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Knowledge and Compliance with Patient Safety in Public Hospitals in Urban and Rural Lebanon

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Abstract

Background: The International Patient Safety Goal (IPSG) standard was established by the Joint Commission International (JCI) to assess Patient Safety (PS) knowledge and compliance among hospital nurses, as part of the overall process of accreditation. The combination of IPSG grading and the exploration of the institutional PS culture have been described as a way of measuring the overall orientation to PS in a given health care unit. This study explored potential particularities in PS and its determinants between urban and rural hospitals in Lebanon.

Methods: A cross-sectional design was used to assess 764 nurses working in 26 of 28 public hospitals in Lebanon. Data were gathered using a self-administered questionnaire and analyzed with SPSS, in the two strata of hospital location "Urban" vs. "Rural". The Chi-square, ANOVA test, and Student-t test were used to determine factors significantly associated with PS knowledge and compliance.

Results: Younger personnel, university hospitals with A-level accreditation, presence of a PS committee, PS program, and periodic training were all significantly associated with PS knowledge and practices among nurses. Nurses in urban hospitals were more knowledgeable and compliant with IPSG than those in rural ones. Perception of teamwork was higher among nurses working in rural hospitals than urban ones.

Conclusions: Improvement of PS culture is required in public rural hospitals than in urban ones. Rural hospitals will need to create and/or activate the PS committee, PS program, and periodic audits. Linking A-level public hospitals in rural areas with medical schools will make a significant difference in PS culture and compliance.

Keywords: Culture; International Patient Safety Goals; Patient safety; Public hospitals

List of Abbreviations

PS	:	Patient Safety
HSOPSC	:	Hospital Survey of Patient Safety Culture
PSC	:	Patient Safety Culture
IPSG	:	International Patient Safety Goal
JCI	:	Joint Commission International
MOPH	:	Ministry of Public Health

Summary

Assessment of patient safety knowledge and practices is the first step in a long process for identifying areas of improvement in hospitals and the healthcare system. Our results clearly indicate that improvement of PS culture may be more intensely required in public rural hospitals than in urban ones. Accreditation remains an important tool in improving quality of care in general. Better emphasis on PS organizational dimensions during the accreditation process will undoubtedly reap good results, especially if unscheduled regular audits are added to the regular schedules.

Introduction

Patient Safety (PS) in hospital practice is required by international and national accreditation organizations [1,2]. The “Hospital Survey of Patient Safety Culture” (HSOPSC) is one of the most common tools used to assess the PS culture in hospitals [3]. In a seminal article on PS, Guldenmund, et al. [4] alerted to the fact that the use of the hospital PS Culture (PSC) questionnaire alone may lead to failure in addressing the core issues related to an organization’s safety culture [4]. Similarly, Ginsburg, et al. [5] advises the organizations and work units who wish to understand their own PSC to use both quantitative and qualitative approaches [5]. Frequent instruments associated with the PSC questionnaire have included the International Patient Safety Goal (IPSG) standard, established by the Joint Commission International (JCI), an organization created to standardize the accreditation process for hospitals at the global level [1]. The IPSG assesses several items of PS knowledge and compliance among hospital nurses, as part of the overall process of accreditation [6]. The combination of IPSG grading and the exploration of the institutional PS culture have been described as an optimal way of measuring the overall orientation to PS in a given health care unit [7,8]. Determinants affecting various components of PS include personal factors, hospital-based structural factors and organization characteristics of the hospital functioning process [9-11].

In Lebanon, hospital accreditation has been established first in 2000. PS items started being included in the accreditation checklist starting 2011. Since then, the particular dimension of PS has not been analyzed as a separate aspect of the Lebanese in-patient healthcare system. This study aims at filling this gap in current evidence, and suggesting avenues for improvement. In particular, the analysis has focused on the potential particularities in PS and its determinants between urban (and suburban) and rural hospitals in Lebanon.

The research team hypothesized that nursing working in urban hospitals are more knowledgeable and compliant with patient safety compared to those working in urban ones. The conceptual model summarizing this vision is proposed below (Figure 1).

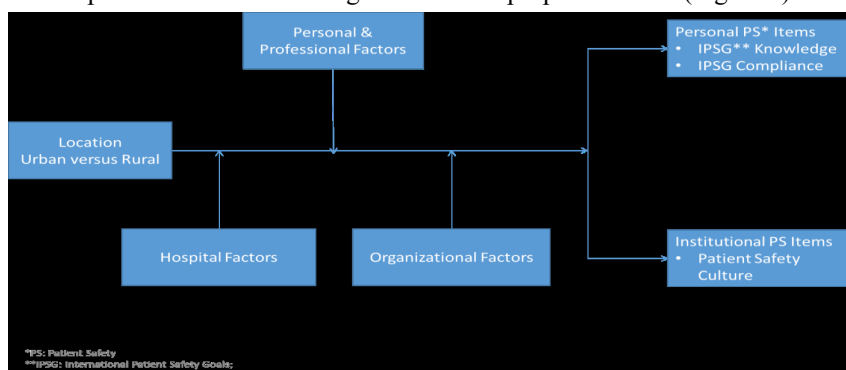


Figure 1: Knowledge and practice regarding patient safety by location in Lebanese public hospitals - Conceptual model.

The objectives of this study were:

- To conduct a baseline assessment of PS knowledge and practices in public hospitals in Lebanon; and
- To compare results between rural hospitals versus urban ones, controlling for several categories of intermediate factors.

Methods

Design, Participants and Instruments

Details related to this analysis have been presented in a previous manuscript. Briefly, a cross-sectional survey collected data from July to November 2020, from 26 of 28 public hospitals currently operational in Lebanon. All nurses from all categories who had worked for at least 6 months in hospitals were invited to participate. Data were collected through self-administered questionnaires, divided into four sections. The first part included socio-demographic and professional data, as well as structural factors related to the work setting. The second part was based on a customized version of the PSC questionnaire to assess nurses’ opinions about patient safety culture in their organization. The third part assessed the staff knowledge and compliance with IPSG elements. A final part included the perception of participants regarding outcomes of PS in their current practice. Of participating hospitals, 12 were classified as “Urban” and 14 as “Rural”, based on their location (Appendix 1).

Data Analysis

Quantitative data were checked, coded and entered into the Statistical Package for the Social Sciences (SPSS version 22). Descriptive analysis was performed and the variables were presented as per their type: nominal variables were presented by frequencies and percentages, and continuous ones by mean and Standard Deviations (SD). The dependent variables of this analysis were the overall scores of PSC, IPSC knowledge and IPSC compliance. Potential determinants: personal and professional, hospital-based and organizational factors have been previously listed and defined. All analysis were conducted in the two strata of hospital location “urban” vs. “Rural”, and findings were considered statistically significant if the p-value derived from the relevant tests was ≤ 0.05 . Variables found to be significantly associated with outcomes of interest were entered in a multivariate linear regression model, to control for potential confounders.

Results

Differences in Nursing Personnel and Structures between Rural and Urban Hospitals

The study recruited 764 nurses, distributed almost equally between “Urban” and “Rural” hospitals. Participants had a mean age of about 35 years, were predominantly women (65.6%), with an average of 12 years of professional experience. More than 70% obtained their final professional degree from a public institution, and more than 50% had ever obtained a course on PS. 162 (21.1%) Nurse Leaders (NL), 535 (70%) Registered Nurses (RN) and 67 (8.8%) Practical Nurses (PN). Nurses in urban areas were on average significantly younger than in rural ones (34 vs. 35 years old respectively). There were no other significant differences in gender distribution, years of experience, nursing school sector or nurse positions (Details in (Table 1)).

Characteristic	Urban hospital	Rural hospital	Total	p-value
n (%)	383 (50.1)	381 (49.9)	764	--
Mean age in years (SD)	34.0 (7.3)	35.2 (7.6)	34.6 (7.5)	0.03
Younger age-group (n, %)	243 (63.4)	203 (53.3)	446 (58.4)	<0.01
Older age-group (n, %)	140 (36.6)	178 (46.7)	318 (41.6)	
Gender (n, %)				0.1
Men	121 (31.6)	142 (37.3)	263 (34.4)	
Women	262 (68.4)	239 (62.7)	501 (65.6)	
Position (n, %)				0.12
Nurse leader	84 (21.9)	78 (20.5)	162 (21.2)	
Registered nurse	258 (67.4)	277 (72.7)	532 (70.0)	
Practical nurse	41 (10.7)	26 (6.8)	67 (8.8)	
Nursing school sector (n, %)				0.36
Private	111 (29.0)	122 (32.0)	111 (29.0)	
Public	272 (71.0)	259 (68.0)	272 (71.0)	
Patient safety course obtained				0.49
Yes	193 (50.4)	200 (52.5)	393 (51.4)	
No	190 (49.6)	181 (47.5)	371 (48.6)	
Mean years of experience (SD)	11.34 (6.84)	12.0 (6.42)	11.7 (6.6)	0.17

Table 1: Personal and professional characteristics of nurses in public hospitals in Lebanon in 2020 by hospital locations (N= 764).

Hospitals in urban areas were significantly more likely to be university-affiliated and to have special care units than rural ones. Urban centers also had a larger proportion of the highest A-level accreditation (62%) compared to rural ones (31.5%). The average number of regular and over-time hours worked by nurses in urban hospitals was significantly less than that in rural hospitals. There were no significant differences in work schedules, mean weekly working hours (including overtime), or mean patients cared for during day and night shifts. (Details in (Table 2)).

Characteristic	Urban hospital	Rural hospital	Total	p-value
n (%)	383 (50.1)	381 (49.9)	764	--
Hospital type (n, %)				< 0.01
General	283 (73.9)	332 (87.1)	615 (80.5)	
University	100 (26.1)	49 (12.9)	149 (19.5)	
Accreditation level (n, %)				< 0.01
A	238 (62.1)	120 (31.5)	358 (46.9)	
B	78 (20.4)	54 (14.2)	132 (17.3)	
C+D	12 (3.1)	111 (29.1)	123 (16.1)	
DK*	55 (14.4)	96 (25.2)	151 (19.8)	
Work area (n, %)				< 0.01
Medical / Surgical	207 (54.0)	242 (63.5)	449 (58.8)	
Intensive care unit(s)	176 (46.0)	139 (36.5)	315 (41.2)	
Mean daily work in hours (S/D)	11.12 (1.9)	11.64 (3.7)	11.38 (2.9)	< 0.01
Work schedule (n, %)				0.86
Day	144 (37.6)	149 (39.1)	293 (38.4)	
Night	27 (7.0)	24 (6.3)	51 (6.7)	
Alternative	212 (55.4)	208 (54.6)	420 (55.0)	
Mean weekly work (including overtime in hours (S/D))	48.81 (13.14)	49.15 (13.27)	49.0 (13.20)	0.72
Staffing during day duty in mean number of patients (S/D)	13.36 (10.09)	13.69 (9.47)	13.52 (9.78)	0.65
Staffing during night duty in mean number of patients (S/D)	12.09 (7.50)	12.13 (8.33)	12.11 (7.90)	0.96
DK: Don't Know				

Table 2: Hospital characteristics of public health hospitals where participating nurses are working by hospital locations (N= 764).

Urban hospitals were significantly more likely to have a PS committee and a PS program, but not a dedicated officer, compared to rural ones. Most hospitals never performed a PS survey or PS periodic training, with significantly more disadvantages in rural hospitals compared to urban ones. Most hospitals covered PS in their orientation programs, but did not have periodical audits of actual performance, with no significant differences between urban and rural locations (Details in (Table 3)).

Characteristic	Urban hospital	Rural hospital	Total	p-value
n (%)	383 (50.1)	381 (49.9)		--
PS* officer available				
Yes	223 (58.2)	194 (50.9)	417 (54.6)	0.07
No	160 (41.8)	187 (49.1)	347 (45.4)	
PS committee present				
Yes	224 (58.5)	195 (51.2)	419 (54.8)	0.04
No	159 (41.5)	186 (48.8)	345 (45.1)	
PS program available				
Yes	142 (37.1)	50 (13.1)	192 (25.1)	< 0.01
No	241 (62.9)	331 (86.8)	572 (74.9)	
Hospital ever performed a PS survey				
Yes	74 (19.3)	9 (2.4)	83 (10.9)	< 0.01
No	309 (80.7)	372 (97.6)	681 (89.1)	
PS periodic audit				
Yes	124 (32.4)	100 (26.2)	224 (29.3)	0.63
No	259 (67.6)	281 (73.8)	540 (70.7)	
PS periodic training				
Yes	171 (44.6)	138 (36.2)	309 (40.4)	0.02
No	212 (55.4)	243 (63.8)	455(59.6)	
PS in orientation program				
Yes	253 (66.1)	233 (61.2)	486 (63.6)	0.16
No	130 (33.9)	148 (38.8)	278 (36.4)	

*PS: Patient Safety

Table 3: Organizational dimensions regarding patient safety (PS) in public hospitals by hospital location (N= 764).

Differences in PS Knowledge, Compliance and Culture

The mean scores of knowledge of and compliance with items included in the IPSG were generally higher for nurses practicing in urban hospitals compared to rural ones. Only knowledge of patient risk for falling and compliance with Safe Surgery were uniformly high, did not attain statistical significance, and were not included in subsequent analysis. Some items of the PSC questionnaire showed significant differences; perception of teamwork was higher in rural nurses, whereas reporting patient safety events and handoffs and information exchange were better perceived among urban nurses. There was no significant difference in the rest of the items, and those were also excluded from the rest of the analysis (Details in (Table 4)).

Characteristic	Urban hospital	Rural hospital	Total	p-value
n (%)	383 (50.1)	381 (49.9)	764	--
IPSG* knowledge (mean, SD)				
Patient identification (/22)	19.0 (4.1)	17.3 (4.6)	18.2 (4.4)	<0.01
Effective communication (/22)	14.9 (5.0)	13.8 (4.6)	14.4 (4.9)	<0.01
Safety of high alert medications (/10)	6.3 (2.6)	5.3 (2.7)	5.8 (2.7)	<0.01
Safe surgery (/8)	5.2 (1.6)	4.7 (1.5)	4.9 (1.5)	<0.01
Infection prevention and control (/24)	14.3 (4.9)	12.6 (4.6)	13.4 (4.8)	<0.01
Patient risk of falling (/8)	5.4 (2.3)	5.2 (2.1)	5.3 (2.2)	0.09
Overall score** (/86)	59.7 (13.3)	53.7 (13.0)	56.7 (13.5)	<0.01
IPSG compliance (mean, SD)				
Patient identification (/20)	14.7 (2.4)	13.7 (2.9)	14.2 (2.7)	<0.01
Effective communication (/15)	10.0 (1.8)	9.5 (1.7)	9.8 (1.8)	<0.01
Safety of high alert medications (/15)	9.2 (2.1)	8.8 (1.8)	9.0 (2.0)	0.02
Safe surgery (/15)	11.4 (2.1)	11.2 (1.5)	11.3 (1.8)	0.08
Infection prevention and control (/20)	11.2 (2.8)	10.2 (2.5)	10.7 (2.7)	<0.01
Patient risk of falling (/5)	3.1 (1.2)	2.6 (1.2)	2.9 (1.2)	<0.01
Overall score (/75)	48.1 (7.4)	44.9 (6.9)	46.5 (7.3)	<0.01
PSC** (mean, SD)				
Staffing and work pace (/20)	12.3 (2.1)	12.4 (2.0)	12.4 (2.1)	0.74
Supervisor support for PS (/15)	9.0 (1.7)	8.9 (1.8)	9.0 (1.7)	0.09
Teamwork (/15)	9.9 (1.7)	10.5 (2.2)	10.2 (2.0)	<0.01
Continuous learning/improvement (/15)	9.0 (2.0)	8.9 (2.0)	8.9 (1.9)	0.41
Communication openness (/20)	13.1 (2.1)	13.2 (2.1)	13.1 (2.1)	0.35
Communication about error (/15)	9.2 (3.3)	9.3 (3.1)	9.2 (3.2)	0.85
Response to error (/20)	11.9 (2.1)	12.0 (2.1)	11.9 (2.1)	0.74
Reporting PS events (/10)	4.7 (2.3)	4.2 (2.3)	4.5 (2.3)	<0.01
Hospital support for PS (/15)	8.9 (2.9)	9.1 (2.8)	9.0 (2.8)	0.25
Handoffs information exchange (/15)	8.9 (2.5)	8.4 (2.3)	8.6 (2.4)	0.02
Overall score (/40)	23.5 (3.1)	23.1 (3.6)	23.3 (3.3)	0.14
*IPSG: International Patient Safety Goal [21], exploring levels of knowledge on several items of patient safety.				
**Overall score included those sub-scores from items with significant differences.				
***PSC: Patient Safety Culture [3] exploring institutional compliance with patient safety recommendations				

Table 4: Patient safety knowledge and practices among nurses in public hospitals in Lebanon in 2020 by hospital location (N= 764).

Differences among nurses in urban versus rural hospitals were stratified according to personal/professional factors and hospital characteristics. Younger age and work in university hospitals were found to be significantly associated with higher overall knowledge, regardless of hospital location. Top accreditation and increased mean of daily work were significantly associated with higher knowledge in urban but not rural hospitals. A-level accreditation made a significant difference with PS culture only in rural locations. (Details in (Table 5)).

IPSG items (mean score, SD)	Urban hospital	Rural hospital
Overall IPSG Knowledge (range of 86)		
Age		
Younger	61.1 (12.2)**	55.3 (13.2)*
Older	57.3 (14.8)	51.9 (12.6)
Hospital type		
General	55.7 (12.4)**	52.6 (12.9)**
University	70.9 (8.6)	61.1 (10.7)
Accreditation level		
A level	61.5 (13.2)**	54.5 (12.7)
All other levels	56.7 (13.1)	53.4 (13.1)
Work area		
Medical / Surgical	59.7 (13.3)	54.4 (13.0)
ICU	59.7 (13.3)	52.5 (12.9)
Mean daily work in hours		
11 hours and less	57.3 (14.7)*	54.3 (12.6)
More than 11 hours	60.4 (12.8)	53.5 (13.1)
Overall IPSG compliance (range of 75)		
Age		
Younger	49.3 (7.0)**	45.9 (7.1)**
Older	46.1 (7.6)	43.7 (6.6)
Hospital type		
General	46.5 (7.2)**	43.9 (6.5)**
University	52.8 (5.6)	51.3 (6.6)
Accreditation		
A level	48.8 (7.8)*	44.5 (6.2)
All other levels	47.0 (6.5)	45.0 (7.3)
Work area		
Medical / Surgical	48.6 (7.6)	44.9 (7.1)
ICU	47.6 (7.0)	44.7 (6.6)
Mean daily work in hours		
11 hours and less	46.7 (7.6)*	44.6 (7.1)
More than 11 hours	48.6 (7.2)	45.0 (6.9)
Overall PS culture (range of 40)		
Age		
Younger	23.1 (3.1)	22.7 (3.3)**
Older		23.7 (3.8)
Hospital type		
General	23.2 (3.2)**	23.3 (3.6)**
University	24.2 (2.7)	21.8 (2.7)
Accreditation		
A level	23.3 (3.1)	23.8 (3.4)*
All other levels	23.9 (2.9)	22.8 (3.6)
Work area		
Medical / Surgical	23.6 (2.9)	23.1 (3.6)
ICU	23.6 (2.9)	23.1 (3.6)
Mean daily work in hours		
11 hours and less	23.8 (3.0)	23.1 (3.3)
More than 11 hours	23.4 (3.1)	23.1 (3.7)
* P-value ≤ 0.05 ; ** P-value ≤ 0.01		

Table 5: Determinants of patient safety knowledge and practices by hospital location among nurses in public hospitals in Lebanon in 2020. (N= 764).

All organizational dimensions: presence of a PS committee, program, training and surveys; had a significant impact on PS knowledge and compliance regardless of hospital location. The overall PS culture was less clearly associated with those organizational items (Details in (Table 6)).

	IPSG items (mean score, SD)	Urban hospital	Rural hospital
Overall IPSG Knowledge	Yes	66.2 (10.6)**	57.8 (13.6)**
PS*** committee	No	50.6 (11.2)	49.4 (10.8)
PS program	Yes	67.2 (10.7)**	61.6 (10.5)**
	No	55.3 (12.7)	52.5 (12.9)
Ever performed a PS survey	Yes	71.2 (6.6)**	65.7 (15.0)**
	No	56.9 (13.1)	53.4 (12.8)
PS periodic training	Yes	64.5 (10.9)**	59.3 (11.2)**
	No	55.8 (13.8)	50.6 (12.9)
Overall IPSG compliance	Yes	51.5 (7.2)**	48.2 (7.2)**
PS committee	No	43.4 (4.3)	41.4 (4.6)
PS program	Yes	53.1 (7.0)**	49.9 (7.8)**
	No	45.2 (5.9)	44.1 (6.5)
Ever performed a PS survey	Yes	57.3 (4.6)**	52.8 (8.7)**
	No	45.9 (6.1)	44.7 (6.8)
PS periodic training	Yes	51.5 (7.3)**	48.7 (7.4)**
	No	45.4 (6.2)	42.7 (5.6)
Overall PS culture	Yes	23.5 (3.1)	22.7 (3.2)*
PS committee	No	23.4 (3.0)	23.6 (3.8)
PS program	Yes	24.0 (2.8)**	22.6 (3.5)
	No	23.2 (3.2)	23.2 (3.6)
Ever performed a PS survey	Yes	23.6 (3.0)	23.4 (3.8)
	No	23.5 (3.1)	23.1 (3.6)
PS periodic training	Yes	23.9 (3.2)*	23.4 (3.4)
	No	23.2 (2.9)	23.0 (3.7)

* P-value ≤0.05; ** P-value ≤0.01; ***PS: Patient Safety

Table 6: Patient safety knowledge and practices by hospital location controlling for organizational dimensions among nurses in public hospitals in Lebanon in 2020 (N= 764).

Three multivariate linear regression models were conducted to estimate adjusted effects of various independent determinants. Knowledge scores were still significantly higher among urban nurses, as well as among those working in university hospitals (vs. general ones) and several elements of PS organizational dimensions: presence of PS committee, surveys and training. Not significantly associated within the multivariate model were younger ages, accreditation class and work in ICUs. Higher practice scores were also significantly associated with urban location, university hospitals, and all PS organizational dimensions except “programs”. However, practice was also significantly associated A-level hospital accreditation and nurses younger age. PS culture was significantly associated with only two PS organizational dimensions: presence of a PS committee and of periodic safety trainings. All other determinants, including location of the hospital, did not emerge as significant in that model. Details are available in (Table 7).

	PS KNOWLEDGE				
	Unstandardized Coefficients		p-values	95% Confidence Interval	
	B	Std. Error		Lower	Upper
Urban (vs. rural)	-1.93	0.89	0.02	-3.65	-0.21
University hospital (vs. general)	8.45	1.31	<0.01	5.87	11.02
Younger age-group (≤34 years)	-0.55	0.83	NS	-2.17	1.07
ICU staff (yes vs. no)	0.43	0.81	NS	-1.16	2.02
Hospital accreditation (A vs. other)	-1.11	0.87	NS	-2.81	0.6
PS committee present	5.66	0.97	<0.01	3.76	7.57
PS program implemented	1.42	1.26	NS	-1.07	3.9
PS surveys ever conducted	7.68	1.66	<0.01	4.42	10.95
PS periodic training available	5.32	0.85	<0.01	3.66	6.98
PS PRACTICE					
Urban (vs. rural)	-0.94	0.42	0.03	-1.76	-0.11
University hospital (vs. general)	3.86	0.63	<0.01	2.63	5.1
Younger age-group (≤34 years)	-0.87	0.4	0.03	-1.65	-0.1
ICU staff (yes vs. no)	0.25	0.39	NS	-0.51	1.01
Hospital accreditation (A vs. other)	1.12	0.42	<0.01	0.3	1.93
PS committee present	3.51	0.47	<0.01	2.59	4.42
PS program implemented	0.76	0.61	NS	-0.43	1.94
PS surveys ever conducted	7.65	0.8	<0.01	6.09	9.21
PS periodic training available	3.73	0.41	<0.01	2.93	4.52
ORGANIZATIONAL PS CULTURE					
Urban (vs. rural)	-0.17	0.27	NS	-0.69	0.36
University hospital (vs. general)	0.13	0.4	NS	-0.66	0.91
Younger age-group (≤34 years)	0.27	0.25	NS	-0.23	0.76
ICU staff (yes vs. no)	0.01	0.24	NS	-0.47	0.5
Hospital accreditation (A vs. other)	-0.27	0.27	NS	-0.79	0.25
PS committee present	-0.76	0.3	0.01	-1.34	-0.18
PS program implemented	0.65	0.39	NS	-0.11	1.41
PS surveys ever conducted	-0.3	0.51	NS	-1.3	0.7
PS periodic training available	0.79	0.26	0.02	0.28	1.3

NS= Not significant

Table 7: Patient safety (PS) knowledge and practices among nurses in public hospitals in Lebanon in 2020 (N= 764) by hospital location: multivariate linear regression.

Discussion

Improved PS knowledge and compliance among hospital personnel, and institutional PS culture within hospitals, are obvious measures to prevent accidents and incidents with hospitalized patients. It is important to understand those modifiable determinants which can be targeted to improve in-patient safety. In this analysis, we have considered both personal and organizational items which may affect the PS knowledge and compliance among nurses and the PS culture in the institutions in which they work. In particular, we have focused on differences in determinants between urban and rural public hospitals. The regional stratification was deemed important to explore in Lebanon, as urban-rural developmental differences are an object of national debate in the country^[12]. While there is so far no surveillance system in Lebanon which would provide evidence for regional incidence of hospital accidents, a related paper conducted by this research team seems to suggest that less reporting and mitigation occur in rural locations compared to urban ones (Akoum et al. in preparation).

In this survey of public hospitals currently in function, most prominent independent differences that appeared included younger personnel, more university hospitals with A-level accreditation and special units, such as intensive care units, in urban public hospitals compared to rural ones. Organizationally, urban hospitals were more likely to have a PS committee, program and audit, and to perform PS training and surveys than rural ones. The presence of PS structures play a crucial role in promoting hospital safety culture and improving patient care processes [9,13,14].

Overall findings indicated that, while PS knowledge and compliance are better among nurses working in public urban hospitals, only some items of PS institutional culture differed. In particular, the perception of teamwork for PS was higher among nurses working in rural hospitals compared to those working in urban ones. On the other hand, reporting PS events and handoff information exchange was judged to be better among urban nurses, suggesting that urban nurses are more accustomed to adhering to formal procedures and less fearful of negative consequences than their rural colleagues. In recent years, only one paper in Indonesia addressed the issue of PS institutional culture among urban, suburban, and rural hospitals, and revealed results that were very much similar to ours. There too, teamwork within units had the highest score in rural hospitals compared to suburban and urban hospitals. Reporting PS events was better in suburban and urban hospitals [15]. It is important to remember that the ratio of public to private ownership is higher in rural areas compared to urban ones, which means that findings from private mostly urban hospitals are likely to be similar to the few public urban hospitals in our study. Ultimately, improvement in formal institutional adherence to PS culture seems to be needed in public and private rural hospitals.

Younger nurses are receiving much more training and awareness on issues of PS worldwide and in Lebanon. The integration of PS in formal nursing training is a relatively recent reality in less developed nations [9,16], which suggests fresh graduates may be better oriented to this issue than older ones.

In our analysis, age did not make a difference on general, theoretical knowledge about PS. The importance of younger nurses appeared to make most difference in real compliance with PS practices, regardless of work location. This finding suggests that PS will be improving in the coming years, as older nurses well set in their usual practices retire, to be replaced by a more aware generation across the Lebanese territory.

The accreditation system is considered a key component in healthcare organizations to ensure the quality of patient care and patient safety culture and outcomes [17]. The results showed a significant difference in nurses' perceptions of patient safety knowledge and practice in A-accredited hospitals, compared to those in less well classified. Hospital accreditation standards have changed many times from 2002 to 2019. Only in the latest version of 2019 did the Lebanese MOPH include in the standards some PS requirements, but those have not yet been implemented in hospitals due to the economic conditions and the COVID-19 epidemic which worsened suddenly in 2020. The difference in nurses' knowledge and compliance in A-rated hospitals does not persist in rural hospitals, when considered separately. This surprising discrepancy may lead to interrogations on the consistency of the procedures and/or of inspection thoroughness during accreditation in rural areas. Unfortunately in Lebanon, the accreditation system is not applied at regular intervals. The last hospital accreditation was conducted in 2012.

The pre-announced accreditation visits may lead to a surge of improvements at all levels, which tend to fall back towards pre-accreditation levels immediately upon receiving the "accredited" status. Stagnation and declining outcomes can be avoided by a continuous survey of readiness programs throughout the hospital to sustain quality and patient safety between successive waves of re-accreditation [18]. Our multivariate results showed that such PS surveys, as well as other dimensions of PS organizational commitment more likely to be higher in urban vs. rural hospitals, are actually driving differences in knowledge and compliance much more than the accreditation level itself. This finding indicates the importance of assessing actual steps taken by the organization on the long-term in support of PS, rather than just what appears to be on-going on the actual, announced day of inspection.

Another element to be added to this discussion on accreditation is the importance of a university affiliation of A-level hospitals, which is more frequent for urban than rural institutions. No doubt that the presence of medical trainees and the academic constraints super-imposed on accreditation requirements positively optimize PS in public hospitals in Lebanon. Hence the importance of linking A-level rural hospitals to university program, at the same rate as their urban counterparts.

All items composing the IPSPG knowledge score showed higher mean scores in urban hospitals compared to rural ones, except the item related to “Risk of Falling”. Nurses regardless of their work location displayed a similar relatively good score of knowledge regarding the risk of falling. Risk of falling among hospitalized patients remains a major challenge: 70% of inpatient accidents in one retrospective assessment in the USA were attributed to falls [19]. Falls carry a major impact on patients’ well-being and costs, and therefore are a prime target for PS [20]. Unfortunately, actual compliance with safety to prevent falls scored significantly higher in urban than rural hospitals. This difference in knowledge and practice in nurses of rural hospitals regarding risk of falling has to be addressed, with targeted training to translate knowledge into actual practice.

Conclusion and Practical Implications

Assessment of patient safety knowledge and practices is the first step in a long process for identifying areas of improvement in hospitals and the healthcare system. Our results clearly indicate that improvement of PS culture may be more intensely required in public rural hospitals than in urban ones. Our findings lead us to propose the following recommendation:

Accreditation remains an important tool in improving quality of care in general. Better emphasis on PS organizational dimensions will undoubtedly reap good results, especially if unscheduled regular audits are added to the regular schedules.

Rural hospitals will need to immediately create and/or activate the patient safety committee, patient safety program, and periodic audit. In addition, they should provide their healthcare providers with effective patient safety policies and train them to improve patients’ handoffs information exchange and report patient safety events for learning and improvement.

It seems very useful to twin A-level public hospitals in rural areas with medical schools, as university-affiliation made a significant difference in PS culture and compliance. It is very likely that an affiliation will create a momentum towards improvement in all sorts of ways, above and beyond patient safety.

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