1 4 (3-5)	0.18
Score≥4	52 (37.4)	95 (42.6)	0.33

\* Scores obtained by every interviewed patient on key questions (from 5 to 10) regarding knowledge of HAI risk and control.

Table II. Probability of having an acceptable level of information on HAI (score $\geq$ 4) at univariate and multivariable analysis.

	Score $\geq$ 4 (n=147)	Score<4 (n=215)	Crude OR (95% CI)	P	Adjusted OR+ (95% CI)	P
Written information	95 (64.6)	128 (59.5)	1.24 (0.80-1.92)	0.33	1.58 (0.72-3.48)	0.26
Female	65 (44.2)	116 (54.0)	0.68 (0.44-1.03)	0.07	0.63 (0.40-0.98)	0.04
Age						
$\leq$ 50	36 (24.5)	32 (14.9)	1.00 (Ref)	0.003*	1.00 (Ref)	
51-65	47 (32.0)	59 (27.4)	0.71 (0.38-1.31)	0.27	0.76 (0.39-1.45)	0.40
66-75	34 (23.1)	59 (27.4)	0.51 (0.27-0.98)	0.04	0.56 (0.28-1.11)	0.10
$\geq$ 76	30 (20.4)	65 (30.3)	0.41 (0.21-0.79)	0.006	0.53 (0.26-1.09)	0.09
High educational level	63 (42.9)	60 (27.9)	1.94 (1.24-3.03)	0.003	1.67 (1.02-2.71)	0.04
Admitting ward						
<i>Internal Medicine</i>	24 (16.3)	65 (30.2)	1.00 (Ref)		1.00 (Ref)	
<i>Surgery</i>	79 (53.7)	94 (43.7)	2.28 (1.29-4.01)	0.003	2.51 (1.33-4.74)	0.004
<i>Specialized</i>	44 (30.0)	56 (26.1)	2.13 (1.14-3.97)	0.02	1.92 (0.98-3.73)	0.06
Admitting hospital						
<i>Hospital 1</i>	23 (15.6)	37 (17.2)	1.00 (Ref)		-	-
<i>Hospital 2</i>	40 (27.2)	35 (16.3)	1.84 (0.91-3.71)	0.08	-	-
<i>Hospital 3</i>	32 (21.8)	56 (26.0)	0.92 (0.47-1.82)	0.81	-	-
<i>Hospital 4</i>	31 (21.1)	44 (20.5)	1.13 (0.56-2.28)	0.72	-	-
<i>Hospital 5</i>	21 (14.3)	43 (20.0)	0.79 (0.37-1.65)	0.52	-	-

\*score trend

+ multivariable logistic regression adjusted by gender, age, educational level and admitting ward