

Factors associated with healthcare professionals' intent to stay in hospital: a comparison across five occupational categories

INGRID GILLES, BERNARD BURNAND AND ISABELLE PEYTREMANN-BRIDEVAUX

Institute of Social and Preventive Medicine (IUMSP), Lausanne University Hospital, 10 Route de la Corniche, Lausanne 1010, Switzerland

Address reprint requests to: Ingrid Gilles, Biopole 2, route de la Corniche 2, CH-1010 Lausanne, Switzerland. Tel: +41-21-314-69-96;

Fax: +41-21-314-73-73; E-mail: ingrid.gilles@chuv.ch

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Abstract

Objectives. To identify factors associated with intent to stay in hospital among five different categories of healthcare professionals using an adapted version of the conceptual model of intent to stay (CMIS).

Design. A cross-sectional survey targeting Lausanne University Hospital employees performed in the fall of 2011. Multigroup structural equation modeling was used to test the adapted CMIS model among professional groups.

Measures. Satisfaction, self-fulfillment, workload, working conditions, burnout, overall job satisfaction, institutional identification and intent to stay.

Participants. Surveys of 3364 respondents: 494 physicians, 1228 nurses, 509 laboratory technicians, 935 administrative staff and 198 psycho-social workers.

Results. For all professional categories, self-fulfillment increased intent to stay (all $\beta > 0.14$, $P < 0.05$). Burnout decreased intent to stay by weakening job satisfaction ($\beta < -0.23$ and $\beta > 0.22$, $P < 0.05$). Some factors were associated with specific professional categories: workload was associated with nurses' intent to stay ($\beta = -0.15$), and physicians' institutional identification mitigated the effect of burnout on intent to stay ($\beta = -0.15$ and $\beta = 0.19$).

Conclusion. Respondents' intent to stay in a position depended both on global and profession-specific factors. The identification of these factors may help in mapping interventions and retention plans at both a hospital level and professional groups' level.

Keywords: workforce, intent to stay, job satisfaction, hospital governance

Introduction

The shortage of hospital healthcare professionals has been of concern for decades [1, 2], and a dramatic increase in the problem is forecast internationally [3] with estimates as high as 29% in the USA [4] and 25% in Switzerland [5] by 2020. The shortage is related to three trends: population aging and an increasing prevalence of elders with chronic diseases [6], an aging healthcare workforce with anticipated retirements [5, 6] and healthcare professionals' harsh working conditions, workload and stress, leading to reduced attractiveness of healthcare careers [7]. In Switzerland, authorities expect an increase of 66% of people aged 65 years and over by 2030, a renewal of 20% of the workforce by 2020 and 47% by 2030, and a decline of ~10% among healthcare students [5]. The decrease of the

workforce combined with the increase in demand for care may undermine healthcare quality and patient safety [2, 8].

Researchers agree that the shortage is a complex problem, which must be approached from different levels [9]. Current research focuses on intent to stay, one of the most accurate indicators of a shortage of professionals [9, 10], particularly in the identification of its psychological, work-related or organizational determinants. Despite the abundant literature on this topic, reports of successful or effective interventions are scarce [11].

Most studies do not include conceptual models of the connection between identified factors and intent to stay [10, 12, 13]. Yet, such models may offer helpful guidelines for the implementation and evaluation of interventions [12, 13]. Several models exist that offer comprehensive views of intent to stay

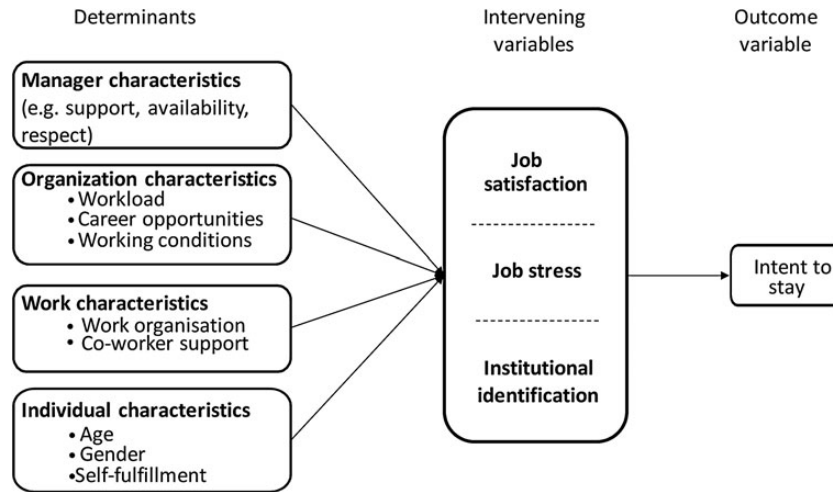


Figure 1 Theoretical model (adapted from Boyle *et al.s'* CMIS [17]).

and turnover mechanisms [14, 15], including in a hospital-specific environments [9, 16]. These models consider psychological, work-related and organizational determinants [10]. The Conceptual Model of Intent to Stay (CMIS) [15, 17, 18], hypothesizes that four types of determinants (management, organizational, work and individual) influence intent to stay indirectly through intervening variables such as job satisfaction, organizational commitment or job stress (Fig. 1). The model incorporates most of the influencing variables described in the literature, identifies direct and indirect links between them and allows the understanding of structures underlying intent-to-stay mechanisms. The latter issue is crucial when developing, implementing and managing retention plans. The CMIS was found to explain up to 52% of intent-to-stay variance [15, 9].

Hospital care involves a series of interdependent providers [19], but the published literature mostly focuses on nurses' intent-to-stay determinants without considering other professional categories [20]. Variations in intent to stay among professional groups may shed light on underlying mechanisms, as well as those specific to professional groups or those more particularly linked to institutional context or culture [21].

The objectives of the present study were (i) to explore associations between factors linked with intent to stay in five different professional groups using the CMIS as a starting point and (ii) to identify mechanisms specific to professional situations and those that are more global in order to (iii) propose a model-based approach for interventions.

Method

Setting

Lausanne University Hospital is one of five Swiss University hospitals. It is located in the French-speaking canton of Vaud (~730 000 residents, approximately one-tenth of the Swiss population) and comprises the usual tertiary acute care departments, geriatric rehabilitation, psychiatric wards and a long-term care facility in separate buildings for a total of 1430 beds

(including 357 in psychiatry, 238 in general medicine, 222 in surgery and 115 in pediatrics). The characteristics of its employees are similar to university hospitals in Switzerland and other settings: two-thirds are women, ~50% of employees are over 40 years old and ~50% of employees are healthcare professionals.

Sample and data collection

Data for this cross-sectional study were collected between 29 August 2011 and 17 October 2011 using the 2011 Lausanne University Hospital job satisfaction survey. Of a total of 10 070 hospital employees, 9108 belonged to one of the following professional groups: physicians, nurses and care providers, laboratory staff, administrative staff, non-physician researchers, logistics staff (e.g. catering, cleaning personnel, technicians) and psycho-social staff. The remaining 962 employees were in apprenticeship, were PhD students or had an external contract. All hospital employees were contacted by e-mail and post and could respond using either an electronic or a paper version of the survey. They received two electronic reminders.

Measures

The Lausanne University Hospital survey, primarily conducted for administrative rather than research purposes, has been used in its current format since 2007. It consists of a self-administered French questionnaire that includes 33 items gathered in 9 dimensions (manager characteristics, workload, career opportunities, working conditions, work organization, co-worker support, self-fulfillment, occupational burnout and institutional identification) and 2 single-item variables (job satisfaction and intent to stay), which correspond to the variables in our adapted version of the CMIS (see Fig. 1).

In the study version, we replaced the occupational stress question with a burnout question which is considered in the literature as both a strong correlate of occupational stress [22] and as a predictor of job satisfaction and intent to stay [23]. Item wording was derived from a French validated questionnaire,

the 2004 version of the French Saphora Job Survey [24] for all dimensions except burnout and work environment. We adapted items so that they were relevant to all professional groups. Measures included in the questionnaire are more precisely described below and a detailed list of items and rating scales is included in Supplementary material, Appendix 1a.

Characteristics of supervising managers were assessed by means of seven items measuring the propensity of the direct supervisor to be available, to be respectful, to provide recognition and to lead his/her team effectively and with equity. Respondents had to indicate their agreement with each item on a four-point scale ranging from 1 (=not at all) to 4 (=yes, absolutely).

Characteristics of organizational functioning were measured using 11 items (4-point scales) divided into three dimensions: (i) perception of workload and private–professional life balance (6 items); (ii) perception of career opportunities (2 items); and (iii) satisfaction with working conditions (6 items). This last dimension was not adapted from an existing questionnaire, but related to the evaluation of material working conditions such as premises, equipment or security.

Characteristics of work included concrete job situations or tasks accomplished by respondents captured by two dimensions: (i) work organization (two items) and (ii) co-worker support (two items).

Following Boyle's focus on individual characteristics such as psychological factors, e.g. personal fulfillment at work [10] and socio-demographic variables, we collected the following: (i) self-fulfillment measured by two items capturing the pleasure associated with work and the application of skills and abilities and (ii) respondents' age and gender.

The work-related burnout subscale of the French validated version of the Copenhagen Burnout Inventory [25, 26] was used to assess occupational burnout. This consisted of seven five-point items considering emotional exhaustion and frustration at work.

Institutional identification (the extent to which employees felt committed to, and identified with, the hospital) was measured using three items with a four-point response scale: the degree to which respondents adhered to hospital values, were proud of working at the hospital and felt useful to its functioning [27].

Overall job satisfaction and intent to stay were measured by single items. Respondents were asked to rate, on a scale ranging from 1 (=not satisfied at all) to 10 (=extremely satisfied), their general level of job satisfaction [28]. Respondents were asked whether they planned to keep working at the hospital in the coming year and responded on a scale ranging from 1 (=not at all) to 4 (=yes absolutely) [27]. Dimension reliability was assessed by using principal component analyses (for unidimensionality) and Cronbach's alphas (Supplementary material, Appendix 1b). We confirmed the stability of indices included in the survey in 2007 and 2009 with results suggesting that survey items were well adapted to type of respondent and hospital context.

Data analyses

Cronbach's alpha was calculated for each of the nine dimensions of the questionnaire. Based on the reliability results,

mean scores were computed for eight of the nine dimensions (Supplementary material, Appendix 2), removing the dimension of career opportunities because of low reliability. Higher scores on two dimensions (workload and burnout) were expected to have a negative impact on intent to stay, while higher scores on the other dimensions were expected to have a positive impact.

Observations for which the outcome variable was missing were removed from the database ($n = 358$). For missing values, with <1% missing, we imputed a predicted value from a regression model (single imputation). The 11.6% of survey responses with age missing ($n = 454$) were deleted because missing values varied as a function of professional group [29].

We examined the normality and linearity of variables (with linear regressions, by checking the normal probability plot of the residual and the residual versus predicted value plot, respectively) and applied appropriate transformations when distributions were skewed (using the *gladder* command on Stata 12). We checked there was no multicollinearity between predicting variables, using the tolerance (>0.40) and the variance inflation factor (VIF; <3.0) indices in linear regressions (see correlations in Supplementary material, Appendix 2). To reduce disparities from rating scales and transformations, we present only the standardized coefficients.

To analyze processes and mechanisms underlying the intent to stay in relation to a specific theoretical model, we conducted multigroup structural equation modeling (SEM) analyses using path analyses with a maximum likelihood estimation method (with software AMOS 19 by AMOS Development Corporation). SEM allows the simultaneous testing of interrelated equations corresponding to a theoretical model [30]. In contrast to general linear models, which solve equations separately, SEM proposes both a simultaneous estimation of the links between variables in the model and an estimation of the fit of the whole model with observed data. The multigroup technique also enables comparisons between professional groups of variations in factors predicting intent to stay.

Path analyses were chosen over models with latent variables because our model included endogenous single-item variables and because some dimensions had high reliability scores [31, 32]. We followed the classic steps recommended by Byrne [33]: the hypothesized model was tested and respecified on each group separately to obtain a baseline model, which was then tested simultaneously on the different groups by using multigroup analyses (configural model, M1). To test differences between professional groups, this model was compared with three constrained models to test the absence of variations in regression weights (M2), the absence of variations in regression weights and variances between professional groups (M3) and the absence of relationships between variables in the model (independence model; M4). Finally, the model was compared with an alternative model in which the only intermediate variable was job satisfaction (M5). The model fit was assessed by using classic indices: chi-square (with associated degrees of freedom and P -value), relative chi-square (χ^2/df ; should be ≤ 2.0) [31], root-mean-squared error of approximation (RMSEA; should be ≤ 0.10) [24], comparative fit index (CFI; should be ≥ 0.95) [34] and standardized root mean square residual (SRMR; should be ≤ 0.08) [31]. We restrained analyses to five professional groups:

physicians, nurses, laboratory staff, administrative staff and psycho-social workers.

Results

Of 5013 respondents (response rate of 49.8%), 4176 indicated belonging to one of the five targeted professional groups. After the removal of 358 respondents who did not answer regarding outcome (intent to stay) and of an additional 454 cases (corresponding to missing cells for respondents' age), the analytical sample consisted of 3364 respondents. Characteristics of the participants included in the analytical sample were similar to those of the 4176 original respondents (Table 1). Respondents were mostly women, or workers with a permanent contract, and >50% had worked in the hospital for over 6 years. All age groups were equally represented.

Baseline model

The hypothesized model presented in Fig. 1 was tested on each professional group; it consistently showed a moderate data fit (all $\chi^2/df > 2.0$; all CFIs < 0.98 ; all RMSEAs > 0.06 ; all SRMRs > 0.04). Following the modification indices, respecification led to a baseline model (Fig. 2) closely resembling the hypothesized model except that three dimensions (manager characteristics, work organization and co-worker support) and socio-demographic variables were removed because they decreased the relevance of the model (see Supplementary material, Appendix 3 for more complete results concerning the test of baseline models). In this baseline model, workload, working conditions and self-fulfillment influenced the intent to stay in three different ways: first, via direct paths; secondly, via indirect paths successively through job satisfaction or institutional identification and thirdly, via indirect paths through burnout and then job satisfaction or

Table 1 Respondents' characteristics

	Survey respondents, % (N = 4176)	Analytical sample, % (N = 3364)	
Gender			
Men	27.2	28.0	
Women	72.3	72.0	
Missing	0.5	–	
Age			
<30 years	18.1	20.0	
30–39 years	25.9	28.0	
40–49 years	24.1	24.2	
≥50 years	23.6	27.9	
Missing	10.9	–	
Work contract			
Permanent	65.8	64.3	
Temporary	12.9	12.6	
Missing	21.3	23.1	
Proportion of working time ^a			
<50%	8.3	9.3	
50–80%	21.1	22.9	
>80%	51.5	57.7	
Missing	19.2	10.1	
Years of working in the hospital			
<3 years	16.6	18.2	
3–5 years	17.9	20.0	
6–10 years	17.7	19.4	
>10 years	34.4	36.1	
Missing	13.4	6.4	
Profession			(response rate)
Physicians	15.3	14.7	31.4
Nurses and care providers	38.0	36.5	41.5
Laboratory	14.4	15.1	67.1
Administrative staff	26.6	27.8	43.7
Psycho-social workers	5.8	5.9	32.3

Only respondents who indicated a professional category were considered in the table.

^aProportion of working time = proportion of working hours in comparison with full-time occupation.

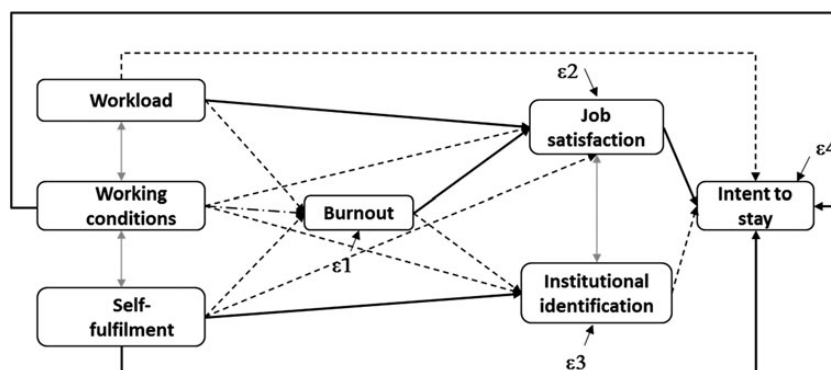


Figure 2 Schematic path diagram for the configural multigroup model. Solid bold arrows represent equal loadings across groups; dashed arrows different loadings between groups; broken dashed arrows marginal differences in loadings between groups; solid gray lines represent controlled correlations; ϵ_1 , ϵ_2 , ϵ_3 , ϵ_4 = disturbances of endogenous variables.

Table 2 Multigroup structural equation analyses: fit indices and model comparisons between baseline (M1) and concurrent models (M2–M5)

	χ^2 (df)	χ^2/df	CFI	RMSEA (90% CI)	SRMR	Model comparison	$\Delta\chi^2$	Δdf
M1	44.2* (26)	1.70	1.00	0.014 (0.006, 0.022)	0.01	–	–	–
M2	169.7*** (86)	1.97	0.98	0.017 (0.013, 0.021)	0.03	M2-M1	125.52***	60
M3	195.7*** (102)	1.92	0.98	0.017 (0.013, 0.020)	0.03	M3-M1	151.47***	76
M4	6984.8*** (105)	66.50	0.00	0.140 (0.137, 0.142)	–	M5-M1	6940.61***	79
M5	297.4*** (5)	59.48	0.96	0.132 (0.119, 0.145)	0.07	M4-M1	253.18***	21

For all models, $\Delta\chi^2$ and Δdf represent the difference relative to the configural model (i.e. the baseline model tested with a multigroup technique). CFI, comparative fit index; RMSEA, root-mean error of approximation; SRMR, standardized root mean square residual; M1, configural model that tests variations between professional groups (corresponding to the baseline model tested on all professional groups simultaneously with multigroup analyses); M2, constrained version of the configural model in which regression weights did not vary between professional groups; M3, constrained version of the configural model in which regression weights and variances did not vary between professional groups; M4, independence model that tests the absence of links between the variables in the model; M5, alternative model in which job satisfaction is the only intervening variable linking the determinants (including institutional identification and burnout) to intent to stay.

* $P < 0.05$; *** $P < 0.001$.

institutional identification. In the latter model, burnout appeared to mediate the link between workload, work environment, self-fulfillment and job satisfaction or institutional identification. Moreover, whereas greater workload and burnout decreased the intent to stay, good working conditions, high self-fulfillment, job satisfaction and strong institutional identification increased it.

The theoretical model was also tested against an alternative model in which job satisfaction was the only intervening variable between the determinants (including burnout and institutional identification) and intent to stay. This model showed poor data fit compared with multigroup test of the baseline model (i.e. the configural model) (Table 2). The baseline model also showed a better data fit compared with the constrained model postulating no differences between groups (M2 and M3), suggesting that the strength of some paths in the model significantly differed across professional groups. We also found a better fit for the baseline model compared with the alternative model (M5) or the independence model (M4) (Table 2).

Description of differences between professional groups

All regression coefficients and explained variance of the multigroup model are reported in Table 3. Given the observed differences between groups, we constrained, successively, each between-variables path, to identify these differences (see Fig. 2). Among the 15 paths included in the model, only 6 did not vary across professional groups. Of note, burnout was consistent across professional groups in decreasing intent to stay through weakened job satisfaction. Moreover, self-fulfillment increased directly and strongly the intent to stay, in contrast to working conditions, which were less influential. Self-fulfillment significantly increased institutional identification. Finally, the effect of workload on job satisfaction was generally a weak predictor of intent to stay in comparison with the other factors.

Examining differences between groups, we found that workload increased burnout more among physicians, nurses, laboratory staff and administrative staff than it did among

Table 3 Standardized path coefficients and R² for the five professional groups included in the multigroup configural model

Paths in the configural model	Professional groups				
	Physicians (n = 494)	Nurses (n = 1228)	Laboratory staff (n = 509)	Administrative staff (n = 935)	Psycho-social (n = 198)
Workload → Burnout	0.40***	0.40***	0.36***	0.43***	0.30***
Working conditions → Burnout	-0.06	-0.07	-0.07	-0.09	-0.23***
Self-fulfillment → Burnout	-0.37***	-0.27***	-0.38***	-0.30***	-0.22***
Workload → Job satisfaction	-0.09	-0.07	-0.06	-0.07	-0.10
Work environment → Job satisfaction	0.15***	0.17***	0.11**	0.08	0.08
Self-fulfillment → Job satisfaction	0.45***	0.39***	0.44***	0.48***	0.50***
Burnout → Job satisfaction	-0.26***	-0.30***	-0.32***	-0.27***	-0.23***
Work environment → Institutional identification	0.12**	0.18***	0.17***	0.06	0.08
Self-fulfillment → Institutional identification	0.30***	0.33***	0.34***	0.40***	0.28***
Burnout → Institutional identification	-0.15**	-0.07	0.01	0.07	-0.01
Workload → Intent to stay	0.02	-0.15***	-0.09	-0.09	0.09
Working conditions → Intent to stay	-0.01	-0.08	-0.01	-0.08	0.01
Self-fulfillment → Intent to stay	0.17***	0.14**	0.20***	0.18***	0.16*
Job satisfaction → Intent to stay	0.24***	0.22***	0.25***	0.23***	0.35***
Institutional identification → Intent to stay	0.19***	0.28***	0.11	0.24***	0.28***
R ² (%)					
Burnout	41.6	34.8	40.1	39.9	31.2
Job satisfaction	52.6	49.7	55.5	51.4	51.7
Institutional identification	19.8	21.2	18.1	15.3	9.6
Intent to stay	23.6	31.4	26.1	27.8	36.0

Each line represents a path in the configural model or R² for endogenous variables in the model; professional groups are represented in rows; paths in bold indicate statistically significant differences between professional groups.

*P < 0.05, **P < 0.01, ***P < 0.001.

psycho-social workers. The mitigating effect of self-fulfillment on burnout was stronger for physicians and laboratory staff than for psycho-social workers and nurses, and working conditions had no impact on burnout in general except among psycho-social workers, for whom bad working conditions increased burnout. Considering job satisfaction as an outcome, we observed a strong positive impact of self-fulfillment but this effect was weaker for nurses than for the other professional groups. Working conditions increased job satisfaction and institutional identification among physicians, nurses and laboratory staff but not among administrative staff and psycho-social workers. Burnout had no impact on institutional identification except for physicians, among whom burnout decreased institutional identification. Finally, among nurses only, workload directly decreased the intent to stay. Institutional identification increased significantly the intent to stay for all professional groups except laboratory staff. Analyses conducted with a complete case strategy showed similar results.

Model R-squares were high and ranged from 23 to 34.3% according to professional groups, reaching 31.9 and 34.3% for nurses and social workers, respectively. Overall, models explained a large part of the burnout and job satisfaction variance (ranging from 28 to 60% across groups) and a reasonable part of institutional identification variance (~18%) except for psycho-social workers (9.5%).

Discussion

Adapting the CMIS to our empirical data enabled us to identify relevant direct and indirect determinants of intent to stay among various hospital healthcare professional groups, as well as associations between these determinants. Our overall results confirm the central role of job satisfaction in intent-to-stay decisions in the five professional groups, findings that were similar to previous observations among nurses [35]. Burnout also appeared as an important determinant, but in our study, it had only an indirect impact on intent to stay, and its association with other variables varied widely across professional groups. Indeed, physicians and psycho-social workers were the two professional categories that differed most with respect to burnout associations. Whereas physicians' workload and self-fulfillment had a great impact on the level of burnout, these variables had smaller effects on psycho-social workers, whose burnout was more influenced by working conditions. Moreover, the deleterious effect of burnout on institutional identification was observed only among physicians.

We found that institutional identification had a direct and strong effect on intent to stay in almost all professional groups. The published literature shows that such an effect remains poorly documented despite studies underlining its relevance in retention plans [20, 36]. Relationships with other variables were not always significant across professional groups, but institutional identification appeared to play a central role in physicians' intent-to-stay mechanisms. A similar importance of institutional identification for physicians had already been highlighted in relation to safety culture [37], or

job attitude [38], but never in relation to retention strategies. This result may be relevant for the retention of physicians in public hospitals because institutional identification, unlike workload, may represent a modifiable lever at an institutional level.

Our findings suggest global mechanisms that are common to the distinct professional groups (for example, the strong impact of job satisfaction and self-fulfillment on intent to stay) and of mechanisms specific to each group (for example, the deleterious effect of workload on intent to stay among nurses only or the irrelevance of institutional identification for intent to stay among laboratory staff). These results suggest that intent to stay depends both on common institutional and profession-specific identities. As a consequence, retention plans or interventions might be planned at two different levels to enhance both shared determinants and professional group-specific determinants.

Finally, the use of a theoretical model, which can create a frameworks for constructing interventions [12] and focus attention on specific factors, is still rarely used in professional interventions [11], despite its common use in the health education area (for example, through intervention mapping) [39]. Our results revealed that manager characteristics, co-worker support and work organization were less relevant than job satisfaction, self-fulfillment, workload (among nurses) and institutional identification for Lausanne Hospital healthcare professionals' intent-to-stay mechanisms.

The study has some limitations. First, the response rate was moderate (49.8%) and there were missing data on age and intent to stay. Secondly, the cross-sectional design of the survey limits assessment of causality of paths in the model and precludes evaluation of model stability over time. Thirdly, the generalizability of these results to hospitals outside university settings and Switzerland is uncertain. The consistency of the results with classic findings reported in the international literature is reassuring.

We have identified several factors that affect hospital professionals' intent to stay. By studying this issue across five distinct professional groups, we were able to identify its determinants and depict their roles in each professional group, thereby highlighting important aspects that could be more specifically targeted in future interventions. We also highlighted that intent to stay could be approached at a hospital level through a global strategy and hospital governance and at a professional group level through more tailored interventions.

Supplementary material

Supplementary material is available at *INTQHC Journal* online.

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References

- Buchan J, Aiken L. Solving nursing shortages: a common priority. *J Clin Nurs* 2008;**17**:3262–8.
- Aiken LH, Clarke SP, Sloane DM *et al*. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA* 2002;**288**:1987–93.
- Duvall JJ, Andrews DR. Using a structured review of the literature to identify key factors associated with the current nursing shortage. *J Prof Nurs* 2010;**26**:309–17.
- Lavoie-Tremblay M, Wright D, Desforges N *et al*. Creating a healthy workplace for new-generation nurses. *J Nurs Scholarsh* 2008;**40**:290–7.
- Jaccard-Ruedin H, Weaver F. *Ageing Workforce in an Ageing Society—How Many Healthcare Professionals Will Be Needed by 2030 in Switzerland? (in French)*. Neuchâtel: Observatoire Suisse de la Santé, 2009.
- Janiszewski Goodin H. The nursing shortage in the United States of America: an integrative review of the literature. *J Adv Nurs* 2003;**43**:335–43.
- Kleinman C. The relationship between managerial leadership behaviors and staff nurse retention. *Hosp Top* 2004;**82**:2–9.
- Moret L, Anthoine E, Paillé C *et al*. Relationship between inpatient satisfaction and nurse absenteeism: an exploratory study using WHO-PATH performance indicators in France. *BMC Res Notes* 2012;**5**:83.
- Cowden T, Cummings G, Profetto-McGrath J. Leadership practices and staff nurses' intent to stay: a systematic review. *J Nurs Manag* 2011;**19**:461–77.
- Cowden TL, Cummings GG. Nursing theory and concept development: a theoretical model of clinical nurses' intentions to stay in their current positions. *J Adv Nurs* 2012;**68**:1646–57.
- Schalk DM, Bijl ML, Halfens RJ *et al*. Interventions aimed at improving the nursing work environment: a systematic review. *Implement Sci* 2010;**5**:34.
- Michie S, Johnston M, Abraham C *et al*. Making psychological theory useful for implementing evidence based practice: a consensus approach. *Qual Saf Health Care* 2005;**14**:26–33.
- Lu H, Barriball KL, Zhang X *et al*. Job satisfaction among hospital nurses revisited: a systematic review. *Int J Nurs Stud* 2012;**49**:1017–38.
- Steel RP, Lounsbury JW. Turnover process models: review and synthesis of a conceptual literature. *Hum Resour Manage Rev* 2009;**19**:271–82.
- Price JL. Reflections on the determinants of voluntary turnover. *Int J Manpower* 2001;**22**:600–24.
- Hayes LJ, O'Brien-Pallas L, Duffield C *et al*. Nurse turnover: a literature review—an update. *Int J Nurs Stud* 2012;**39**:887–905.
- Boyle DK, Bott MJ, Hansen HE *et al*. Manager's leadership and critical care nurses' intent to stay. *Am J Crit Care* 1999;**8**:361–71.
- Taunton RL, Boyle DK, Eoods CQ *et al*. Manager leadership and retention of hospital staff nurses. *West J Nurs Res* 1997;**19**:205–26.
- Davis MM, Devoe M, Kansagara D *et al*. 'Did I do as best as the system would let me?' Healthcare professional views on hospital to home care transitions. *J Gen Intern Med* 2012;**27**:1649–56.
- Holtom BC, O'Neill BS. Job embeddedness: a theoretical foundation for developing a comprehensive nurse retention plan. *J Nurs Adm* 2004;**34**:216–27.
- Mallidou AA, Cummings GG, Estabrooks CA *et al*. Nurse specialty subcultures and patient outcomes in acute care hospitals: a multiple-group structural equation modeling. *Int J Nurs Stud* 2011;**48**:81–93.
- Maslach C, Jackson SE, Leiter MP. *The Maslach Burnout Inventory*. 3rd edn. Palo Alto, CA: Consulting Psychologists Press, 1996.
- Leiter MP, Maslach C. Nurse turnover: the mediating role of burnout. *J Nurs Manag* 2009;**17**:331–9.
- Consortium CLARTE, Pourin S, Domecq S *et al*. Programme national CLARTE: des indicateurs RH en développement. *Revue Hospitalière de France* 2012;**548**:46–51.
- Kristensen TS, Borritz M, Villadsen E *et al*. The Copenhagen Burnout Inventory: a new tool for the assessment of burnout. *Work Stress* 2005;**19**:192–207.
- Bourbonnais R, Brisson C, Vinet A *et al*. Development and implementation of a participative intervention to improve the psychosocial work environment and mental health in an acute care hospital. *Occup Environ Med* 2006;**63**:326–34.
- Tourangeau AE, Cranley LA. Nurse intention to remain employed: understanding and strengthening determinants. *J Adv Nurs* 2006;**55**:497–509.
- Wanous JP, Reichers AE, Hudy MJ. Overall job satisfaction: how good are single-item measures? *J Appl Psychol* 1997;**82**:247–52.
- Sterne JAC, White I, Carlin JB *et al*. Multiple imputation for missing data in epidemiological and clinical research: potential and pitfalls. *BMJ* 2009;**338**:b2393.
- Duncan OD. *Introduction to Structural Equation Models*. New York: Academic, 1975.
- Kline RB. *Principles and Practice of Structural Equation Modeling*. 2nd edn. New York: The Guilford Press, 2005.
- Stephenson MT, Holbert RL. A Monte Carlo simulation of observed versus latent variable structural equation modeling techniques. *Commun Res* 2003;**30**:332–54.
- Byrne BM. Testing for multigroup invariance using AMOS graphics: a road less traveled. *Struct Equ Modeling* 2004;**11**:272–300.
- Hu L, Bentler P. Cutoff criteria for fit indices in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equ Modeling* 1999;**6**:1–55.
- Coomber B, Barriball KL. Impact of job satisfaction components on intent to leave and turnover for hospital-based nurses: a review of the research literature. *Int J Nurs Stud* 2007;**44**:297–314.
- Laschinger HK, Finegan J. Using empowerment to build trust and respect in the workplace: a strategy for addressing the nursing shortage. *Nurs Econ* 2005;**23**:6–13.
- Listyowardjo TA, Nap RE, Johnson A. Variations in hospital worker perceptions of safety culture. *Int J Qual Health Care* 2012;**24**:9–15.

38. Heponiemi T, Kuusio H, Sinervo T *et al.* Job attitudes and well-being among public vs. private physicians: organizational justice and job control as mediators. *Eur J Public Health* 2011;**21**:520–5.
39. Bartholomew LK, Parcel GS, Kok G *et al.* *Planning Health Promotion Programs: An Intervention Mapping Approach*. 2nd edn. San Francisco, CA: Jossey-Bass, 2006.