Are staffing, work environment, work stressors, and rationing of care related to care workers' perception of quality of care? A cross-sectional study

Running Title: Work environment and quality of care

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Abstract

Objectives: To describe care worker-reported quality of care and to examine its relationship with staffing variables, work environment, work stressors, and implicit rationing of nursing care.

Design: Cross-sectional study.

Setting: National, randomly selected sample of Swiss nursing homes, stratified according to language region and size.

Participants: 4311 care workers of all educational backgrounds (registered nurses, licensed practical nurses, nurse aides) from 402 units in 155 nursing homes completed a survey between May 2012 and April 2013.

Measurements: Care worker-reported quality of care was measured with a single item; predictors were assessed with established instruments (e.g. Practice Environment Scale – Nurse Working Index) adapted for nursing home use. A multilevel logistic regression model was applied to assess predictors for quality of care.

Results: Overall, 7% of care workers rated the quality of care provided as rather low or very low. Important factors related to better quality of care were higher teamwork and safety climate (OR=6.19; 95% CI, 4.36-8.79), better staffing and resources adequacy (OR=2.94; 95% CI, 2.08-4.15), less stress due to workload (OR=0.71; 95% CI, 0.55-0.93), less implicit rationing of caring, rehabilitation, and monitoring (OR=0.34; 95% CI, 0.24-0.49), and less rationing of social care (OR=0.80; 95% CI, 0.69-0.92). Neither leadership nor staffing levels, staff mix, or turnover were significantly related to quality of care.

Conclusions: Work environment factors and organizational processes are vital to provide high quality of care. The improvement of work environment, support in handling work stressors and reduction of rationing of nursing care might be intervention points to promote high quality of care in nursing homes.

Keywords: nursing homes; quality of health care; work environment; rationing of care; staffing

INTRODUCTION

Nursing homes play an important role in the provision of care for dependent older people. Compared to former decades, older adults in nursing homes demand more choice, service quality, and autonomy, while needing more intensive care and resources. Due to the demographic change with a higher number of care-dependent older people and the need for expansion and diversity in service, nursing homes are challenged to provide continuous high levels of quality of care, while at the same time having difficulties in recruiting and retaining a qualified nurse workforce [1, 2]. Long-term care expenditure will substantially increase by 2050, increasing the demand for accountability about public spending in this sector [3]. Accordingly, the quality of care in nursing homes has become an international priority [2].

The Institute of Medicine defines quality of care as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" [4]. An aspect seldom explored in nursing home research is the care workers' perception of quality of care. Care workers are the residents' primary care providers as well as intermediaries with other services and they are in an excellent position to rate the quality of care provided. Their perception of quality of care is not based on isolated contacts or adverse events, such as pressure ulcers or patient falls, but has developed over time in a variety of encounters with residents and in interdisciplinary collaboration [5]. Hospital studies showed that nurse-reported quality of care was e.g. related to mortality, failure to rescue, survival, and patients' reports of their care experience [6, 5, 7], and was a valid indicator that reflected differences in hospital quality [5].

Based on the structure-process-outcome-model of Donabedian [8], Figure 1 shows that quality of care, considered as an outcome is determined by structure and process factors, such as organizational, personnel, and resident characteristics, as well as the work environment, work stressors, and the necessity of rationing of care. The relationships of staffing level, turnover, or staff mix with quality of care have been broadly researched in nursing homes [9-11] with a tendency for better quality of care being

associated with better staffing factors, but results are still inconclusive. Studies seldom combine staffing with work environment factors like leadership behavior, care workers' participation in decision making, communication, collaboration, conflict resolution, or teamwork, which have been repeatedly shown to be positively related to quality of care in nursing homes and might influence the relationship of staffing with quality of care [12-21]. Higher safety climate is related to better quality outcomes in the hospital sector [22, 23], but evidence is still scarce about its importance in nursing homes [24]. Work stressors, especially high workloads with time pressure, role ambiguity, role conflict, and lack of skills tend to be negatively associated with quality of care with some mixed results [25-29]. An additional element that might be related to quality of care and has not been examined so far in nursing homes is implicit rationing of nursing care. It reflects the process of nursing care, i.e. what is actually done when giving care and what is left undone due to time constraints and might help to explain the variation observed in the relationship of staffing resources, work environment, and work stressors with quality of care. Hospital studies showed significant relationships of rationing of nursing care with patient satisfaction, overall quality of care, falls, pressure ulcers, medication errors, and mortality rates [30-38].

A recent review showed that there is still a lack of international studies looking at the relationship of nursing homes' work environment with quality of care and that most studies to date were US- or Canada-based [39]. Moreover, implicit rationing of nursing care has not yet been integrated in nursing home research about quality of care. The aims of the study were therefore (1) to describe care- worker reported quality of care and (2) to examine its relationship with staffing, work environment characteristics, work stressors, and implicit rationing of nursing care.

METHODS

Design and Sample

This study was nested within the Swiss Nursing Home Human Resources Project (SHURP), a cross-sectional, multi-center study in a random sample of 163 nursing homes in the German-, French-, and

Italian-speaking language regions of Switzerland. The sampling, data collection and data management are described elsewhere in more detail [40]. Included were nursing homes licensed by Swiss cantonal authorities with at least 20 beds; residential homes and hospice facilities were excluded. In this sub-sample, units that did not provide unit data were excluded. All care workers within a nursing home were included if they had no leadership position and had worked at least 8 hours per week for at least one month on their assigned unit.

Variables and measurement

To measure *quality of care*, care workers were asked to rate the overall quality of care on their unit in a single item on a 4-point Likert scale, which for analysis was dichotomized as very low or rather low opposed to rather high or very high in accordance with former studies [6, 41, 42]. A single-item measure of nurse-reported quality of care has been repeatedly used in hospital studies [43, 6, 44, 38] and has been shown to be a valid measurement of quality of care on the hospital level [5]. In this study, intraclass correlation (ICC) 2 was 0.69 on unit level and 0.80 on facility level. The independent variables of interest as described in Figure 1 are staffing levels, staff mix, and turnover at the unit level, and perceptions of work environment factors, teamwork and safety climate, work stressors, and implicit rationing of nursing care at the individual level. The variables are described in Table 1.

Data collection

The survey was administered in the three language versions German, French, and Italian between May 2012 and April 2013. All nursing home directors from the participating nursing homes gave written informed consent to participate in the study. Sending back the care worker questionnaire was considered informed consent from care workers. The study was approved by all Swiss cantonal ethics committees (leading ethics committee: Beider Basel, Ref.Nr. EK:02/12).

Data Analysis

Descriptive statistics (frequencies, percentages, means, standard deviations (SD)) were calculated as appropriate to describe the variables measured. A three-level logistic regression model was used to examine the relationship of staffing, work environment, and rationing of nursing care with quality of care. The decision for multilevel analysis was based on the calculation of intraclass correlation 1 (ICC1) and the between-group variance among units and facilities: ICC1 was 0.17 on unit level and 0.11 on the facility level for quality of care and both units and facilities differed significantly in relation to quality of care, which made it necessary to account for the clustering of care worker data within units and facilities. Both unadjusted and adjusted results are reported. To compare relative fits of the models, Akaike's information criterion (AIC) was used; the model with the lower value has a better fit [45]. Cases with missing values were excluded from the analysis. A p-level of <.05 was considered significant. Since care workers might overrate the quality of care, a sensitivity analysis was performed excluding the top 10% of performing units in relation to reported quality of care. Data analyses were performed with Stata/IC 13.1.

RESULTS

The final sample consisted of 4,311 care workers from 402 units and 77 additional care teams not assigned to a specific unit (e.g. night shift team) in 155 nursing home facilities. The mean response rate over all units was 79.3%. Most respondents came from medium-sized facilities in the German-speaking region. The average unit size was 25 beds with 13 FTE care worker positions of which 31% were registered nurses. The average turnover per unit was 12% and 62% of residents had either a diagnosis or symptoms of dementia. Facility, unit, resident, and personnel characteristics are detailed in Table 2. Seven percent (n=289) of the care workers reported rather low or very low quality of care on their units, one third of which were concentrated in 13 facilities where 20% and more of care workers reported that their organization had a low quality of care. Overall, care workers gave high mean ratings for leadership and teamwork and safety climate, while staffing and resources adequacy was less favorably rated. The most frequent source of work stress was heavy workload with a mean rating of 1.53, which corresponds to answers between the options seldom and sometimes.

Work environment factors, work stressors, and rationing of nursing care were significantly related to quality of care, while staffing level, staff mix, and turnover were not (Table 3). The factor most strongly associated with quality of care was teamwork and safety climate. The odds of a positive rating of quality of care increased more than six-fold with a one-point increase in the rating of teamwork and safety climate (OR=6.19; 95% CI, 4.36-8.79) and almost three-fold with a better perception of staffing and resources adequacy (OR=2.94; 95% CI, 2.08-4.15). Leadership was not a significant work environment factor related to quality of care in the model. As for work stressors, the odds of a high quality of care decreased with more frequent stress due to workload (OR=0.71; 95% CI, 0.55-0.93), but interestingly increased with stress due to a lack of preparation (OR=1.60; 95% CI, 1.18-2.15). A similar effect was observed among the subscales on rationing of nursing care: while the odds for better quality of care increased with less rationing of caring, rehabilitation, and monitoring (OR=0.34; 95% CI, 0.24-0.49) and less rationing of social care (OR=0.80; 95% CI, 0.69-0.92), with more rationing of documentation increased the odds for better quality of care (OR=1.45; 95% CI, 1.14-1.84). The sensitivity analysis without the 10% of top rated units showed similar results.

DISCUSSION

In this study, a high percentage of nursing home care workers perceived a good quality of care on their units. Work environment, work stressors, and implicit rationing of nursing care were important factors related to quality of care, as suggested in Figure 1, while staffing level, staff mix, turnover, and leadership were not. Overall, the findings in this study partly confirm the model described in Figure 1 with facility and unit characteristics showing less importance than expected for unit level quality of care.

The percentage of care workers giving a good quality of care rating was very high with 93%. In comparison, 80% of care workers in Germany rated the quality of care in nursing homes to be good [41], while in a large hospital study over 12 countries, the percentage of nurses considering the quality of care on their ward as good ranged from 53% in Greece, 65% in Germany, 80% in Switzerland, and 84% in the USA to the highest percentage of 89% in Ireland [6].

In our study, teamwork and safety climate was the most important factor related to good quality of care. This is consistent with US nursing homes care workers where teamwork was the most influential factor in the ability to provide good care, followed by good communication and working with experienced and dedicated colleagues [46]. Good teamwork in health care teams is reached through interdependent collaboration, open communication, and shared decision-making [47]. Care workers themselves identify local interaction patterns such as being approachable, pitching-in, seeking assistance, giving praise or respect as fundamental activities that improve teamwork and quality of care [48]. Interventions to improve these local interaction patterns show potential to improve resident outcomes, such as e.g. falls [49]. Teamwork allows for a smoother work organization, streamlines workflow, and gives more time to offer residents individualized care [50].

Both high stress due to workload and care workers' perception of inadequate staffing resources were related to a decreased quality of care, as opposed to actual staffing levels, which showed no relationship with quality of care. Based on qualitative research, the mechanism in play might be that lack of time leads to rationing of relational aspects of care, while physical care in the activities of daily living are maintained [51]. Other studies confirm this link between the lack of adequate time and perceived staffing and the ability to form meaningful relationship with residents [52] and to provide individualized care [53, 46]. Based on interviews in hospitals, nurses included in their rating of staffing adequacy the personnel mix, the cohesiveness of the staff, the care delivery systems, and how well nurses knew the patients [54], which covers more than just actual staffing numbers. The lack of a relationship between staffing levels and quality of care in this study might point to the importance of not only the numbers of care workers but the quality of the team: Care workers who are able to collaborate as a team, have a shared concept about care, a clear task distribution, and an open communication, might better handle a higher workload than a less-well functioning team.

Surprisingly, leadership was not related to quality of care. It suggests that teamwork may be more important than leadership for the perception of quality of care. In a UK-hospital study, managerial support

after clinical incidents was not related to perceived quality of care delivery, while the lack of support from colleagues worsened the perception of quality of care [55]. Peers are of paramount importance to handle challenging clinical demands or complex care situations. However, according to a US nursing home study, the combined presence of different working conditions such as good leadership, communication, teamwork, and staff appreciation were shown to be related with better quality of care [56]. Leaders provide the structures and processes needed to allow for good teamwork, communication, and safety climate and to reduce work stressors [48, 56], they deal with staff shortages and create supportive conditions to ensure continuity of care [57]. Further studies are needed to explore this lack of a relationship of leadership ratings with quality of care in this study.

While the rationing of activities of daily living was not related to quality of care, both the rationing of caring and social care were associated with lower perceptions of quality of care. Care workers in nursing home conceptualize quality of care as creating a home-like environment, where holistic, emotional, individualized, and family-centered care is possible [51]. According to Bowers et al. [46], short staffed situations led not only to care activities left undone, but also to a bundling of activities, which reduce to possibility of individualize care and building a relationship with residents and causes distress for both care workers and residents. Both rationing of caring and of social care refer to the reduction of the relational aspect of nursing care and make it difficult to provide individualized and person-centered care. In contrast, the rationing of documentation is related to a better perception of quality of care, probably because less time spent with administrative tasks allowing more time to be spent with residents. The development of personal care worker-resident relationships and person-centered care has been repeatedly linked with high quality of care [58], as well as residents' well-being [59, 60] and care workers' job satisfaction and retention [52, 61, 62].

An unexpected finding was the positive relationship between care workers reporting more frequent stress due to lack of preparation for their job and better ratings of quality of care. A possible explanation might be that the awareness of one's own short-comings heightens the desire and effort to

provide good care. On the other hand, the inadequate preparation might negatively impact care workers' ability to recognize deficits in the care quality on their unit. Overall, this finding needs further inquiry to be able to understand it.

A strength of this study is the use of administrative data for staffing and that all data were collected in the same time frame, allowing an actual comparison of staffing, work environment, work stressors, rationing, and outcome data. However, since the results of this study are cross-sectional, no causal links can be established. Longitudinal studies with actual changes in work environment factors, work stressors or implicit rationing of nursing care would be valuable to confirm the findings. The random selection of the nursing homes allows for a generalization of the results for Switzerland. However, the specific context of Swiss nursing homes with e.g. a high proportion of registered nurses in care teams (mean of 31%) requires caution for further generalization [63]. A potential limitation of the study is the subjective rating of quality of care. Although care workers are in a very good position to rate quality of care, we do not explicitly know how they define quality of care and they might have different perceptions. Since less well prepared personnel might rate quality of care higher due to an inability to recognize deficits, we controlled for the educational background in our model and did not find a significant difference in the ratings of nurse aides and registered nurses. The results of this study that show the importance of work environment factors for quality of care need further corroboration with additional outcome measures, such as e.g., specific measurements of person-centered care or residents' quality of life. Common-method bias might have influenced the results; however, the use of a different source for staffing data and of different answer options should have helped to reduce the bias.

CONCLUSION

Although nursing home studies comparing care workers' perception of quality of care with other quality measures are lacking, studies in the hospital setting suggest that care workers' perceptions are a valid proxy measure of quality of care. Measuring care workers' perceptions of quality of care might be an important addition to quality measurements. On one hand, awareness of staff perceptions is essential for

quality development [20]. On the other hand, care workers' perceptions add to other, more medically oriented quality indicators, since they seem to put emphasis on the relational aspects of care. Further inquiry is needed to examine the relationship of care workers' perceptions of quality of care with separately measured quality indicators in nursing homes, as well as the importance of work environment factors and implicit rationing of nursing care for other resident outcomes.

The findings of this study suggest several domains of interventions that may improve quality of care in nursing homes, first among them improving the teamwork and safety climate, reducing workload, and reducing rationing of caring. Further research would be needed to evaluate the impact of interventions designed to address the factors identified on quality-related outcomes, including not only care workers' perception of quality of care, but also medical and psychosocial resident outcomes.

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Tables and Figures

Table 1: Description of independent variables used in study

Variable Name	Description	Measurement
Unit characteristics		
Number of beds	Number of beds on unit	
Number of FTE/100 beds	Number of full-time equivalent (FTE) positions divided by number of beds multiplied by 100	
Staff mix (%)	Percentage of registered nurses of all FTE per unit	
Turnover overall (%)	Number of persons who left the unit in the last 6 months in relation to the number of persons present at the time of data collection	
Residents with either diagnosis or symptoms of dementia (%)	Percentage of residents on unit who have either a diagnosed dementia of any form or who have symptoms of dementia (e.g. memory problems, difficulties with language, planning and executing daily activities, change in personality and mood, social withdrawal)	
Residents		
Mean age	Mean age of all residents per unit	Years
Mean length of stay	Mean length of stay of all residents on unit, calculated from day of admission to day of data collection	Days
Mean care load (scale from 1-12)	Mean care load of all residents on unit: based on national reimbursement system, each resident is allocated to one of 12 groups. Each higher group represents an additional 20 minutes in care time per day.	Group 1 to 12
Practice Environment Scale- Nurse Working Index (PES-NWI)		
Leadership	5-item subscale "*Nurse manager ability, leadership, and support of care workers"* of the PES-NWI [64], assessing support by direct supervisors, their competency, back-up in decision making, praise and recognition given, and the use of mistakes as learning opportunities and not criticism	4-point Likert scale from 1=strongly disagree to 4=strongly agree Cronbach's α=.84

Variable Name	Description	Measurement
Staffing and resources adequacy	3-item subscale "*Staffing and resources adequacy*" of the PES-NWI [64], assessing whether there was enough time and opportunity to discuss resident care problems, enough qualified personnel to provide quality resident care, and enough staff to get the work done	4-point Likert scale from 1=strongly disagree to 4=strongly agree Cronbach's α=.74
Safety Attitude Questionnaire (SAQ)		
Teamwork and safety climate	Combination of two subscales of the SAQ [65]: Based on confirmatory factor analysis, the original two subscales *Teamwork* and *Safety Climate* could not be confirmed. Two items with low item discrimination (corrected item-scale correlation < 0.4) were removed. This resulted in one 10-item single factor for *Teamwork and Safety Climate*, assessing e.g. the opportunity to speak up or to ask questions when something is not understood, the extent to which other team members provide assistance when needed, the opportunity to discuss errors and to learn from each other, and the reception of feedback about one's performance	5-point Likert scale from 1=strongly disagree to 5=strongly agree with the option "don't know" Cronbach's α=.89
Health Professions Stress Inventory (HPSI)		
	Out of the original 30-item HPSI [66, 67] 12 items were selected based on expert ratings concerning their relevance in the nursing home context. Exploratory factor analysis identified 3 factors. Rating of frequency of experiencing stress.	5-point Likert scale ranging from 0=never to 4=very often
Work stressors: Conflict and lack of recognition	6-item subscale, assessing e.g. disagreement with other health professionals concerning residents' treatment, conflicts with supervisors, not being asked about one's opinion when making decisions about one's job, and not being paid enough	Cronbach's α=.76
Work stressors: Workload	3-item subscale, assessing e.g. having so much work to do that not everything can be done well and not having enough people working to get the work done well	Cronbach's α=.74

Variable Name	Description	Measurement
Work stressors: Lack of preparation	3-item subscale, assessing e.g. not being trained to meet residents' needs, being afraid of making a mistake in the residents' treatment and being overwhelmed by caring for terminally ill residents	Cronbach's α=.63
Basel Extent of Rationing of Nursing Care (Bernca)		
	Original version adapted to nursing homes [68]. Additional three questions concerning the rationing of social activities. Rating of how often in the last seven days care workers could not perform certain care activities that were necessary and usual, due to lack of time or high workload.	5-point Likert scale from "1=never" to "4=often" with a "0" option for activity that was no necessary
Activities of daily living	5-item subscale, assessing e.g. support with eating, drinking, washing, mouth care	Cronbach's α=.78
Caring, rehabilitation, and monitoring	8-item subscale assessing e.g. emotional support of residents or relatives, toileting, rehabilitating care, monitoring confused residents	Cronbach's α=.83
Documentation	3-item subscale, assessing e.g. setting up care plans, documentation of care	Cronbach's α=.77
Social care	3-item subscale, assessing e.g. single or group activities with residents	Cronbach's α=.86

Table 2: Characteristics of variables under study

	%	Mean	SD	Missing n (%)
Facility characteristics (n=155 facilities)				
Language region				0 (0)
German-speaking part	75.5			
French-speaking part	18.7			
Italian-speaking part	5.8			
Profit status				0 (0)
Public	37.4			
Private subsidized	26.5			
Private	36.1			
Facility size				0 (0)
Small (20-49 beds)	38.1			
Medium (50-99 beds)	47.7			
Large (100 and more beds)	14.2			
Unit characteristics (n=402 units)				
Number of beds		25.2	10.7	0 (0)
Number of FTE/100 beds		51.7	15.3	0 (0)
Staff mix (% registered nurses)		31.8	12.03	0(0)
Turnover overall (%)		11.8	15.6	0 (0)
Residents with either diagnosis or symptoms of dementia (%)		62.1	24.4	0 (0)
Nursing home resident characteristics (per unit, n=402 units)				
Mean age (years)		84.6	3.0	0 (0)
Mean length of stay (days)		1237.0	434.5	0 (0)
Mean care load (scale from 1-12)		5.9	1.6	0 (0)
Care worker characteristics (n=4311 respondents)				
Gender (female)	92.3			50 (1.2)
Age (years)		43.37	12.20	132 (3.1)
Educational background				50 (1.2)

	%	Mean	SD	Missing n (%)
Registered nurse (3-4 years of education)	25.3			
Licensed practical nurse (3 years of education)	21.5			
Certified assistant nurse (1-2 years of education)	19.9			
Nurse aide (training on the job)	30.0			
Other	3.3			
Work environment (scale range)				
PES-NWI: Leadership (1-4)		3.14	0.59	1 (0.0)
PES-NWI: Staffing and resources adequacy (1-4)		2.82	0.66	8 (0.2)
SAQ: Teamwork and safety climate (1-5)		3.97	0.66	16 (0.4)
HPSI Work stressors: Conflict and lack of recognition (0-4)		0.91	0.66	17 (0.4)
HPSI Work stressors: Workload (0-4)		1.53	0.82	18 (0.4)
HPSI Work stressors: Lack of preparation (0-4)		0.68	0.59	24 (0.6)
Implicit rationing of nursing care (BERNCA-NH) (scale range: 0-4)				
Activities of daily living		1.36	0.55	63 (1.5)
Caring, rehabilitation, and monitoring		1.70	0.62	46 (1.1)
Documentation		2.03	0.88	67 (1.6)
Social care		1.45	1.10	166 (3.9)
Care worker –reported quality of care				25 (0.6)
Very low / rather low	6.7			
Very high / rather high	93.3			

FTE: full-time equivalent; PES-NWI: Practice Environment Scale-Nurse Working Index; SAQ: Safety Attitudes Questionnaire; HPSI: Health Professionals Stress Index; BERNCA-NH: Basel Extent of Rationing of Implicit Rationing of Nursing Care – Nursing Home version.

Underlined scores are preferable scores.

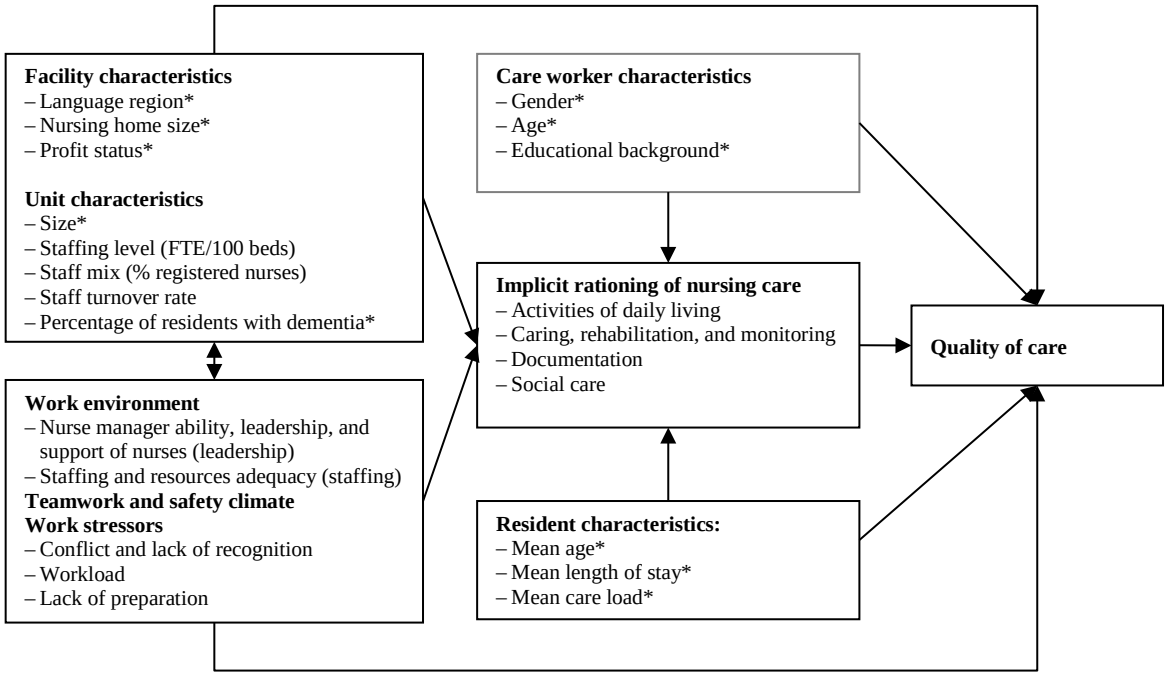
Table 3: Relationship of staffing variables, work environment, work stressors, and implicit rationing of nursing care with care worker-perceived quality of care

	Unadjusted (n=4089)			**Adjusted[*] (n=3952)**		
	Odds ratio	**95%CI**	**p-value**	**Odds ratio**	**95%CI**	**p-value**
Organizational context						
- *FTE/100 beds*	1.000	0.986 - 1.014	0.999	1.008	0.991 - 1.026	0.364
- *Staff mix*	0.999	0.982 1.016	0.899	1.005	0.990 1.021	0.496
- *Turnover*	0.989	0.978 - 1.001	0.071	0.992	0.980 - 1.003	0.149
Work environment (PES-NWI)						
- *Leadership*	0.938	0.660 - 1.332	0.719	1.073	0.748 - 1.539	0.702
- *Staffing and resources adequacy*	2.703	1.937 - 3.773	0.000	2.939	2.082 - 4.149	0.000
Teamwork and Safety Climate (SAQ)	6.454	4.558 - 9.139	0.000	6.186	4.355 - 8.788	0.000
Work stressors (HPSI adapted)						
- *Conflict and lack of recognition*	0.794	0.589 - 1.071	0.131	0.785	0.578 - 1.065	0.120
- *Workload*	0.668	0.516 - 0.864	0.002	0.714	0.548 - 0.932	0.013
- *Lack of preparation*	1.725	1.292 - 2.302	0.000	1.595	1.184 - 2.149	0.002
Rationing of nursing care						
- *Activities of daily living*	0.769	0.560 - 1.057	0.105	0.751	0.541 - 1.043	0.087
- *Caring, rehabilitation, and monitoring*	0.380	0.267 - 0.541	0.000	0.340	0.236 - 0.490	0.000

	Unadjusted (n=4089)				Adjusted* (n=3952)			
	Odds ratio	**95%CI**		**p-value**	**Odds ratio**	**95%CI**		**p-value**
- *Documentation*	1.313	1.044	1.651	0.020	1.447	1.140	1.836	0.002
- *Social care*	0.813	0.706	0.936	0.004	0.799	0.691	0.924	0.003
Constant	0.049	0.008	0.287	0.001	0.000	0.000	0.147	0.010
Random-effects Parameters								
- *Facility level variance*	0.407	0.172	0.966		0.100	0.012	0.835	
- *Unit level variance*	0.054	0.000	172.254		0.00	-	-	
AIC	1142.431				1081.084			

CI: Confidence interval; FTE: Full-time equivalent; PES-NWI: Practice Environment Scale – Nurse Working Index; SAQ: Safety Attitude Questionnaire; HPSI: Health Professions Stress Inventory; AIC: Akaike's information criterion.

*The adjusted model was controlled for: Facility characteristics: language region (German, French, or Italian), profit status (public, private subsidized, private), size (small=20-49 beds, medium=50-99 beds, large=100 and more beds); Unit characteristics: number of beds, percentage of residents with diagnosed dementia or symptoms of dementia; Resident characteristics: mean age per unit, mean length of stay per unit, mean care load; Care worker characteristics: gender, age, educational background



*control variables

Figure 1: Factors related to quality of care