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Judul : LITERATUR RIVIEW: ANALISIS HUBUNGAN MUTU PELAYANAN KESEHATAN DENGAN TINGKAT KEPUASAN PASIEN



Pembimbing: Saiful Nurhidayat, S.Kep.,Ners., M.Kep

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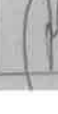
LEMBAR KONSULTASI


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Relationship quality of health services with satisfaction of patients in H. Hanafie Muara Bungo Hospital in 2019[☆]



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KEYWORDS

Quality of service;
Patient satisfaction;
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Abstract Hospitals as a place of health services are required to provide quality services. One of the determinants of the level of satisfaction of health services is health workers. The purpose of this study was to determine the relationship of health service quality with patient satisfaction at H. Hanafie Muara Bungo Hospital. This research is an analytic study using a cross-sectional study approach. The population in this study were all inpatients at H. Hanafie Muara Bungo Hospital. The sampling technique used an accidental sampling of 49 people. Data collection was done using questionnaires. Analysis of the data was done by univariate and bivariate analysis. The results showed there was a significant relationship between the reliability of officers, the responsiveness of officers, employee guarantees, the attention of health workers, and physical evidence of health services with the level of patient satisfaction at H. Hanafie Muara Bungo Hospital in 2019. Based on the results of the study, it was found that officer response, officer guarantee, officer attention, and physical evidence of service in the category of not qualified and there is a significant relationship with the level of patient satisfaction at H. Hanafie Muara Bungo Hospital in 2019.

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Introduction

The hospital, as a place of health services, must provide quality services so that the hospital is required to improve the quality of service. The purpose of health services is the achievement of a degree of public health that satisfies the expectations and degrees of community needs (consumer satisfaction) through effective services by service

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providers who will also provide satisfaction in the expectations and needs of service providers (provider satisfaction) in-service institutions that are organized efficiently (institutionally satisfaction). The interaction of the three main pillars of health services that are harmonious, harmonious, and balanced is a combination of satisfaction of the three pillars, and that is satisfying health care (satisfaction health care).¹

There are six factors of customer dissatisfaction with a product, namely: not in line with expectations, the service during the process of enjoying unsatisfactory services, unsatisfactory personal behavior, unsatisfactory atmosphere, and physical environment, high cost, promotion which does not correspond to reality.² Therefore, the provider must be able to provide satisfaction to its customers, for example, by providing higher quality products, cheaper and better services. A product is said to be of quality if it can meet the needs of its customers. Therefore, knowledge of customer needs and satisfaction (customer requirements) is very important.

A survey was conducted at H. Hanafie Muara Bungo Hospital by the researchers based on interviews with 10 hospitalized patients on February 24, 2019. About 5 people expressed dissatisfaction with the procedure for admitting patients that were not fast and precise (reliability), 4 people were not satisfied with officers who are not fast in providing services (responsiveness), 1 person was dissatisfied with officers who are not dexterous in carrying out service actions (collateral), 2 people were not satisfied with officers who discriminated patients with different status (empathy), 2 people are not satisfied with the flow of services or service instructions (physical evidence).

Based on the description in this background, the researcher is interested in the quality of health services to patient satisfaction at H. Hanafie Muara Bungo Hospital in 2019.

Method

This study is an analytic study with a cross-sectional study approach that aims to see the relationship between the independent variable (service cover) with the dependent variable (patient satisfaction). The population in this study were inpatients of H. Hanafie Muara Bungo Hospital. As many as 49 respondents were selected. Measuring instruments in this study used questionnaires given directly to inpatient. Data analysis in this study was analyzed using univariate and bivariate analysis. The univariate analysis uses the frequency test to display the frequency distribution, while bivariate analysis uses quadratic analysis or Chi-Square.

Result

Univariate analysis

1. The majority (79.6%) the patients stated that the health worker's reliability is in the category of Inequality.
2. The majority (81.6%) of the patient's responsiveness is in the category of unqualified.

3. The majority (81.6%) of the patient's assurance is in a category of inequality.
4. The majority (83.7%) the patient's attention is in the category of inequality.
5. The majority (79.6%) of the patients states that the physical evidence of service is in the category of inequality.
6. Less than half (42.9%) of the patients expressed satisfaction with the services provided them were in the satisfactory quality category.

Bivariate analysis

Based on statistical tests with Chi-Square, there is a relationship between the reliability of the officer with the level of patient satisfaction at H. Hanafie Muara Bungo Hospital with $p=0.001$ (p -value of <0.05). There is a meaningful association between the responders with the patient satisfaction rate with $p=0.028$ (p -value <0.05). There is a meaningful relationship between the assurance officer and the satisfaction level with $p=0.028$ (p -value of <0.05). There is a meaningful relationship between the reliability of the officer and the patient satisfaction rate $p=0.015$ (p -value of <0.05). Moreover, there is a positive relationship between the reliability of the officer with the level of satisfaction of the patient with $p=0.012$ (p -value of <0.05) (Table 1).

Discussion

The quality of good health services is the expectation of service users, including reliability which is an ability to provide services immediately, accurately (and accurately), with satisfactory level, as well as responsiveness are needed, as they must be polite and must master their skills given, have attention (empathy), good communication, understand the needs, listen to patient complaints. These must be supported by attractive and fun physical facilities in providing services and carrying out activities according to a set schedule, so as to provide satisfaction to patients. Health system responsiveness has been recognized as one of the fundamental aims of health care systems.³ Responsiveness accounts to a system's capability to respond to the legitimate expectations of potential users about non health enhancing characteristics of care⁴ and it is the way in which individuals are treated and the environment in which they are treated, taking into account the experience of each individual related with the health system.⁵ The results of this study are also in accordance with research conducted by Respati in 2014⁶ about the relationship between the quality of health services and the level of satisfaction of inpatients at the Halmahera Public Health Center in Semarang, which shows a relationship between the dimensions of responsiveness and patient satisfaction, lack of clarity of information provided and the delay in providing officials service will cause dissatisfaction of the patient. Therefore, health workers must have a responsive attitude and have a willingness to help and provide services that are fast (responsive). The results of research conducted by Sri Mulyanti⁷ found a significant relationship between health care workers' guarantees with the level of patient satisfaction at UPTD West Sumatra Health Laboratory. Winardi⁸ concluded that a good guarantee is associated with increased patient satisfaction and

Table 1 Bivariate analysis of relationship quality of health services with satisfaction of patients in H. Hanafie Muara Bungo Hospital in 2019.

	Patient satisfaction level						p-value
	Satisfied		Not satisfied		Amount		
	F	%	F	%	F	%	
Reliability							
No quality	12	30.8	27	69.2	39	100	0.001
Have quality	9	90	1	10	10	100	
Total	21	42.9	28	57.1	49	100	
Responsiveness							
No quality	14	35	26	65	40	100	0.028
Have quality	7	77.8	2	22.2	9	100	
Total	21	42.9	28	57.1	49	100	
Assurance							
No quality	14	35	26	65	40	100	0.028
Have quality	7	77.8	2	22.2	9	100	
Total	21	42.9	28	57.1	49	100	
Attention							
No quality	14	34.1	27	65.9	41	100	0.015
Have quality	7	87.5	1	12.5	8	100	
Total	21	42.9	28	57.1	49	100	
Physical evidence							
No quality	13	33.3	26	66.7	39	100	0.012
Have quality	8	80	2	20	10	100	
Total	21	42.9	28	57.1	49	100	

patient loyalty. The results of this study are in line with the research of Puspitasari and Edris⁹ regarding patient satisfaction and concluded that the variable of attention is a very dominant influence on patient satisfaction. Physical evidence, namely the availability of physical facilities and infrastructure as well as environmental conditions act as tangible evidence of the services provided. Good physical evidence in health services is very much needed to attract customers. Manengkei¹⁰ concludes that physical evidence is significantly related to patient satisfaction.

Thus, improvements in responsiveness is necessary for the development of better health system to increase the quality of basic amenities. However, these implications are tentative and require further investigations.

Conflict of interest

The authors declare no conflict of interest.

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ORIGINAL RESEARCH:
EMPIRICAL RESEARCH - QUANTITATIVE

Factors influencing nurse-assessed quality nursing care: A cross-sectional study in hospitals

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Abstract

Aim: To propose a hypothesized theoretical model and apply it to examine the structural relationships among work environment, patient-to-nurse ratio, job satisfaction, burnout, intention to leave and quality nursing care.

Background: Improving quality nursing care is a first consideration in nursing management globally. A better understanding of factors influencing quality nursing care can help hospital administrators implement effective programmes to improve quality of services. Although certain bivariate correlations have been found between selected factors and quality nursing care in different study models, no studies have examined the relationships among work environment, patient-to-nurse ratio, job satisfaction, burnout, intention to leave and quality nursing care in a more comprehensive theoretical model.

Design: A cross-sectional survey.

Methods: The questionnaires were collected from 510 Chinese nurses in four Chinese tertiary hospitals in January 2015. The validity and internal consistency reliability of research instruments were evaluated. Structural equation modelling was used to test a theoretical model.

Results: The findings revealed that the data supported the theoretical model. Work environment had a large total effect size on quality nursing care. Burnout largely and directly influenced quality nursing care, which was followed by work environment and patient-to-nurse ratio. Job satisfaction indirectly affected quality nursing care through burnout.

Conclusions: This study shows how work environment past burnout and job satisfaction influences quality nursing care. Apart from nurses' work conditions of work environment and patient-to-nurse ratio, hospital administrators should pay more attention to nurse outcomes of job satisfaction and burnout when designing intervention programmes to improve quality nursing care.

KEYWORDS

burnout, intention to leave, job satisfaction, nurse, patient-to-nurse ratio, quality nursing care, structural equation modelling, work environment

1 | INTRODUCTION

Improving quality of healthcare services is an international priority in healthcare systems (Kutney-Lee, Wu, Sloane, & Aiken, 2013). Ensuring quality nursing care has become the core consideration in nursing administration, because it is important for improving patients' health and well-being (Dai, 2015). Registered nurses' self-assessment of quality nursing care was determined to be an important method to improve healthcare quality (Cline, Rosenberg, Kovner, & Brewer, 2011). This is because nurses assessing quality nursing care by themselves can help nurses to understand the components that are required for quality nursing service, which is desired by patients (Ding & Jiang, 2013).

Nurse-assessed quality nursing care (NAQNC) is defined as "nurses' perception about the degree of excellence on the standard nursing services they provide with their expectation to meet patients' needs and to satisfy patients' demands" (Liu, 2014 p.8). The international survey of Aiken et al. (2011) project revealed that 68%, 60%, 30% and 20% of hospital nurses in South Korea, Japan, China and Germany reported NAQNC as poor or fair respectively. Additionally, several studies have shown that poor NAQNC can significantly increase negative patient outcomes, such as patient injury (Sochalski, 2001), nosocomial infections (Lucero, 2008), medication errors (Sochalski, 2001), falls (Lucero, 2008) and failure to rescue (McHugh & Stimpfel, 2012). Furthermore, poor NAQNC was related to increased patients' length of stay (Lucero, 2008) and mortality rate (McHugh & Stimpfel, 2012). These evidences confirmed it is important and essential to study NAQNC. Moreover, if researchers can explore which kinds of factors significantly influenced NAQNC, it will further help hospital administrators to design effective intervention programmes to improve their services' quality.

Nurse Work Environment, Nurse Staffing and Outcome Model, for which the abbreviation of NWE-NS-OM is used for the purpose of this study, has been internationally used in nursing research to guide healthcare outcome research (Aiken, 2002). This model revealed that nurses' work environment and patient-to-nurse ratio significantly influenced nurse outcomes, which is defined as nurses' reactions to their work (Hinto, Partanen, & Vehviläinen-Julkunen, 2012). Aiken (2002) asserted that nurse outcomes include job satisfaction, burnout, intention to leave and NAQNC. While the nurse outcomes of job satisfaction, burnout and intention to leave are related to nurses' emotional response, NAQNC is related to nurses' perception of the behavioural result of nursing care. Kaur, Sambasivan, and Kumar (2013) stated that the nurses' ability to control their emotions was very important to their caring behaviours. However, in NWE-NS-OM, there were no explanations on how nurse outcomes related to their emotions, such as job satisfaction, burnout and intention to leave influenced NAQNC. Although previous studies have showed bivariate relationships among patient-to-nurse ratio, work environment, job satisfaction, intention to leave, burnout and NAQNC, the structural relationships among these factors and NAQNC have not been

Why is this research needed?

- Ensuring quality of nursing service is a priority consideration by nursing administrators globally.
- A theoretical model can provide a comprehensive understanding of the structural relationships among influencing factors and nurse-assessed quality nursing care.
- To examine the structural relationships among work environment, patient-to-nurse ratio, job satisfaction, burnout and intention to leave and nurse-assessed quality nursing care, which have not been previously studied.

What are the key findings?

- Work environment had the highest total effect on nurse-assessed quality nursing care with large effect size, which is followed by large total effect of burnout, medium total effect of job satisfaction and small total effect of patient-to-nurse ratio.
- Patient-to-nurse ratio only had a small direct effect on nurse-assessed quality nursing care.
- Nurses' burnout was the factor with the highest direct influence on quality nursing care with a large effect size. Nurses' job satisfaction was found to have the highest indirect influence on nurse-assessed quality nursing care through burnout with a medium effect size.

How should the findings be used to influence policy and practice?

- Hospital administrators should learn from the successful hospital management experiences of magnet hospitals to provide healthy work environments.
- Hospital administrators should figure out the appropriate patient-to-nurse ratio in contemporary hospitals' working environment.
- Hospital administrators should consider strategies or programmes that reduce burnout and increase job satisfaction in clinical settings to give benefits for improving quality nursing care.

studied yet. Additionally, most of models did not study indirect effects of these factors on NAQNC. When nurses work in the clinical setting, these factors interrelated with each other to influence how nurses perform their work. The relationships among factors that determine NAQNC are complex. Thus, to comprehensively understand the phenomena of factors influencing NAQNC, it is necessary to establish a hypothesized theoretical model and apply it to examine the structural relationships between selected factors and NAQNC.

1.1 | Background

According to the model of NWE-NS-OM (Aiken, 2002), good nurses' work environment is an important factor increasing job satisfaction and NAQNC and reducing burnout and intention to leave. Nurses' work environment is referred to as the organizational characteristic that supports nurses to deliver nursing care (Hoffart & Woods, 1996). Through the 1980s, the magnet hospitals' characteristics were explored to better understand which kinds of work environment can retain and attract nurses in practice (McClure, Poulin, Sovie, & Wandelt, 1983). Additionally, since the 1990s, providing quality patient care has been firstly considered in all healthcare organizations (Erith-Toth & Spencer, 1991). Furthermore, in the nursing context, a good nurses' work environment has been found to significantly increase quality nursing care (You et al., 2013), nurses' competency (Numminen et al., 2016) and job satisfaction (Lacher, De Geest, Denhaerynck, Trede, & Ausserhofer, 2015). When nurses work in a good work environment, they will feel less burnout and do not want to leave their jobs (Numminen et al., 2016).

Nurses' job satisfaction is referred to as: "nurses' positive feelings in response to the work conditions that support their desired needs as the result of their evaluation of the value or equity in their work experience" (Liu, Aunguroch, & Yunibhand, 2016b, p. 87). The causes of nurses' job satisfaction have been found to be related to several factors, such as work environment (Van Bogaert, Clarke, Vermeyen, Meulemans, & Heyning, 2009), transformational leadership (Andrews, Richard, Robinson, Celano, & Hallaron, 2012), structural empowerment (Casey, Saunders, & O'Hara, 2010), social or organization support (Kwak, Chung, Xu, & Eun-Jung, 2010), autonomy (Duffield, Roche, O'Brien-Pallas, Catling-Paull, & King, 2009) and nurse staffing (Aiken et al., 2012). Additionally, through reviewing previous studies, it also was found that when nurses feel satisfied with their work, they will show good job performance (Kounenou, Aikaterini, & Georgia, 2011) and increased quality of their services (Kwak et al., 2010; MacDavitt, 2008). Moreover, when nurses were satisfied with their job, they experienced less burnout (Khamisa, Peltzer, Illic, & Oldenburg, 2016), did not consider about leaving their job (Liu et al., 2012) and preferred to stay at their current work place (Larrabee et al., 2010).

Nurses' burnout is referred to as the syndrome of feelings including reduced personal accomplishment, depersonalization and emotional exhaustion that nurses experienced during their work (Maslach, Jackson, & Leiter, 1996). In a nursing context, the cause of burnout may result from inadequate staffing (Rafferty et al., 2007), experiencing higher stressors (Wang, Liu, & Wang, 2015), higher work load and long work shift (Pienaar & Bester, 2011), poor work environment (Van Bogaert et al., 2009), or lack of support (Khamisa et al., 2016). Additionally, when nurses experienced higher burnout, it has been found to be related to several negative outcomes, such as decrease in NAQNC (Poghosyan, Clarke, Finlayson, & Aiken, 2010) and increase in nurses' intention to leave (Tan, Zou, Liu, & Hu, 2014).

Intention to leave is nurses' opinions or perception of voluntarily leaving their current jobs (Hinshaw & Atwood, 1985). Several factors

have been found to causes nurses' intention to leave their jobs, such as poor work environment (Choi, Cheung, & Pang, 2013), low patient-to-nurse ratio (Aiken et al., 2012), nurses' dissatisfied with jobs (Yurumezoglu & Kocaman, 2016) or nurses experiencing high burnout (Laschinger, Leiter, Day, & Gilin, 2009). In addition, MacDavitt (2008) found that when nurses intend to leave their jobs, NAQNC will decrease.

In the aforementioned empirical evidence, work environment significantly influenced job satisfaction, burnout and intention to leave and NAQNC. In addition, job satisfaction, burnout and intention to leave directly influenced NAQNC and had an interrelated influence on each other. Thus, we hypothesized that:

H1a) A positive work environment directly and positively influences NAQNC and job satisfaction but directly and negatively influences burnout and intention to leave.

H1b) A positive work environment indirectly and positively influences NAQNC but indirectly and negatively influences intention to leave through job satisfaction and burnout.

In the model NWE-NS-OM (Aiken, 2002), it also posited that higher patient-to-nurse ratio is another important factor increasing burnout and Intention to leave, while reducing job satisfaction and NAQNC. Patient-to-nurse ratio is defined as how many patients one nurse takes care of (Aiken, Clarke, & Sloane, 2002). Previous studies have revealed that the patient-to-nurse ratio negatively influence NAQNC (You et al., 2013). Additionally, Aiken et al. (2012) revealed that when one nurse takes care of more patients, he or she may experience high burnout, would like to leave their jobs and were not satisfied with their jobs. Furthermore, as empirical evidence of bivariate relationships among job satisfaction, burnout and intention to leave has been described above, we further hypothesized that:

H2a) A higher patient-to-nurse ratio directly and negatively influences NAQNC and job satisfaction but directly and positively influences burnout and intention to leave.

H2b) A higher patient-to-nurse ratio indirectly and negatively influences NAQNC but indirectly and positively influences intention to leave through job satisfaction and burnout.

Last but not least, based on the aforementioned empirical evidence, we hypothesized that:

H3a) Job satisfaction directly and positively influences NAQNC but directly and negatively influences burnout and intention to leave.

H3b) Job satisfaction indirectly and positively influences NAQNC but indirectly and negatively influences intention to leave through burnout.

H4a) Burnout directly and negatively influences NAQNC but directly and positively influences intention to leave.

H4b) Burnout indirectly and negatively influences NAQNC through intention to leave.

H5) Intention to leave directly and negatively influences NAQNC.

2 | THE STUDY

2.1 | Aim

The aim of this study was to test the hypothesized theoretical model and apply it to examine structural relationships among work environment, patient-to-nurse ratio, job satisfaction, burnout and intention to leave and NAQNC in Chinese tertiary general hospitals using structural equation modelling (SEM).

2.2 | Design

A cross-sectional survey design was employed.

2.3 | Sample and participants

In the SEM, the minimum ratio of 15 responses for each measured variable was suggested by Siddiqui (2013). Therefore, 345 participants was the minimum sample size given 23 measured variables in this theoretical model. However, based on Hair, Black, Babin, and Anderson (2010) suggestions, a sample size of 500 nurses is required, if one construct has less than three observed items. In this study, patient-to-nurse ratio was a one-item scale. Thus, 500 nurses were needed. Additionally, 10% of the estimated sample was added to offset the attrition of the sample. Hence, a sample size of 550 nurses was calculated to test the theoretical model. A multi-stage random sampling approach was used to select nurses from four tertiary general hospitals. First, out of six administration regions, four were simple randomly selected. The simple random sampling was used to select one hospital in selected administration regions. The proportional stratified random sampling was used to select individual nurses from each hospital. As the personnel should be accounted one by one, when the calculation identified the number of personnel as less than one, it was counted as one. Therefore, finally 566 nurses were selected for data collection. These nurses met the inclusion criteria of working at hospitals at least 3 months, holding Chinese Registered Nurse licenses, willing to participate in this research and providing direct nursing care to patients.

2.4 | Measurements

A Chinese version of the Practice Environment Scale (C-PES) was used to measure work environment. The C-PES was adapted, translated, back-translated and validated by Wang and Li (2011) from Lake's (2002) Practice Environment Scale of Nursing Work Index

(PES-NWI), which is a valid instrument used worldwide (Swiger et al., 2017). In Wang and Li (2011) study, the content validity was 0.94. The initial construct validity was tested by exploratory factor analysis (EFA). The internal consistency reliability was 0.91. It included five dimensions of nurse participation in hospital affairs; resource adequacy; collegial nurse-physician relations; nurse manager's ability, leadership and support of nurses; and nursing foundations for quality of care. It is a 4-point Likert Scale with 28 items. The scoring ranged from 1 = strongly disagree–4 = strongly agree.

Patient-to-nurse ratio was measured by the Nurse Staffing Form (NSF). It was a self-report questionnaire that asked nurses to report the average number of patients they took care of in each shift during the past 1 month, which was adapted by the principle investigator (PI) (Liu, 2014) from Aiken, Clarke, & Sloane, (2002) nurse staffing measurement. The predicative validity of Aiken's instrument was tested by nurse report (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002). The last 30 days were used instead of last shift due to the way Chinese hospitals' managers design nurses' working schedule in each month. It was applicable to ask nurses recall the average number of patients they used to take care in each shift during the past 1 month (Khumyu, 2002). The content validity of NSF was 0.83.

Job satisfaction was measured by the Chinese Nurse Job Satisfaction Scale (CNJSS). CNJSS was developed by the PI, which based on Herzberg's (1959) Two Factor Theory, Adams' (1973) Equity Theory and Vroom's (1964) Expectancy Theory. CNJSS includes the dimensions of administration, recognition and responsibility, salary and fringe benefits, work conditions, promotion and individual growth, interaction and family and work balance. It is a 5-point Likert scale with 34 items. The scoring ranges from 1 = fully dissatisfied–5 = fully satisfied (Liu, Aunguroch, & Yunibhand, 2016a). The Scale Content Validity Index (S-CVI/Ave) was 0.97. Initially, the construct validity was tested by the EFA. The internal consistency reliability was 0.93 among 302 Chinese RNs.

Burnout was measured by the Chinese version of Maslach Burnout Inventory Human Service Survey (C-MBI-HSS). C-MBI-HSS was translated, back-translated and validated by Li and Liu (2000) from MBI-HSS, which is based on Maslach's Burnout Theory (Maslach et al., 1996). The content validity for each item was more than 0.80. The internal consistency reliability of the total scale was .93. It included the dimensions of depersonalization, emotional exhaustion and personal accomplishment. It is a 7-point Likert scale with 22 items. The scoring ranges from 0 = none–6 = every day.

To measure intention to leave, the Chinese version of Anticipated Turnover Scale (C-ATS) was used. C-ATS was translated and back-translated by the PI (Liu, 2014) from the Anticipated Turnover Scale (Hinshaw & Atwood, 1985), which has been demonstrated to have validity and has been used worldwide (Barlow & Zangaro, 2010). The C-ATS was validated by S-CVI/Ave, which was 0.96. The internal consistency reliability was .81. It is a 7-point Likert scale with five items. The scoring ranges from 1 = agree strongly–7 = disagree strongly.

To measure NAQNC, the Chinese Nurse Assessed Quality of Nursing Care Scale (CNAQNCs) was used. CNAQNCs was

developed by the PI, which was based on Donabedian's structure, progress and outcome model (Donabedian, 1980). The S-CVI/Ave was .98. The construct validity of CNAQNCS was initially tested by EFA. The internal consistency reliability was 0.97. It includes dimensions of staff characteristic, human-orientated activities, task-orientated activities, precondition, physical environment and patient outcomes (Liu, 2014). It is a 5-point Likert scale with 38 items. The scoring ranges from 1 = strongly disagree–5 = strongly agree.

In this study, all study variables were measured by acceptable construct validity and reliability scales. The detail information is presented in this paper's result section under "the results of measurement models."

2.5 | Data collection procedure

A developed questionnaire was used for data collection, which was conducted between 1 and 30 January 2015. After completing the ethical review procedures, the process of data collection was as follows: First, the PI explained the purpose and scope of this study to research assistants in each hospital for getting the permission. Second, the PI explained the inclusion criteria and sampling technique to research assistants. Third, the research assistants and the PI went to each department and sent out the package of questionnaires to simple randomly selected nurses based on the number of nurses from each ward. Nurses returned the completed and sealed questionnaire to head nurses in each ward. Fourth, the research assistants and the PI collected questionnaires from head nurse. Out of 566 questionnaires, 537 of the questionnaires were completed and returned. The return rate was 94.88%.

2.6 | Ethical considerations

This research got the ethics approval from the researcher's institute, from the Ethical Review Committee for Research Involving Human Research Subjects, Health Sciences Group (ECCU) (No.098.1/57).

2.7 | Data analysis

In this study, all of the data were checked and cleaned up by the PI before data analysis. The univariate outlier of variables was tested by the Z score and using IBM SPSS version 22.0. Kline stated that $|Z| > 3.00$ indicates an outlier (Kline, 2011).

The characteristics of the participants were analysed by using IBM SPSS version 22.0. The descriptive statistics including percentage, frequency, mean and standard deviation (SD) were reported. Cronbach's alpha of internal consistency reliability scores for each scale was computed with SPSS version 22.0 and scores of greater than 0.8 revealed a good reliability (Polit & Beck, 2012).

Factor structure of each scale was evaluated through Confirmatory Factor Analysis (CFA) using the LISREL 8.72 program. The assumptions of normality, linearity and multicollinearity were tested before conducting CFA. The robust maximum likelihood estimation method was used for no normality distribution data. Moreover,

statistic criteria of goodness-of-fit for CFA included chi-square ($\chi^2/df < 2$, p -value $> .05$, Normed Fit Index (NFI) > 0.90 , Goodness of Fit Index (GFI) > 0.90 , Adjusted Goodness of Fit Index (AGFI) > 0.80 , Root Mean Square Error of Approximation (RMSEA) < 0.07 and Standardized Root Mean Residual (SRMR) < 0.08 (Hair et al., 2010).

The LISREL 8.72 program was also used for analysing the structural relationships among studying variables for the theoretical model. The assumptions of normality, linearity, homoscedasticity and multicollinearity were tested before running model. When participants are more than 500, $\chi^2/df < 3$, p -value $> .05$, SRMR < 0.08 , RMSEA < 0.07 , NFI > 0.90 , GFI > 0.90 and AGFI > 0.80 were set up as the criteria to test the model fit (Hair et al., 2010). Additionally, when the observed variables violated the assumption of multivariate normality, the Generalized Least Squares (GLS) estimation method was used for testing SEM (Hair et al., 2010). In this theoretical model, there are existing multiple testing hypotheses. To avoid Type I error, the false discovery rates (FDR) was used to adjust all p -values of hypotheses to set up the appropriate significance level in this study (Benjamini & Hochberg, 1995). Once it was determined that the researcher's data supported the theoretical model, path coefficients and squared multivariate correlation coefficients (R^2) were estimated for factors influencing NAQNC.

3 | RESULTS

3.1 | Participant characteristics

After deleting 27 univariate outliers from 537 completed cases, 510 self-reported questionnaires without missing data were used for data analysis to ensure the data were of good quality. The age of nurses ranged from 21 to 54 with the mean of 31.19 (SD 6.32). More than half of the nurses were married (61.96%) and got a bachelor's degree (62.94%). The details of nurses' demographic information are presented in Table 1.

3.2 | The results of measurement models

Construct validity of each scale was tested through CFA before running the theoretical model. All of the scales got perfect goodness-of-fit indicators, which are presented in Table 2. In addition, scales have good reliability indicated by Cronbach's alpha coefficients (Table 2).

3.3 | The results of hypothesis model

The mean, SD and the correlations between variables are shown in Table 3. The initial modified theoretical model obtained the goodness-of-fit ($\chi^2 = 120.92$, $df = 108$, $\chi^2/df = 1.12$, p -value = .19, AGFI = 0.96, GFI = 0.99, NFI = 0.92, RMSEA = 0.02 and SRMR = 0.03). Based on Benjamini and Hochberg (1995) method, the p -values of initial modified goodness-of-fit theoretical model's paths related to all hypotheses were used to set up the significance level of this study (Cribbie, 2007), which was equal to adjusted all p -values less than .026. To make the theoretical model more parsimonious, the paths that did not meet statistical significance

TABLE 1 Participants' demographic characteristics

Characteristics	Frequency	Percentage
Age (years)		
≥50	4	0.78
40–49	59	11.57
30–39	187	36.67
20–29	260	50.98
Gender		
Female	506	99.22
Male	4	0.78
Marital status		
Married	316	61.96
Never married	191	37.45
Divorced	3	0.59
Education		
Master's degree	6	1.18
Bachelor's degree	321	62.94
Associate degree	156	30.59
Secondary technical	27	5.29
Work departments		
Surgical	157	30.78
Medical	187	36.67
OBGYN	40	7.84
Paediatric	24	4.71
EENT	22	4.31
ER	19	3.73
ICU	61	11.96
Work experience		
>30 years	2	0.39
26–30 years	9	1.76
21–25 years	41	8.04
16–20 years	48	9.41
11–15 years	51	10.00
6–10 years	162	31.77
≤5 years	197	38.63
Employment status		
Contract	388	76.08
Permanent	122	23.92

OBGYN, gynaecology and obstetrics; EENT, eye, ear, nose and throat; ER, emergency room; ICU, intensive care unit.

($p < .026$) were independently removed from the model. The model's goodness-of-fit indicators after each insignificant path removal are presented in Table 4. After seven insignificant paths were removed, all significant standardized path coefficients are showed in Figure 1. The goodness-of-fit indicators of the final theoretical model were $\chi^2 = 134.77$, $df = 115$, $\chi^2/df = 1.17$, $p\text{-value} = .10$, AGFI = 0.96, GFI = 0.98, NFI = 0.92, RMSEA = 0.02 and SRMR = 0.03. The predictors accounted for total 68.4% of the variance to explain the influencing of NAQNC.

The results revealed that work environment directly influenced job satisfaction ($\beta = 0.85$, $p < .001$), intention to leave ($\beta = -0.24$, $p < .001$) and NAQNC ($\beta = 0.41$, $p < .001$). In addition, work environment indirectly influenced NAQNC ($\beta = 0.30$, $p < .001$) through job satisfaction and burnout. The total effect of work environment on NAQNC was 0.71 ($p < .001$). It also was found that work environment indirectly influenced intention to leave ($\beta = -0.25$, $p < .001$) through job satisfaction and burnout. The total effect of work environment on intention to leave was -0.49 ($p < .001$). Therefore, H1a was partially supported and H1b was supported. Patient-to-nurse ratio ($\beta = -0.10$, $p < .01$) only directly influenced NAQNC. Therefore, H2a was partially supported and H2b was rejected.

Job satisfaction directly influenced burnout ($\beta = -0.70$, $p < .001$). Additionally, job satisfaction was the factor that indirectly affected NAQNC ($\beta = 0.36$, $p < .001$) through burnout. Job satisfaction indirectly influenced intention to leave ($\beta = -0.29$, $p < .001$) through burnout. Thus, H3a was partially supported and H3b was supported.

Burnout was only directly influenced NAQNC ($\beta = -0.51$, $p < .001$) and intention to leave ($\beta = 0.42$, $p < .001$). Thus, H4a was supported, while H4b was rejected. As intention to leave did not significant influence NAQNC, H5 was not supported.

4 | DISCUSSION

The SEM results showed that the data support the hypothesized theoretical model. The final model explained the high variance of work environment, patient-to-nurse ratio, job satisfaction and burnout influencing NAQNC.

First, we found that work environment had a direct, medium and positive effect on NAQNC, a large and positive effect on job satisfaction and a small and negative effect on intention to leave (H1a). These pattern of influences were similar to the model of NWE-NS-OM (Aiken, 2002) and previous study (You et al., 2013). This may be a result from the good work environment that has adequate resources and supportive nurse managers, allows nurses to participate in hospital affairs, encourages good nursing service and formulates good nurse–physician relationships. Thus, nurses will be motivated to provide good nursing care services, feel satisfied with their jobs, cherish working at their current working place and not want to leave their job. Additionally, this high path coefficient between work environment and nurse job satisfaction was consistent with other Chinese studies (Li, 2013; Shao, 2016). Thus, nurse managers should pay attention to positive work environment to make nurses satisfied with their job. Moreover, we discovered that work environment indirectly and moderately influenced NAQNC through job satisfaction and burnout (H1b). This discovered new knowledge may result from when nurses work in a good work environment, which can fulfil nurses' desired needs, make nurses feel happy with their jobs and make nurse feel their jobs are valuable. These positive feelings make nurses satisfied with their jobs. In addition, when nurses are satisfied with their jobs, they may experience an

TABLE 2 Confirmatory factor analysis of measurement model and Cronbach's alpha coefficient of study instruments

Instruments	χ^2	df	χ^2/df	p-value	GFI	AGFI	NFI	RMSEA	SRMR	α
CNJSS	433.70	391	1.11	.07	0.93	0.95	0.99	0.02	0.05	0.94
CNAQNCS	550.63	498	1.10	.05	0.95	0.92	0.99	0.01	0.04	0.96
C-PES	299.97	265	1.13	.07	0.96	0.94	0.99	0.02	0.03	0.93
C-MBI-HSS	140.71	115	1.22	.05	0.98	0.95	0.98	0.02	0.05	0.83
C-ATS	3.10	3	1.04	.38	1.00	1.00	0.99	0.01	0.01	0.82

CNJSS, Chinese Nurse Job Satisfaction Scale; CNAQNCS, Chinese Nurse Assessed Quality of Nursing Care Scale; C-PES, Chinese version of the Practice Environment Scale; C-MBI-HSS, Chinese version of Maslach Burnout Inventory Human Service Survey; C-ATS, Chinese version of Anticipated Turnover Scale; AGFI, Adjusted Goodness of Fit Index; df, degree of freedom; GFI, Goodness of Fit Index; NFI, Normed Fit Index; RMSEA, Root Mean Square Error of Approximation; SRMR, Standardized Root Mean Residual; χ^2 , Chi-square.

TABLE 3 Mean, standard deviation and variable correlations

	M	SD	NAQNC	NWE	NJS	NB	NIL	PNR
NAQNC	4.26	0.43	1					
NWE	3.01	0.39	0.50**	1				
NJS	3.48	0.49	0.50**	.78**	1			
NB	1.92	0.82	-0.39**	-0.41**	-0.49**	1		
NIL	3.04	1.22	-0.34**	-0.47**	-0.50**	0.39**	1	
PNR	14.39	9.63	-0.11**	-0.11**	-0.06	-0.03	0.08*	1

NAQNC, nurse-assessed quality nursing care; NWE, nurse work environment; NJS, nurses' job satisfaction; NB, nurse burnout; NIL, nurses' intention to leave; PNR, patient-to-nurse ratio; M, mean; SD, standard deviation.

* $p < .05$, ** $p < .01$.

TABLE 4 Modified theoretical model: the removed path name and model goodness-of-fit indicators

Theoretical models	χ^2	df	χ^2/df	p-value	AGFI	GFI	NFI	RMSEA	SRMR
Initial	120.92	108	1.12	.19	0.96	0.99	0.92	0.02	0.03
Removed path from NWE to NB	121.33	109	1.11	.20	0.96	0.99	0.92	0.02	0.03
Removed path from NJS to NAQNC	125.60	110	1.14	.15	0.96	0.99	0.92	0.02	0.03
Removed path from NJS to NIL	125.27	111	1.13	.17	0.96	0.99	0.92	0.02	0.03
Removed path from NIL to NAQNC	129.61	112	1.16	.12	0.96	0.98	0.92	0.02	0.03
Removed path from PNR to NJS	130.71	113	1.16	.12	0.96	0.98	0.92	0.02	0.03
Removed path from PNR to NB	131.68	114	1.16	.12	0.96	0.98	0.92	0.02	0.03
Removed path from PNR to NIL	134.77	115	1.17	.10	0.96	0.98	0.92	0.02	0.03

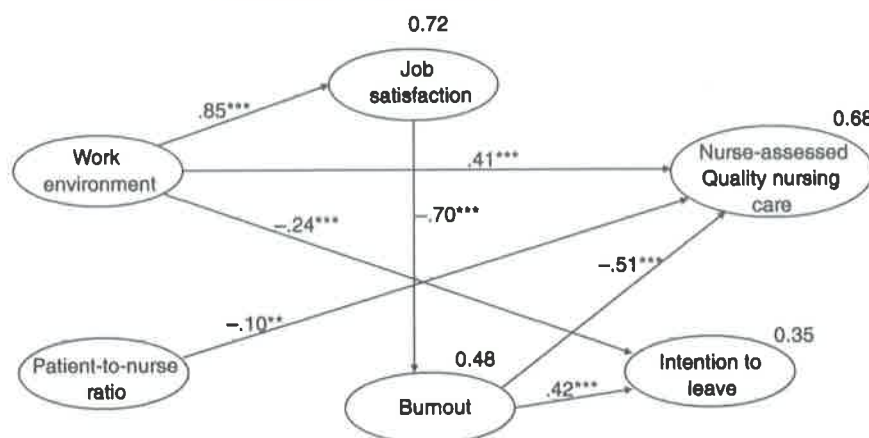
NWE, nurse work environment; NB, nurse burnout; NJS, nurse job satisfaction; NAQNC, nurse-assessed quality nursing care; NIL, nurse intention to leave; PNR, patient-to-nurse ratio; χ^2 , Chi-square; df, degree of freedom; AGFI, Adjusted Goodness of Fit Index; GFI, Goodness of Fit Index; NFI, Normed Fit Index; RMSEA, Root Mean Square Error of Approximation; SRMR, Standardized Root Mean Residual.

appropriate workload, receive good salary and get support from administrators. These benefits could highly reduce nurses' feelings of burnout. Finally, when nurses experience lower burnout, they may further provide good nursing services to patients. We also uncovered that work environment indirectly influenced intention to leave through burnout and job satisfaction with a large effect size (H1b).

Second, patient-to-nurse ratio was found to negatively and directly influence the NAQNC with a small effect size (H2a). This pattern of influence was similar to the model of NWE-NS-OM (Aiken, 2002) and previous studies (Aiken et al., 2012). The possible reason was that nurses can spend more time with one patient if they take care of fewer patients. Therefore, the lower patient-to-nurse

ratio related to a good achievement of nursing services that patients received. However, patient-to-nurse ratio was not related to job satisfaction, burnout and intention to leave in this study, which was inconsistent with the model of NWE-NS-OM (Aiken, 2002). Thus, the indirect effect of patient-to-nurse ratio on NAQNC was not identified (H2b). Other nurse staffing indicators, such as nursing working hours per patient day, skill mix or Registered Nurses staff qualifications may be considered for using to explore significant effects in further study.

Third, this study revealed that job satisfaction largely, directly and negatively influenced burnout (H3a). This pattern of influence was similar to Chen's (2005) and Meng's (2005) studies' results.



Chi-square = 134.77, $df = 115$, $p\text{-value} = .10$, RMSEA = .02

** $p < .01$, *** $p < .001$

FIGURE 1 Final modified theoretical model of factors influencing nurse-assessed quality nursing care. The variance explained for each endogenous variable is presented above the study variables. For instance, 0.68 is interpreted that the factors accounted for total 68% of the variance to explain the influence of nurse-assessed quality nursing care

Thus, nurse managers should pay attention to ensure that nurses are satisfied with their job. This is because when nurses were not satisfied with their jobs, they will experience emotional exhaustion, depression or lower personal achievement. This syndrome will further reduce their effective work performance and services' quality. Additionally, we discovered that job satisfaction indirectly and moderately affected NAQNC through burnout (H3b). This is different from MacDavitt (2008) study, which stated that job satisfaction directly and positively influenced NAQNC. This may be related to Chinese nurses higher professional role. Although sometimes they were not satisfied with their jobs, they have responsibility to provide good care to patients. This discovery extended our new knowledge on the indirect effect of job satisfaction on NAQNC through burnout with medium effect size in complex clinical settings. Thus, the improvement of nurses' job satisfaction result in reducing nurses' burnout was a good strategy for increasing quality of nursing services. We also uncovered that job satisfaction only had a small and indirect effect on intention to leave through burnout (H3b), which sensitized nursing administrators to preferentially consider nurses' burnout to stabilize the nursing workforce.

Fourth, we also found that burnout largely, directly and negatively influenced NAQNC (H4a). This pattern of influence is consistent with MacDavitt's (2008) and Poghosyan et al.'s (2010) studies. Basar and Basim (2016) also found that nurses' burnout was related to neglect of work. A possible reason is that when nurses experience higher burnout, the components of personal accomplishment will decrease, while emotional exhaustion and depersonalization will increase. The emotional exhaustion was referred to as nurses being emotionally overextended and drained by others (Maslach et al., 1996). The nature of nursing work requires nurses to put both physical and psychological endeavours on it. When nurses experienced higher emotional exhaustion, their abilities may fall short to provide good nursing services. The depersonalization was referred to as the syndrome of a cruel disregard towards patients' treatments, care, services or instructions (Maslach et al., 1996). When nurses

experience higher depersonalization, it is related to patients getting bad nursing care. Moreover, personal accomplishment is referred to as nurses' feelings of their competence and achievement in their services (Maslach et al., 1996). When nurses experience lower personal accomplishment, they may have low competence or achievement to provide nursing care. As burnout had a high path coefficient value direct effects on NAQNC, when designing an intervention programme, increasing feelings of achievement and reduced feelings of emotional exhaustion or depersonalization should be considered to increase nurses' service quality. In addition, burnout positively and moderately affected intention to leave (H4a). This finding was congruent with previous study (Bartram, Casimir, Djurkovic, Leggat, & Stanton, 2012). A possible reason is that higher physical efforts were required to provide patients' care. Moreover, although nurses spend more time on nursing services, society does not value nurses' work as much as that of physicians. Thus, these psychological and physical pressures may make nurses want to leave their jobs. In this model, as the intention to leave was not found to significantly influence NAQNC, the indirect effect of burnout on NAQNC through intention to leave was not found (H4b).

Finally, this study did not find nurses' intention to leave significantly influenced NAQNC (H5), which was inconsistent with MacDavitt (2008) research findings. However, this result was consistent with Ma, Lee, Yang, and Chang's (2009) study result. This may result from three levels of quality control procedures that have been generally implemented in Chinese tertiary hospitals. Although nurses did not want to stay in their work place, they have to abide by the regulations to provide good service to patients.

4.1 | Limitations

Although the advantage of SEM is that it can advance our understanding of the complex structural relationships among study variables and incorporate measurement error adjustments into statistical analysis, there are still some limitations. First, self-reported

questionnaires may cause overestimation or underestimation of the value of study variables. However, validated instruments were used in this study. Thus, it is recommended to further validate this model with other larger representative samples. Second, the nature of cross-sectional design is limited with regard to reflecting the causalities of independent variables on the dependent variable. Thus, a longitudinal design is suggested for further study. Third, as the participants of this study were tertiary general hospitals' nurses, it may limit the application of the findings to primary or secondary hospitals. Thus, it is suggested to test this model in other levels of hospitals to increase the generalization of this model.

5 | CONCLUSIONS

Our data supported the theoretical model. This study confirmed the model of NWE-NS-OM that work environment and patient-to-nurse ratio can significantly influence NAQNC. Work environment also significantly increased job satisfaction and reduced intention to leave. This study provides new knowledge about work environment having a large total effect on NAQNC, which included direct effect and indirect effect through job satisfaction and burnout. Additionally, this study contributes to the new knowledge that burnout had a large direct influence on NAQNC, followed by a direct and medium influence of work environment and a direct and small influence of patient-to-nurse ratio. Moreover, this study extends our knowledge that nurses' job satisfaction indirectly influences NAQNC through burnout with medium effect. However, in the theoretical model, intention to leave was not found to influence NAQNC. Therefore, hospital administrators should learn from the experiences of the magnet hospitals in other countries about successful programmes for a healthy work environment and implement these programmes in Chinese hospitals. This is because on the one hand, these programmes can dependently increase NAQNC, increase job satisfaction, reduce burnout and reduce intention to leave. Additionally, the improvement of nurses' job satisfaction and reduction in nurses' burnout will further improve NAQNC, which will significantly enhance the power of healthy work environments to increase NAQNC. Furthermore, an appropriate patient-to-nurse ratio should be implemented by policy makers to increase NAQNC. Moreover, other strategies that can reduce nurses' burnout and increase nurses' job satisfaction should be implemented by hospital managers to improve NAQNC in further study.

CONFLICT OF INTEREST

There is no conflict of interest.

AUTHOR CONTRIBUTIONS

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (<http://www.icmje.org/recommendations/>)]:

1. substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data;
2. drafting the article or revising it critically for important intellectual content.

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Factors Associated with Patient Satisfaction of Community Mental Health Services: A Multilevel Approach

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Abstract

Community care is increasingly the mainstay of mental healthcare provision in many countries and patient satisfaction is an important barometer of quality of patient care. This paper explores the key factors associated with patient satisfaction with community mental health services in England and then compares providers' performance on patient satisfaction. Our analysis is based on patient-level responses from the community mental health survey, which is run annually by the Care Quality Commission (CQC) for the years 2010 to 2013. We perform a repeated cross-section analysis, identifying factors associated with patient satisfaction via a multi-level ordered probit model, including both patient- and provider-level variables. We identify hospital-specific effects via empirical Bayes estimation. Our analysis identifies a number of novel results. First, patient characteristics such as older age, being employed, and being able to work, are associated with higher satisfaction, while being female is associated with lower satisfaction. Service contact length, time since last visit, condition severity and admission to a mental health institution, are all associated with lower satisfaction. Second, treatment type affects satisfaction, with patients receiving talking therapies or being prescribed medications being more satisfied. Third, care continuity and involvement, as proxied by having a care plan, is associated with higher satisfaction. Fourth, seeing a health professional closer to the community improves satisfaction, with patients seeing a community-psychiatric nurse, a social worker or a mental-health support worker being more satisfied. Finally, our study identifies the need for service integration, with patients experiencing financial, accommodation, or physical health needs being less satisfied. At a provider level, we find a negative association between the percentage of occupied beds and satisfaction. We further identify significant provider-specific effects after accounting for observable differences in patient and provider characteristics which suggests significant differences in provider quality of care.

Keywords Community mental-health services · Patient satisfaction · Multi-level modelling · Ordered probit model

Introduction

Internationally the provision of mental health services saw a paradigm shift away from institutional models of care towards care being provided in the community (Heller 1989; World Health Organization 1990). Allowing patients to be closer to their communities aligns with the objective

of focusing on empowerment, involvement and recovery (Fitzsimons 2002; Tait and Lester 2005). Additionally, care in the community can help foster more integrated care (Frank and Kamlet 1989; Laugharne and Priebe 2006), reduced hospital time and an increased focus on patients' needs (William 1993).

Traditionally, community mental health services include aspects of both mental healthcare—such as treatment, crisis care and preventative care, and social care—such as day-to-day support around managing work, relationships, personal care, and housing—or any combination of the two (Burns 2004). Depending on the healthcare system, access to services generally requires the assessment of the care needs by an appropriate professional (Mind 2013). The attendance of those needs might include a variety of care professionals

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with care being performed in single episodes or via longer-term service contact in the community.

Patient satisfaction with services is generally considered a key component of quality of care (Cleary and McNeil 1988; Edlund et al. 2003). Patient satisfaction affects clinical outcomes, patient retention, and medical malpractice claims. It also affects the timely, efficient, and patient-centered delivery of care (Prakash 2010). It is therefore a vital measure for health services to monitor and is often included as an important indicator of quality of mental health services (Ruggeri et al. 2007). Variation in service delivery, along with differences in patients' needs, implies that patient satisfaction in community mental health might vary considerably across individuals and providers (Raleigh et al. 2007; Ruggeri et al. 2003).

This paper explores the determinants of patient satisfaction with community mental health services in England performing a multi-level repeated cross-section analysis of individual responses to the Care Quality Commission (CQC) community mental health survey for the years 2010 to 2013. The community mental health survey provides a national sample of the views of the national population of community mental health patients on care received. Our analysis explores the effect that patient characteristics and provider-specific variables might have on patient satisfaction. The multi-level structure of our dataset allows us to explore the presence of provider-specific effects.

Our paper makes a number of novel contributions. First our work adds to the still limited literature applying multi-level techniques to the analysis of patient satisfaction. Second, by estimating provider-specific effects, our analysis expands the current knowledge of the impact of unobservable factors such as the quality of hospital management, on patient satisfaction. Third, our work expands the body of literature by adopting a longitudinal analysis (repeated cross-sections) of patient satisfaction. Fourth, our analysis allows us to study patient satisfaction with care provided in the community. Lastly, the richness of our dataset allows us to focus on aspects which are beyond traditional care provision, such as exploring the role of patients' needs and the type of care professional in driving satisfaction.

Literature on Determinants of Patient Satisfaction in Mental Health Services

We explored the broader literature on the key determinants of patient satisfaction for mental health care, not just specifically community services, and identified four key areas as determinants of patient satisfaction, namely: (i) patient characteristics, (ii) access to services, (iii) the relationship with the care professional, and (iv) characteristics of services provided.

A summary of the specific elements included in these categories and their identified effect on patient satisfaction is reported in Table 1. The table shows the area of care to which studies refer (column 1), the specific factor identified by individual studies (column 2), and the sign of the factor's effect on patient satisfaction (column 3). As indicated, a variety of factors might affect patient satisfaction and these might depend on the study design.

We also examined the literature on methodological approaches used to identify the determinants of patient satisfaction. These saw a considerable development over time, with initial studies using correlation analysis and more recent ones using statistical techniques such as multivariate regression and factor analysis (Rosenheck et al. 1997; Sohn et al. 2014). Recent studies identified complex interactions between factors influencing patient satisfaction at both a patient and provider level using multi-level analysis (Bjorngaard et al. 2007). From a methodological perspective the vast majority of studies have used cross-sectional analysis, with only a minority of studies focusing on longitudinal data analysis (Ruggeri et al. 2004).

Data

We use patients' responses to the English community mental health survey for the years 2010 to 2013 (Care Quality Commission 2010a, b). The community mental health survey is a national survey run by the English hospital regulator the CQC to capture key aspects of patient experience with care, including overall satisfaction. With an average of 13,000 annual respondents and a 31.5% response rate, this survey measures the experience of a sample of the national population of community mental health service users in England (Care Quality Commission 2010a, b).¹ We focus on the years 2010 to 2013 as the surveys were comparable.

Each year all NHS Mental Health Trusts (hereafter referred to as hospitals)² which provide secondary mental health services, including community care, are requested by the CQC to take part in the survey. Each hospital is required to identify 850 eligible patients from their records.

¹ The technical documentation of the Community Mental Health Survey does not explicitly indicate whether the sample is representative of the service user population. While the number of responses is large and the response rate is in line with other national health surveys, it is not possible to completely rule out the presence of non-response bias. See <http://nhssurveys.org/wp-content/surveys/05-community-mental-health/03-instructions-guidance/2013/Survey%20guidance%20manual.pdf>.

² In reality NHS Mental Health Trusts (the legal entities) may comprise several different hospitals and may provide community services in many different localities, but for convenience we refer to these all as hospitals.

Table 1 Factors affecting patient satisfaction as identified in the literature

Key area	Specific factor	Identified effect
Patient characteristics	<i>Gender [female]</i>	+ Bjorngaard et al. (2007), Robillos et al. (2014) – Desai et al. (2005)
	<i>Age [older]</i>	+ Bjorngaard et al. (2007, 2012), Ford et al. (2013), Raleigh et al. (2007), Robillos et al. (2014) and Rosenheck et al. (1997) – Eytan et al. (2004)
	<i>Disability [none]</i>	+ Desai et al. (2005)
	<i>Disability/medical comorbidities</i>	– Holcomb et al. (1998) and Kilbourne et al. (2006)
	<i>Ethnicity [White]</i>	+ Swanson et al. (2007)
	<i>Ethnicity [non-White]</i>	– Boydell et al. (2012)
	<i>Social class [lower]</i>	– Boydell et al. (2012)
	<i>Relationship status [single]</i>	– Gigantesco et al. (2002)
	<i>Relationship status [married]</i>	+ Desai et al. (2005)
	<i>Social relationships/support</i>	+ Blenkiron and Hammill (2003) and Swanson et al. (2007)
	<i>Employment status [employed]</i>	+ (Holcomb et al. 1998) – Edlund et al. (2003) and Kilbourne et al. (2006)
	<i>Patient status: inpatient</i>	– Gigantesco et al. (2002)
	<i>Psychosis diagnosis</i>	– Boydell et al. (2012), Ford et al. (2013), Gebhardt et al. (2013) and Gigantesco et al. (2002)
	<i>Low psychiatric severity</i>	+ Bjorngaard et al. (2007)
	<i>Better subjective mental health/initial level of functioning</i>	+ Bjorngaard et al. (2007), Edlund et al. (2003), Ford et al. (2013), Holcomb et al. (1998), Robillos et al. (2014), Rosenheck et al. (1997) and Smith et al. (2014) – Ford et al. (2013), Gigantesco et al. (2002) and Raleigh et al. (2007)
Access to services	<i>Service convenience</i>	+ Robillos et al. (2014) and Sohn et al. (2014)
	<i>Waiting times</i>	– Robillos et al. (2014) and Swanson et al. (2007)
	<i>Lack of personal support to access</i>	– Kilbourne et al. (2006)
	<i>Involuntary admission</i>	– Strauss et al. (2003) and Smith et al. (2014)
	<i>Psychiatric referral</i>	+ Eytan et al. (2004)
	<i>Previous hospitalization</i>	+ Eytan et al. (2004) – Kilbourne et al. (2006) and Raleigh et al. (2007)
	<i>Readmission intensity</i>	– Druss et al. (1999) and Raleigh et al. (2007)
	<i>Contact length</i>	+ Rosenheck et al. (1997) – Gigantesco et al. (2002)
	<i>Previously refused medication</i>	– Strauss et al. (2003)

Table 1 (continued)

Key area	Specific factor	Identified effect
Relationship with care professional	Positive patient/care professional transactions	+ Baronet and Gerber (1997), Brunero et al. (2009), Pickett et al. (1995) and Smith et al. (2014)
	Therapist perceived as skilful	+ Pickett et al. (1995)
	<i>Team attitude</i>	+ Bjorngaard et al. (2007)
	Be listened to/respect for patients opinions	+ Baronet and Gerber (1997) and Pellegrin et al. (2001)
	Feeling safe and secure	+ Brunero et al. (2009)
	<i>Involvement</i>	+ Jorgensen et al. (2009), Sohn et al. (2014) and Swanson et al. (2007)
	Staff availability	+ Baronet and Gerber (1997), Robillos et al. (2014) and Sohn et al. (2014)
	<i>General support received</i>	+ Gebhardt et al. (2013) and Jorgensen et al. (2009)
	Quality of life	+ Blenkiron and Hammill (2003)
	<i>Financial strain</i>	– Kilbourne et al. (2006)
	Living alone	– Raleigh et al. (2007)
Characteristics of services provided	Support on discharge	+ Brunero et al. (2009)
	Perceived treatment quality	+ Edlund et al. (2003) and Sohn et al. (2014)
	<i>Perceived treatment benefit/helpfulness</i>	+ Brunero et al. (2009), Ford et al. (2013) and Pellegrin et al. (2001)
	Positive treatment outcome	+ Bjorngaard et al. (2007), Gebhardt et al. (2013), Holcomb et al. (1998), Robillos et al. (2014) and Smith et al. (2014)
	Pharmacologic disturbances	– Gebhardt et al. (2013)
	Location convenience	+ Pickett et al. (1995)
	Positive ward atmosphere/milieu	+ Jorgensen et al. (2009)
	Specialised facilities: mental health	– Rosenheck et al. (1997)
	<i>Larger facilities</i>	– Rosenheck et al. (1997)

A positive (negative) sign indicates that the study identified the factor as having a positive (negative) association with patient satisfaction. Italics factors identified in the literature were included in our model (see Table 2)

Eligibility requires patients to have received specialist care for a mental health condition and to be seen in the community during the sampling period.

Excluded patients, according to the 2010 eligibility criteria, were those seen only once for an assessment, patients receiving drug and alcohol, learning disability, or specialist forensic services, current inpatients, and patients who only see their GP for their mental health condition. Patients also needed to be at least 18 years old (16 years old prior to 2012).

Data used in this analysis were downloaded in raw format from the UK Data Archive (Care Quality Commission 2010a, b). Details of our data cleaning process are reported in the Appendix. With the exception of ethnicity variables, which are only reported at the hospital level, all data used in the analysis are unweighted by age and gender. To avoid potential bias from a high prevalence of specific population

groups in a given hospital, we control for both age and gender effects in the models.

Our analysis focused on questions which remained consistent across years. Similarly, we kept hospitals that participated in the survey in all years (52 out of 59). One further hospital was removed as hospital-level variables for that organisation were missing. This left us with 51 providers across all 4 years.

Dependent Variable and Covariates

Our dependent variable is overall satisfaction with care measured on a six-point scale from “Very Poor” to “Excellent” until 2012 and on a 10-point scale from 0 (“Very Poor”) to 10 (“Very Good”) in 2013. To ensure comparability of overall satisfaction across years, 2013 results were mapped into the previous years’ six-point scale with

1 indicating a “Very Poor” experience, and 6 indicating an “Excellent” experience.

To minimise potential bias in translating 2013 satisfaction responses on a 6 point scale, we created a 10-to-6 mapping that minimised the distance to the average satisfaction score for the years 2010 to 2012. We aimed to reproduce a 2013 satisfaction score which on average looked like the previous 3 years. Two alternative approximations of 2013 satisfaction were computed, with mapping 2 being slightly more conservative on high scores compared to mapping 1.³ We used the first mapping as the base case for our analysis and the second mapping for sensitivity analysis (cfr Overall Satisfaction Mapping in the Appendix). To check for potential bias introduced by this mapping, we estimated a version of the model excluding 2013 observations (not reported).

We sought to cover as many of the factors under each of the four key areas identified in the literature (Table 1) as potential covariates in the model. The included factors are in italics in Table 1. Of the patient characteristics reported in Table 1 our analysis included gender, age and employment status. Gender was coded as a dummy variable with one indicating female. Age was captured by the survey in four different bands (under 35, 36–50, 51–65, over 65). Employment variables were registered in the survey as a “tick all that apply” option. We used dummy variables for employed, student, and voluntary work. Dummies for “retired” and “unemployed” were removed as they were correlated with age and ethnicity respectively.

A dummy variable was also used to indicate a patient’s ability to work, with one indicating being able to work. Self-reported mental health was coded on a scale from 1 to 6, with 1 indicating a “Very Poor” and 6 indicating an “Excellent” mental health status.

Of the access variables, listed in Table 1, we included length of contact with services and time passed since last contact. The former was coded on a 0 to 3 scale, with 0 indicating “less than 1 year”, 1 indicating “1 to 5 years”, 2 indicating “6 to 10 years” and 3 indicating “more than 10 years”. The other contact with services variable was coded on a 0 to 4 scale with 0 indicating “in the last month”, 1 indicating “1–3 months ago”, 2 indicating “4–6 months ago”, 3 indicating “7–12 months ago” and 4 indicating “more than 12 months ago”. A dummy variable indicating admission to a hospital for a mental health condition in the last 12 months was used as an indicator of previous hospital admissions.

Of the characteristics of services provided type variables listed in Table 1, we included dummies indicating whether

patients received prescribed medications or talking therapies. We considered these variables as proxies for perceived treatment benefit.

Of the relationship with care professional variables in Table 1, we included dummies indicating respondents’ having a care plan as a proxy of involvement, and the support received on physical, accommodation and financial needs as proxies for general support received and financial strain.

In addition we included dummies to indicate the type of care professional the patient last interacted with. These included community psychiatric nurse, social worker, psychiatrist, mental health support worker, occupational therapist, and an ‘other’ care professional category.

We also included a number of hospital-level characteristics. Among patient characteristics reported in Table 1, we included the hospitals’ ethnicity composition of survey respondents, allowing us to account for potential lower satisfaction experienced by minority ethnic groups (Boydell et al. 2012; Ford et al. 2013). Ethnicity data was only available as a hospital-level aggregate weighted by age and gender.

Among the service characteristics listed in Table 1, we accounted for hospital size (Rosenheck et al. 1997) by including the total number of full time equivalent staff (medical and non-medical) as obtained from the NHS workforce statistics. This variable has been aggregated to an annual level from monthly data. Logs were taken to avoid scaling issues. The percentage of utilised hospital beds was also included as a proxy for service efficiency.

We included the percentage of hospital staff members reporting experiencing work-related stress in the last 12 months to account for potential effects of work-related stress on patient satisfaction. Stress level statistics were obtained from the NHS Staff Survey (Care Quality Commission 2010b). We interpreted this variable as influencing team attitudes from Table 1.

In addition to factors identified in the literature, we accounted for other factors affecting hospitals’ care delivery by incorporating the mental health reference cost index (MHRCI). MHRCI measures the actual cost of a hospital’s casemix compared to the national average casemix. We interpret MHRCI as an efficiency measure potentially affecting care delivery. MHRCI was the only hospital-level indicator that was not time-varying.

We then included a number of dummies to indicate which hospitals have Foundation Trust status, a measure of greater autonomy given to better performing providers. We also included year and commissioning region dummies. Our analysis aimed to include population deprivation, however this measure ended-up being collinear with ethnicity variables, therefore we removed it from the analysis. To ensure consistency across estimated models, we kept observations with no missing data across the various model specifications we ran. Our final dataset had 28,288 observations.

³ Mapping 1 was: ((10, 9)→6, (8, 7)→5, (6, 5)→4, (4, 3)→3, (2, 1)→2, (0)→1).

Mapping 2 was: ((10)→6, (9, 8)→5, (7, 6)→4, (5, 4)→3, (3, 2)→2, (1, 0)→1).

Methodology

Modelling of Determinants

We used a multi-level ordered probit model to estimate the probability of a given patient being assigned a specific satisfaction score, conditional on a set of confounders. We selected the probit model as it is the standard reference econometric specification to be used when modelling binary dependent variables. This approach models the inverse standard normal distribution of the dependent variable as a function of its covariates, via an underlying latent class model.

Contrary to ordinary least squares, probit models allows one to have estimated probabilities strictly between 0 and 1 (Wooldridge 2010, Chap. 17). Our analyses are based on a repeated cross-section of survey data across single years.

Our model can be written as:

$$Y_{ijt} = m \quad \text{if } k_{m-1} < y_{ijt} \leq k_m, \quad m = 1, \dots, 6. \quad (1)$$

Our threshold values are unknown and therefore they are estimated from the data (Wooldridge 2010). This threshold model relates the ordinal outcome to an unobservable underlying variable indicating patients' overall satisfaction with the care they received. We assume this underlying latent variable to be continuous. What we observe is patient-reported overall satisfaction with care which we code as an ordered variable.

The latent satisfaction with care y_{ijt} can then be described by the following equation:

$$y_{ijt} = \beta_1 x'_{1,ijt} + \beta_2 x'_{2,ijt} + u_j + e_{ijt}, \quad (2)$$

where $x'_{1,ijt}$ represents patient characteristics, $x'_{2,ijt}$ represents hospital-level variables, u_j represents a hospital-specific random term, and e_{ijt} is a normally distributed error term with mean 0 and variance σ^2 . We use the index i to refer to patients, and j to refer to hospitals.

We checked for collinearity among our covariates by computing Pearson correlations and by running factor analysis. Collinear variables were removed from the analysis. Survey questions with a high number of missing values were also removed.

We ran three different models. Models M0–2 represent alternative multilevel ordered probit models. Model M0 is a reference empty model including only year- and region-specific dummy variables. Model M1 allows for patient-specific characteristics. Model M2 allows for patient- and hospital-specific characteristics.

We provide an interpretation of the estimated coefficients of the ordered probit model by computing the increase in probability of observing an at least “Good” evaluation of overall satisfaction following a unitary increase in our explanatory variables (Greene 2002). Our marginal effects are computed at the average value of other explanatory variables.

We estimate the multilevel categorical probit model using the *clmm* function of the R package ORDINAL (Christensen 2011). The ordinal package allows us to estimate cumulative link (mixed) models via maximum likelihood. Mixed models are fitted with the Laplace approximation and adaptive Gauss-Hermite quadrature.

Sensitivity Analysis

We ran a number of alternative models to check for model robustness. Our alternative models included a linear model, a simplified probit model collapsing satisfaction results into two categories (an “Excellent” and “Very Good” category, versus all other responses), a multilevel ordered probit model including a varying slope in the number of full time equivalent staff to test whether hospitals are affected differently by variations in staff numbers. To check for any bias in our transformation of patient satisfaction in 2013 we estimated a multilevel ordered probit model including data for the years 2010 to 2012 only.

Analysis of Variance and Hospital Performance Comparison

We compare the estimated effect that individual hospitals have on the unobserved underlying patient satisfaction using Empirical Bayes techniques (Skrondal and Rabe-Heskett 2009). Empirical Bayes predictions are obtained using the prior distribution of a single hospitals' random effects combined with the likelihood of obtaining the posterior distribution of the random effects given the observed response variables. Empirical Bayes estimates allow us to order hospitals by their base effect on patient satisfaction while all other confounders have been accounted for. We compute hospitals' random effects as posterior modes of the distribution for the random effects given the observed data and the estimated model parameters. In our analysis we plot the posterior modes together with their 95% confidence intervals, obtained by multiplying the estimated conditional variance by the z-score corresponding to a 5% confidence level of a normal distribution (1.96%). Our Empirical Bayes have been obtained using the R function *ranef*, while the conditional variance has been obtained using the function *condVar*.

Table 2 Descriptive statistics

N = 28,288						
Category	Variable	Mean	St. Dev.	Min	Max	
Dependent variable	Overall satisfaction (1 = "Very Poor", 6 = "Excellent")	4.61	1.33	1	6	
Explanatory variables						
Year	[2010]	0.26	0.44	0	1	
	2011	0.27	0.44	0	1	
	2012	0.26	0.44	0	1	
	2013	0.22	0.41	0	1	
	[London]	0.16	0.37	0	1	
Region	North	0.3	0.46	0	1	
	South	0.22	0.42	0	1	
	Midlands and East	0.32	0.47	0	1	
	[London]	0.16	0.37	0	1	
Patient-level characteristics						
Gender	[Female]	0.58	0.49	0	1	
	[18–35]	0.17	0.37	0	1	
Age	36–50	0.29	0.37	0	1	
	51–65	0.26	0.45	0	1	
	> 66	0.29	0.45	0	1	
Employment status	Employed	0.14	0.35	0	1	
	Student	0.02	0.47	0	1	
	Voluntary	0.07	0.26	0	1	
Ability to work	Being able to work (0 = "No", 1 = "Yes")	0.61	0.24	0	1	
Mental health status	(1 = "Very Poor", 6 = "Excellent")	3.31	1.26	1	6	
Contact with services	Length of contact with services (0 = "Less than 1 year", 3 = "More than 10 years")	1.64	1.18	0	3	
	Last contact with services (0 = "In the last month", 4 = "More than 12 months ago")	0.71	1.02	0	4	
Admitted	(0 = "No", 1 = "Yes")	0.13	0.34	0	1	
Therapy	Prescribed medications (0 = "No", 1 = "Yes")	0.9	0.09	0	1	
	Talking therapies (0 = "No", 1 = "Yes")	0.41	0.24	0	1	
Care plan	Having a care plan (0 = "No", 1 = "Yes")	0.74	0.19	0	1	
Specific needs	Physical health need (0 = "No", 1 = "Yes")	0.71	0.21	0	1	
	Accommodation need (0 = "No", 1 = "Yes")	0.27	0.2	0	1	
	Financial need (0 = "No", 1 = "Yes")	0.52	0.25	0	1	
Health professional	Community psychiatric nurse	0.33	0.22	0	1	
	Social worker	0.08	0.08	0	1	
	Psychiatrist	0.25	0.19	0	1	
	Mental health support worker	0.14	0.12	0	1	
	Occupational therapist	0.03	0.03	0	1	
	[Other health professional]	0.09	0.29	0	1	
Category	Variable	Source	Mean	St. Dev.	Min	Max
Hospital-level characteristics						
Ethnicity	White	CQC	0.88	0.12	0.35	1
	Mixed	CQC	0.01	0.02	0	0.07
	Asian	CQC	0.04	0.05	0	0.25
	Black	CQC	0.03	0.05	0	0.3
	[Other]	CQC	0.04	0.03	0	0.15
Capacity	FTE staff	NHS England	4.3	0.98	0	5.32
	Percentage occupied beds	NHS England	0.87	0.06	0.69	0.99
Efficiency	MHRCI	Department of Health	1.04	0.25	0.46	3.53
Staff	Staff work-related stress	NHS England	0.37	0.01	0.18	0.53
Hospital status	Foundation Trust status	Care and Quality Commission	0.72	0.45	0	1

Reference category is given in square parentheses. Employment status does not include a reference variable as these variables were in multiple response format. Health professional variables does not sum to 1 as pre-2012 answer "psychologist" was removed for consistency

Table 3 Estimation results

	Empty model (M0)		Patient characteristics model (M1)		Patient and hospital characteristics model (M2)	
N obs	28,288		28,288		28,288	
Variable	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
2011	− 0.01	0.02	− 0.02	0.02	− 0.02	0.02
2012	0.02	0.02	− 0.01	0.02	− 0.02	0.03
2013	0.2***	0.02	0.24***	0.02	0.23***	0.04
North	0.15***	0.03	0.13***	0.03	0.11*	0.04
South	0.04	0.03	0.03	0.03	− 0.02	0.05
Midlands and East	0.09***	0.03	0.1**	0.03	0.07	0.04
Patient-level characteristics						
Female			− 0.03**	0.01	− 0.03*	0.01
Mental health status			0.28***	0.01	0.27***	0.01
Admitted			− 0.17***	0.02	− 0.17***	0.02
Age 36–50			0.21***	0.02	0.21***	0.02
Age 51–65			0.27***	0.02	0.27***	0.02
Age over 66			0.42***	0.02	0.42***	0.02
Employed			0.06***	0.02	0.06**	0.02
Student			0.03	0.04	0.03	0.04
Voluntary			− 0.03	0.02	− 0.03	0.02
Length of contact with services			− 0.08***	0.01	− 0.08***	0.01
Last contact with services			− 0.18***	0.01	− 0.18***	0.01
Therapy: prescribed medications			0.14***	0.02	0.14***	0.02
Therapy: talking therapies			0.31***	0.01	0.31***	0.01
Having care plan			0.43***	0.02	0.43***	0.02
Being able to work			0.09***	0.02	0.09***	0.02
Physical health need			− 0.08***	0.01	− 0.08***	0.01
Accommodation need			− 0.19***	0.02	− 0.19***	0.02
Financial need			− 0.13***	0.01	− 0.13***	0.01
Community psychiatric nurse			0.17***	0.02	0.17***	0.02
Social worker			0.06*	0.03	0.06*	0.03
Psychiatrist			0.03	0.02	0.03	0.02
Mental health support worker			0.12***	0.02	0.12***	0.02
Occupational therapist			0.05	0.04	0.05	0.04
Hospital-level characteristics						
White					− 0.20	0.44
Mixed					0.4	0.81
Asian					− 0.71	0.57
Black					− 0.18	0.56
FTE staff					− 0.01	0.01
Percentage occupied beds					− 0.30*	0.15
MHRCI					0.05	0.03
Staff work-related stress					0.18	0.21
Foundation Trust status					− 0.01	0.02
Threshold	Estimate	Standard error	Estimate	Standard error	Estimate	Standard error
Threshold coefficients						
1 2	− 1.78	0.03	− 0.67	0.05	− 1.11	0.47
2 3	− 1.32	0.03	− 0.13	0.05	− 0.57	0.47
3 4	− 0.78	0.03	0.50	0.05	0.06	0.47
4 5	− 0.20	0.03	1.16	0.05	0.72	0.47

Table 3 (continued)

Threshold	Estimate	Standard error	Estimate	Standard error	Estimate	Standard error
516	0.62	0.03	2.08	0.05	1.65	0.47
Diagnostics						
LogLik	– 42,976.77		– 40,079.39		– 40,071.62	
AIC	85,977.55		80,228.79		80,231.25	

Ordered probit models. 2010 is the reference year, male is the reference gender, age < 35 is the reference age, “other ethnicity” is the reference ethnicity status. M0 represents the empty model. M1 allows for patient characteristics. M2 allows for both patient- and hospital-level characteristics

Significance is * $p < .05$, ** $p < .01$, *** $p < .001$

Results

We plotted the mean of patients’ overall satisfaction across all years and across commissioning regions (see Fig. 3) and averaged across all hospitals (see Fig. 4⁴). Overall satisfaction appeared to be comparable across years and regions, with some variation evident across hospitals.

Modelling of Determinants

Correlation analysis identified patient satisfaction being correlated with having a care plan, support received from services for specific needs, and variables associated with relationships with care professionals, such as being listened to. Variables relating to relationships with care professionals and service support were also positively correlated with one another. Positive correlation was also present between older age (over 66) and being retired, between the London dummy and the ethnicity variables, and between unemployed and ethnicity variables. Lastly, we identified a positive correlation between the staff work-related stress variable and the 2013 dummy. To avoid collinearity we removed the variables being retired, being unemployed and relational aspects of care variables from our analysis.

Factor analysis identified the following factors: service support for specific needs, ethnicity, relational aspects of care, age, employment, being admitted to hospital, region, and being seen by a health care professional. Factor analysis also identified a factor affecting relational aspects of care and overall satisfaction simultaneously.

We interpret the potential collinearity between relational aspects of care and overall satisfaction as an indication of endogeneity via the potential presence of a common unobservable factor affecting both variables simultaneously. Including endogenous covariates in the probit model might lead to spurious results (Wooldridge 2010). Although relational aspects of care might be a factor associated with

patient satisfaction, the presence of both significant correlation with other covariates and the presence of an unobservable common factor with the dependent variable might lead to bias in the estimated results. For these reasons we decided to remove relational aspects of care from our analysis.

Table 2 summarises the descriptive statistics for all variables in our final estimation sample with reference categories in brackets.

Table 3 provides the results of our multilevel models.

By computing the marginal effects of our estimated coefficients, our study identifies being female as having a 0.67% reduction in the probability of achieving at least good satisfaction compared to being male. We found that older age is associated with higher satisfaction, with individuals over 66 being 10.07% more likely to achieve at least good satisfaction compared to individuals in the reference age group (35 or under). Employed patients were 1.44% more likely to report high satisfaction compared to unemployed individuals. Patients admitted to a mental health institution were 4.14% less likely to have a high satisfaction compared to non-admitted patients, while patients able to work are 2.06% more likely to report high satisfaction levels compared to unable to work patients.

A unitary increase in the 1-to-6 scale for mental health self-assessment is associated with a 6.61% increase in the probability of reporting higher satisfaction. Longer contact length and longer time from last contact with services were both associated with negative satisfaction. Patients treated in the North region or in 2013 were respectively 2.75% and 5.42% more likely to report an at least good level of overall satisfaction compared to other patients.

Our study finds a number of novel results. First we find that service type affects patient satisfaction, with patients receiving talking therapies, and those who were prescribed medications being respectively 7.42% and 3.41% more likely to experience a higher satisfaction. Having a care plan was also associated with positive satisfaction, with patients having a care plan being 10.28% more likely to report higher satisfaction. Our model identifies that patients reporting an accommodation, a physical, or a financial need were

⁴ Notice that in Fig. 4 the x-axis represents individual hospitals.

Table 4 Sensitivity analysis

Model	Patient and hospital characteristics model (M2)		Patient and hospital characteristics model with alternative satisfaction mapping (M3)	
N obs	28,288		28,288	
Variable	Coefficient	Standard error	Coefficient	Standard error
Year [2011]	− 0.02	0.02	− 0.03	0.02
Year [2012]	− 0.02	0.03	− 0.03	0.03
Year [2013]	0.23***	0.04	− 0.22***	0.04
North	0.11*	0.04	0.12*	0.05
South	− 0.02	0.05	− 0.01	0.05
Midlands and East	0.07	0.04	0.08	0.05
Patient-level characteristics				
Female	− 0.03*	0.01	− 0.03*	0.01
Mental health status	0.27***	0.01	0.27***	0.01
Admitted	− 0.17***	0.02	− 0.18***	0.02
Age 36–50	0.21***	0.02	0.2***	0.02
Age 51–65	0.27***	0.02	0.26***	0.02
Age over 66	0.42***	0.02	0.40***	0.02
Employed	0.06**	0.02	0.05**	0.02
Student	0.03	0.04	0.02	0.04
Voluntary	− 0.03	0.02	− 0.03	0.02
Length of contact with services	− 0.08***	0.01	− 0.08***	0.01
Last contact with services	− 0.18***	0.01	− 0.18***	0.01
Therapy: prescribed medications	0.14***	0.02	0.13***	0.02
Therapy: talking therapies	0.31***	0.01	0.30***	0.01
Having care plan	0.43***	0.02	0.42***	0.02
Being able to work	0.09***	0.02	0.09***	0.02
Physical health need	− 0.08***	0.01	− 0.08***	0.01
Accommodation need	− 0.19***	0.02	− 0.18***	0.02
Financial need	− 0.13***	0.01	− 0.13***	0.01
Community psychiatric nurse	0.17***	0.02	0.17***	0.02
Social worker	0.06*	0.03	0.07*	0.03
Psychiatrist	0.03	0.02	0.02	0.02
Mental health support worker	0.12***	0.02	0.12***	0.02
Occupational therapist	0.05	0.04	0.04	0.04
Hospital-level characteristics				
White	− 0.20	0.44	− 0.24	0.44
Mixed	0.4	0.81	− 0.30	0.82
Asian	− 0.71	0.57	− 0.77	0.58
Black	− 0.18	0.56	− 0.19	0.57
FTE staff	− 0.01	0.01	− 0.01	− 0.01
Percentage occupied beds	− 0.30	0.15*	− 0.31	0.15
MHRCI	0.05	0.03	0.05	0.03
Staff work-related stress	0.18	0.21	0.16	0.21
Foundation Trust status	− 0.01	0.02	− 0.01	0.02
Threshold	Estimate	Standard error	Estimate	Standard error
1/2	− 1.78	0.03	− 1.19	0.48
2/3	− 1.32	0.03	− 0.66	0.47
3/4	− 0.78	0.03	− 0.01	0.47
4/5	− 0.20	0.03	0.66	0.47

Table 4 (continued)

Threshold	Estimate	Standard error	Estimate	Standard error
516	0.62	0.03	1.69	0.47
Diagnostics				
LogLik	− 40,071.62		− 41,004.76	
AIC	80,231.25		82,079.52	

Ordered probit model with alternative mapping. 2010 is the reference year, male is the reference gender, age < 35 is the reference age, “other ethnicity” is the reference ethnicity status. M2 is our reference model. M3 is used for sensitivity analysis

Significance is * $p < .05$, ** $p < .01$, *** $p < .001$

respectively 4.51%, 1.94% and 3.08% less likely to achieve a high satisfaction level compared to other patients. The type of health professional most recently seen by the patient appeared to influence satisfaction, with being seen by a community psychiatric nurse, a social worker, or a mental health support worker leading to a 4.12%, 1.5% or a 2.93% increase in the probability of reporting an at least good assessment of overall satisfaction respectively. At a hospital level we found that a 1% increase in occupied beds was associated with a 7.2% decrease in the probability of reporting at least good overall satisfaction.

Our sensitivity analysis model adopting the alternative mapping for overall satisfaction in year 2013 identified comparable estimated coefficients, except for 2013 becoming negative, and with the percentage of occupied beds variable becoming non-significant (see model M3 in Table 4).

Our alternative model specifications (not presented) identified the same significant variables as model M2, with the exception of percentage of occupied beds becoming not significant in the simplified probit model and in the linear model. In addition, in the linear model the dummies for the years 2011 and 2012 became significant, while female gender became non-significant. At a hospital level the linear model identified all ethnicity variables and MHRCI as positive and significant. Excluding the observations in the year 2013 led to no qualitative difference, except for female gender becoming non-significant. No significant changes were identified in the varying slopes model.

Analysis of Variance and Provider Random Effects

Figure 1 presents the Empirical Bayes for hospital-level residual variation estimated using model M2. Hospitals are ordered from left to right according to their performance on

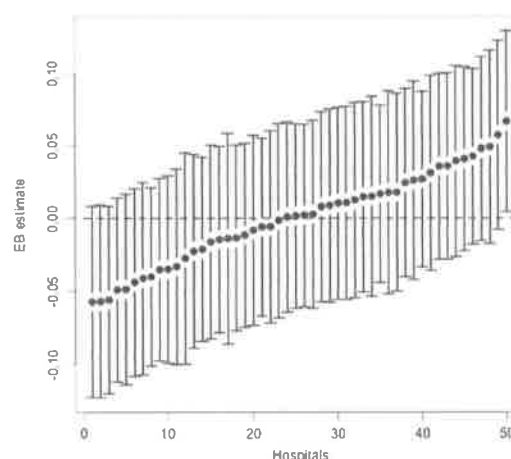


Fig. 1 Empirical Bayes estimates with 95% confidence intervals of hospital-level residual variance for ordered probit model. The x-axis represents individual hospitals. The y-axis report Empirical Bayes estimates

patient satisfaction after conditioning on covariates. Numbers on the x-axis indicate arbitrary numeric identifiers for individual hospitals. The y-axis indicates Empirical Bayes estimates. The whiskers of the graph represent the 95% confidence intervals of the estimated provider-specific effects. Hospitals with higher conditional variance in the estimated provider-effect will have wider confidence intervals compared to other providers. As shown in the figure, we identify the absence of overlaps in whiskers between the bottom 3 and top 1 performing hospital. This result highlights

the presence of, albeit small, some statistically significant variation across providers, even once other covariates are accounted for.

Conclusions

Our paper focused on identifying the factors associated with patient satisfaction with community mental health services in England via a multi-level analysis including both patient- and provider-level variables.

Our paper identified a number of novel results. First, we identify that treatment type affects satisfaction, with patients receiving talking therapies and prescribed medications reporting higher satisfaction. Second, we identify that a coordinated approach to care, as indicated by having a care plan, positively affects satisfaction. Third, our analysis highlights the need for integrated care, with patients reporting physical, financial or accommodation needs reporting lower satisfaction. Fourth, we identify that having a last interaction with a care professional closer to the community, such as a community psychiatric nurse, a social worker, or a mental health support worker, improves satisfaction. We interpret these results as evidence that a coordinated approach to care, higher care integration, and being treated closer to the community all lead to higher patient satisfaction.

By applying multi-level techniques to community mental health services, our study finds the presence of hospital-specific performance variation, even once other covariates are accounted for. We interpret these differences as resulting from different unobservable factors across hospitals such as variation in management styles and the organisation and design of community services.

The results presented in this analysis will be useful to policymakers in understanding what affects patient satisfaction in community mental health settings and in understanding how to use limited resources to effectively plan and co-ordinate care to meet patients' expectations. In particular, our analysis identified the need to focus on the patient journey, providing a coordinated approach to care and ensuring the provision of integrated services.

Our work will be useful to hospital regulators in the monitoring and inspection of hospitals as variations in satisfaction might identify potential differences in quality of care. Particular attention should be given by regulators to understanding hospital-specific variation in patient satisfaction when planning regulatory activities.

Given the international interest towards providing mental health care in the community, our analysis might be useful for other countries aiming to identify what factors should be accounted for when planning the provision of care away from institutional settings.

Our study is subject to a number of limitations. Our dataset provides limited evidence on the role of ethnicity as these variables are not available at a patient-level. Our dataset is also affected by having a different scale of patient satisfaction for the year 2013. Lastly, being based on a repeated sample, our dataset does not provide pseudonymised patient identifiers and we are restricted to analysing repeated cross-sections.

Future research should consider how some of the harder to measure factors such as the quality and style of hospitals' management impacts overall satisfaction. The importance of access to services, contact length and closeness to the community in affecting satisfaction suggests that additional attention should be given to understand the role that the patient journey has on overall satisfaction with services. Lastly, future research should focus on exploring the impact of different aspects of integrated care on patients' satisfaction.

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Compliance with Ethical Standards

Conflicts of Interest None.

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Appendix

Data Cleaning

The following responses to survey questions were reported as NA in our final dataset: "not applicable", "not answered", "don't know/can't remember", "item not applicable", "schedule not applicable" and "not answered".

Answers to two option questions (“Yes” or “No”) were coded as 1 and 0 respectively. These questions included: (a) receiving prescribed medications, (b) receiving talking therapies, (c) having a care plan, (d) having a physical health need, (e) being able to work, (f) having an accommodation need, (g) having a financial need, (h) being admitted to a mental health hospital.

Answers referring to patient’s contact length with services were coded on a 0 to 3 scale, indicating “less than 1 year”, 1 indicating “1 to 5 years”, 2 indicating “6 to 10 years” and 3 indicating “more than 10 years”. Answers to patient’s last contact with services were coded on a 0 to 4 scale with 0 indicating “in the last month”, 1 indicating “1–3 months ago”, 2 indicating “4–6 months ago”, 3 indicating “7–12 months ago” and 4 indicating “more than 12 months ago”. Patients’ self-reported mental health was coded from 1 (“Very poor”) to 6 (“Excellent”).

The following variables were turned into (0, 1) dummy variables: (a) most recent health professional seen by the patient, (b) age group, (c) employment status.

Overall Satisfaction Mapping

Overall satisfaction in year 2013 was mapped into a 6 point scale using two alternative mappings.

Mapping 1 was: ((10, 9) → 6, (8, 7) → 5, (6, 5) → 4, (4, 3) → 3, (2, 1) → 2, (0) → 1).

Mapping 2 was: ((10) → 6, (9, 8) → 5, (7, 6) → 4, (5, 4) → 3, (3, 2) → 2, (1, 0) → 1).

Figure 2 shows that mapping 1 underestimates the objective for low values of patient satisfaction, while the opposite holds true for mapping 2. Figure 3 shows overall satisfaction aggregated across years (left) and across regions (right). Figure 4 shows overall satisfaction averaged across hospitals, with lines representing standard deviation.

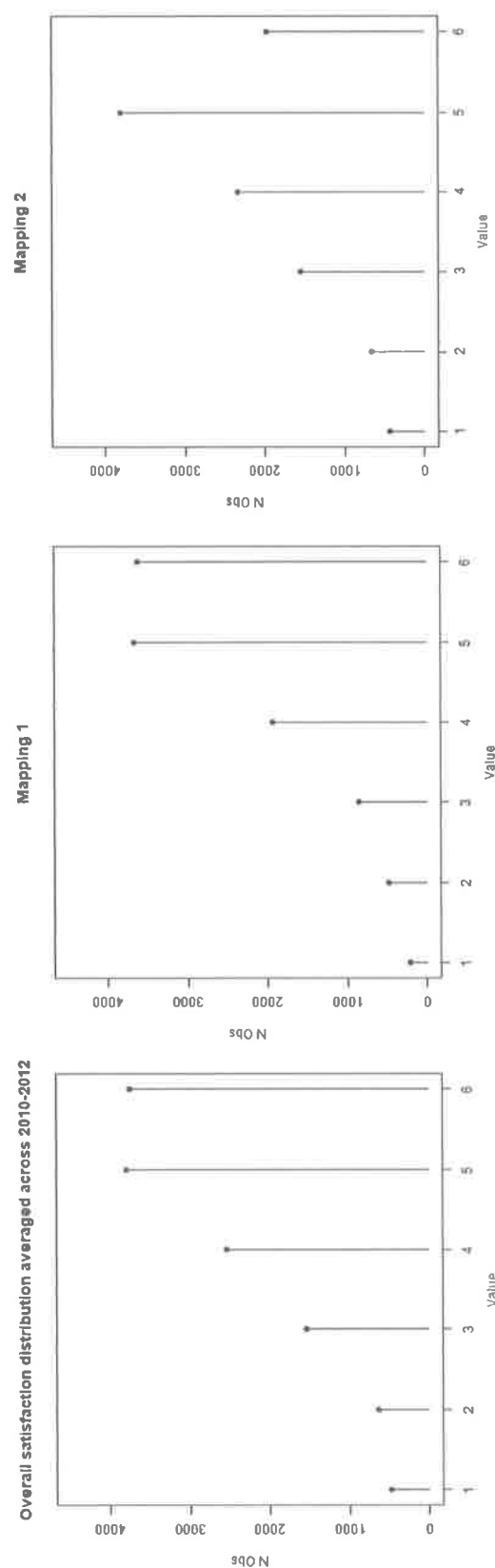


Fig. 2 Histograms of overall satisfaction mapping. The plots represent the average overall satisfaction across the three available years (left), mapping 1 (centre), mapping 2 (right)

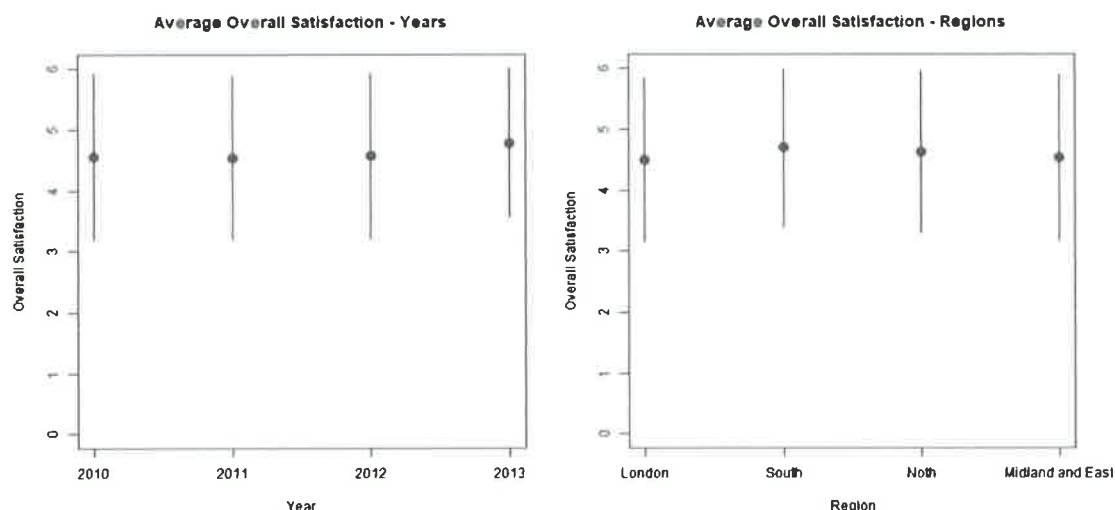


Fig. 3 Hospital mean overall satisfaction across years (left) and across commissioning regions (right). Bold dots represent average values, lines represent standard deviation

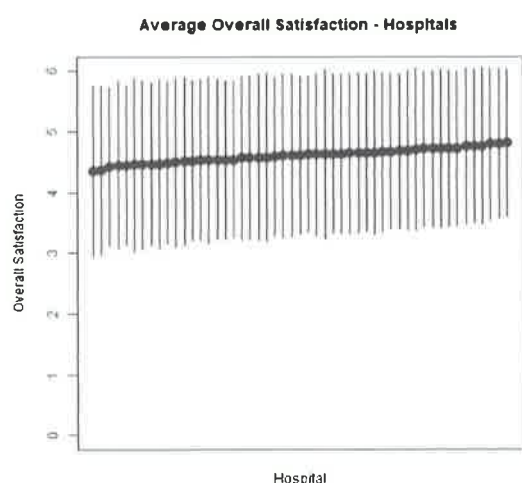


Fig. 4 Mean overall satisfaction across hospitals. Bold dots represent average values, lines represent standard deviation. The x-axis represents individual hospitals. The y-axis report Empirical Bayes estimates

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Quality Assessment of the Oncology Health Service in a Public Hospital

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Abstract Quality assessment is a crucial issue in the strategic management of the public health sector. The objective of this study is to investigate the patients' perception of the health system quality and explore the relationships between doctors and long-term cancer patients. The data under study have been collected during a survey conducted with long-term cancer patients who follow an oncological therapy in a Public Hospital. In the study, exploratory factorial analysis is developed and two structural equation models are proposed. The first model describes the service quality as perceived by the patients, which is influenced by four important factors, namely tangible aspects, reliability, empathy (doctor–patient human relations) and hospital organization. The second model describes the relationship between doctors and long-term cancer patients, which is influenced by three factors, that is reliability, empathy and hospital organization. The discussion highlights the contribution that the results of the study may make to the investigation of the possible strategies for improving health care service quality.

Keywords Patients' customer satisfaction · Health system quality · Exploratory factorial analysis · Structural equation models

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Article

Combining Direct and Indirect Measurements to Assess Patients' Satisfaction with the Quality of Public Health Services in Romania: Uncovering Structural Mechanisms and Their Implications

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Abstract: **Introduction:** Patients' satisfaction was extensively researched over the last decades, given its role in building loyalty, compliance to treatment, prevention, and eventually higher levels of wellbeing and improved health status. Patients' feedback on the perceived quality of health services can be incorporated into practice; therefore, understanding factors and mechanisms responsible for patients' satisfaction allows providers to tailor targeted interventions. **Method:** A questionnaire assessing patients' perception of the quality of health services was administered to a country-representative sample of 1500 Romanian patients. Using a partial least squares—path modeling approach (PLS-PM), with cross-sectional data. We developed a variance-based structural model, emphasizing the mediating role of trust and satisfaction with various categories of health services. **Results:** We confirmed the mediating role of trust in shaping the relationship between the procedural accuracy of health professionals, along with the perceived intensity of their interaction with patients, and patients' experienced quality of the health services. We confirmed the mediating role of satisfaction by the categories of services in the relationship between waiting time on the premises, attention received, and the perceived reliability of the information received, as predictors, and the experienced quality of the health services. In addition, indirect assessment of patients' satisfaction is a good predictor for direct assessment, thereby affirming the idea that the results of the two types of evaluations converge. **Discussions:** One of the most efficient solutions to increase both patients' satisfaction and their compliance is to empower the communication dimension between patients and health practitioners. Given the non-linear relationships among variables. We advocate that, unless the nature of the relationships between satisfaction and its predictors is understood, practical interventions could fail. The most relevant variable for intervention is the degree of attention patients perceive they received. We suggest three methods to turn waiting time into attention given to patients.

Keywords: patients' satisfaction; health services quality; PLS-PM modeling; mediation analysis

1. Introduction

Patients' satisfaction was extensively researched over the last decades, with various systematic reviews encompassing the most relevant studies in the field [1–4]. Satisfaction prompts loyalty,

compliance to treatment, and prevention [5], and it eventually translates into higher levels of wellbeing, lower levels of out-of-pocket expenditures to manage unexpected health events, and improved health status and happiness [6].

Understanding factors and mechanisms responsible for patients' satisfaction allows providers to tailor targeted interventions [7] and helps health practitioners to improve their approach [8–10]. A prevalent research area is assessing patients' satisfaction with separate categories of practitioners: doctors [11,12], nurses [13], and doctors and nurses [14], as well as with various categories of services or healthcare centers [15]. In this paper, we aim to explore the mechanisms that shape patients' satisfaction, as well as patients' self-perception of quality, taking into account their interaction with three categories of health professionals: doctors, nurses, and hospital housekeepers.

Our contribution to the existing literature is multi-fold. Firstly, we explore, empirically, how patients' actual experience with health services shapes their perception of the quality of the health services. Unlike most of the previous studies, we combine direct and indirect assessments [2]. We investigate how satisfied patients are with the services received, which is a direct assessment, but we also ask the patients to rate different aspects of their experience, which is an indirect assessment of their satisfaction.

In explaining how satisfaction and perceived quality of the health services are shaped, we combine predictors coming from two different theoretical backgrounds: human capital and social capital. On the one hand, we place waiting time on the premises, attention given to patients, and patients' trust in the information received from health professionals as dimensions related to human capital. On the other hand, we place health professionals' perceived procedural accuracy and support provided in their interaction with patients as part of social capital.

Then, we look into potential mechanisms underlying the relationships between our predictors and the perceived quality and identify two relevant mediators. Other studies also approached research on patients' satisfaction using structural modeling [16–21]. Based on the results, we inform practical interventions.

The rest of the paper is organized as follows: the next section presents the conceptual model and the literature review. Section 3 introduces the data, the measurement tools, and the method. Section 4 presents the results, while the last section concludes our research, suggests theoretical and practical implications, and presents the limitations of our work.

2. Background

Our primary goal, the importance of which is supported in recent literature [22], is to identify the determinants of patients' perception of the experienced quality of health services (henceforth EQ), which are relevant for practical interventions. We focus on patients' perceived experience with four types of health institutions: family physicians, specialists, hospitals, and laboratories. Firstly, we examine how the patients' perception of their experience and the health practitioners' attitude toward them [23] affect satisfaction with specific services, while also investigating their level of trust. Secondly, we discuss how all these factors impact EQ. Figure 1 shows our conceptual model, along with the research hypotheses, while Table 1 summarizes the main acronyms of the variables. The following subsections discuss the role played by each variable included in our study and ground the research model in the existing literature. We explain the mediating role of two latent variables as mechanisms that can explain the relationship between the EQ and its predictors.

Table 1. Latent variables measurement.

Latent Variable	Acronym	Measurement Items (Likert 1–5)
Perceived intensity of interaction (PII)	To what extent did you discuss with health professionals regarding the following?	
	PII1	The solution to your health issue
	PII2	The treatment/medication for your health issue
Trust (TRUST)	According to your personal experience, rate the level of trust you have in the following categories of health professionals:	
	TRUST_DOCTORS	Doctors
	TRUST_NURSES	Nurses
	TRUST_HH	Hospital housekeepers
Procedural accuracy —doctors (PAD)	PAD1	The doctor acted professionally
	PAD2	The doctor observed confidentiality
	PAD3	The doctor informed you about all possible risks and alternatives related to your treatment
	PAD3	The doctor informed you about all possible risks and alternatives related to your treatment
Procedural accuracy —nurses (PAN)	PAN1	The nurse acted professionally
	PAN2	The nurse observed confidentiality
	PAN3	The nurse informed you about all possible risks and alternatives related to your treatment
	PAN3	The nurse informed you about all possible risks and alternatives related to your treatment
Hospital housekeepers' support (HHS)	HHS1	The hospital housekeepers acted professionally
	HHS2	The hospital housekeepers helped you effectively
Waiting time on the premises (WTP)	According to your experience, when confronted with a medical situation, how do you rate the waiting time inside the building in each of the following cases? (1—very short; 5—very long)	
	WTP1	Family physicians
	WTP2	Specialists
	WTP3	Hospital
	WTP4	Laboratory
Satisfaction by category of services (SCS)	How do you rate the quality of the health services you received from the following sources?	
	SCS1	Family physicians
	SCS2	Specialists
	SCS3	Hospital
	SCS4	Laboratory
Attention (ATT)	According to your experience, when confronted with a medical situation, how do you rate the attention you received in each of the following cases?	
	ATT1	Family physicians
	ATT2	Specialists
	ATT3	Hospital
	ATT4	Laboratory
Perceived information reliability (PIR)	To what extent do you trust information from the following sources?	
	PIR1	Family physicians
	PIR2	Specialists

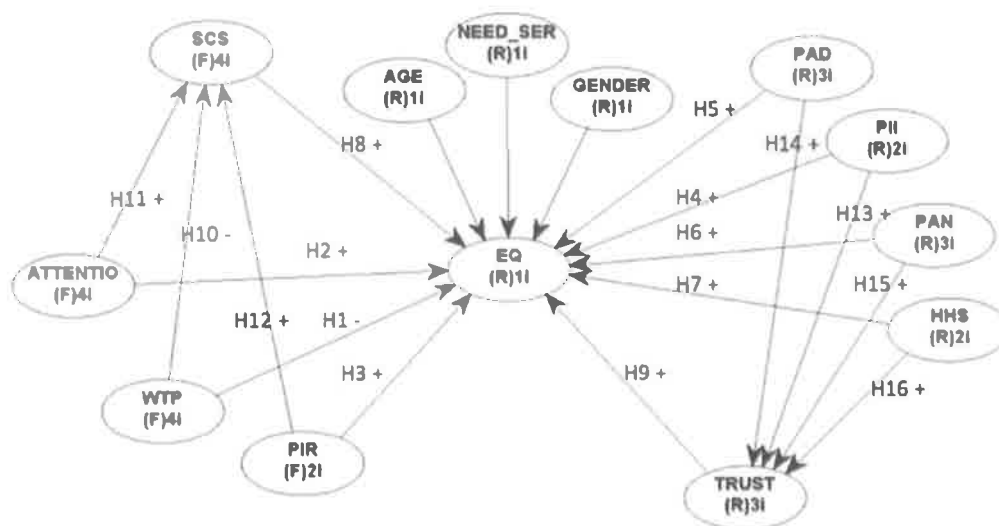


Figure 1. Conceptual research model and hypotheses.

2.1. Waiting Time, Attention, and Information Reliability

Waiting time on the premises (henceforth WTP), and attention received by patients in their interaction with health professionals (henceforth ATT) are both documented in the literature as building satisfaction [24,25]. Apart from that, lay-people experience information asymmetrically when relating to health services. Although they need the health practitioner to provide reliable information and psychological comfort, patients are increasingly skeptical about expert opinions, want more autonomy, and are eager to choose between different options presented by the health professionals [26]. The perceived quality of the actual interaction of patients with their doctor influences both the satisfaction and the level of concern about one's health. The quality of this interaction is assessed differently by the doctor and the patient; what the patient views as important may be different from what the physician thought was important. We set perceived information reliability (henceforth PIR) as the predictor and set the first three hypotheses as follows:

Hypothesis 1 (H1). WTP is negatively correlated with EQ.

Hypothesis 2 (H2). ATT is positively correlated with EQ.

Hypothesis 3 (H3). PIR is positively correlated with EQ.

2.2. Perceived Interaction and Health Professionals' Procedural Accuracy

Social capital covers the level of civic participation, trust, and social networks existing within specific communities. Social capital can be regarded as a property of an individual providing access to different resources [27], or Putnam's five-dimensions perspective [28,29], or a group perspective [30]. Regardless of its conceptualization, social capital is responsible for the perception of quality in health services [31].

In this context. We refer to social capital as the relationship between health practitioners and patients [32]. Using McKenzie's three-dimensional model. We measured patients' perception toward professionals' procedural accuracy (henceforth PAD for medical doctors; PAN for medical nurses) and support (HHS for hospital housekeepers), as reflected in their interpersonal relationships. These are all documented as predictors of satisfaction and perceived quality [33,34]. McKenzie's model was chosen because it includes a structural and cognitive dimension, a bonding and bridging dimension, and a horizontal and vertical dimension, which we found to be the best fit for our conceptualization. We also

measured the extent to which patients valued the information exchange with these professionals, concerning their intimate issues, medication, and treatment [35], and we labeled this variable “perceived intensity of interaction” (henceforth PII). We build our argument on the idea that, in the first instance, information asymmetry exists between the patient and health professional. The gap decreases through communication, in turn developing the patient’s confidence [36,37] and the perception of better control [38]. In this context, the following four hypotheses were proposed:

Hypothesis 4 (H4). *PII is positively correlated with EQ.*

Hypothesis 5 (H5). *PAD is positively correlated with EQ.*

Hypothesis 6 (H6). *PAN is positively correlated with EQ.*

Hypothesis 7 (H7). *HHS is positively correlated with EQ.*

2.3. The Mediating Effect of Satisfaction by Category of Services and Trust

The ability to find answers to patients’ problems provides the cornerstone to developing trust in professionals’ expertise and experience. It also makes patients see the health professionals’ recommendations and information as reliable, which, in turn, plays a crucial role in patients’ assessment of service quality and results in satisfaction [39–41]. In our paper, we measured patients’ satisfaction by the category of services (henceforth SCS), referring, in particular, to family physicians, specialists, hospital services, and laboratories. The process of value creation in vulnerable customers is important [42], and previous research showed that competent delivery of professional health services develops trust (henceforth TRUST) in patients [43]. As a result, the final nine hypotheses were as follows:

Hypothesis 8 (H8). *SCS is positively correlated with EQ.*

Hypothesis 9 (H9). *TRUST is positively correlated with EQ.*

Hypothesis 10 (H10). *WTP is negatively correlated with SCS.*

Hypothesis 11 (H11). *ATT is positively correlated with SCS.*

Hypothesis 12 (H12). *PIR is positively correlated with SCS.*

Hypothesis 13 (H13). *PII is positively correlated with TRUST.*

Hypothesis 14 (H14). *PAD is positively correlated with TRUST.*

Hypothesis 15 (H15). *PAN is positively correlated with TRUST.*

Hypothesis 16 (H16). *HHS is positively correlated with TRUST.*

2.4. Control Variables

There is conflicting evidence regarding gender and age as predictors of patients’ satisfaction and their experience with the quality of healthcare services. Some studies found that older patients tend to be more satisfied [44,45], but the results were context-dependent. Similarly, there is no consensus about possible gender differences, although some studies reported men as slightly more satisfied than women [46].

Measuring patients' experience is also sensitive to the moment of measurement. If an experience is not measured at the very moment of its end, then memory self-evaluation and experience self-evaluation compete for how the experience is recalled [47]. In line with Kahneman et al.'s findings [41], other studies analyzing the patients' account of their last consultation also documented the experienced utility and the remembered utility [48]. Differentiating between patients' perception and patients' experiences with medical care is of paramount importance; while the patients' perception deals with expectations and a subjective check against reality (what was actually happening), the patients' experiences are merely a kind of reflection of what happened to them and if their needs were met. Sometimes patients might overrate satisfaction due to different biases.

People adopt general categories to organize their memories about other people or experiences in social contexts. The individual acts in a socially determined framework based on their expectations about a particular situation [49]. Although effective most of the time, this strategy has the potential to generate false memories, because sometimes people remember category-consistent information that never occurred in that context [50]. To control the potential effects of assessing the respondents' experience after it occurred. We included a dummy variable indicating whether or not the respondents had contact with medical services in the last 12 months.

3. Data, Measurement, and Method

3.1. Data

We collected data through a questionnaire comprising 27 questions aimed at assessing 10 different dimensions of the perceived quality (henceforth PQ) of the Romanian health services. The questionnaire, available in the Supplementary Materials, followed the logic of the conceptual model presented in Figure 1, and previous studies provided valuable guidance in developing the items included in Table 1 [51–54]. The original questionnaire was developed in the Romanian language and discussed with representatives of the Romanian Authority for Quality Management in Healthcare, for content validation. Then, a pilot study conducted with 30 respondents confirmed that the questions were articulately phrased.

3.2. Imputation

Among the 1500 respondents, some did not respond to several questions. The number of missing answers varied by question, from 11 to 250. Handling missing data is a common problem in social sciences. The literature addresses this challenge in three ways: deleting observations with missing entries and working with the complete cases only, weighting, and imputation [55]. In this research. We used the first and third strategies. For the third strategy. We implemented two types of imputation: arithmetic mean and multiple regression imputation [56,57]. To account for potential biases. We compared the estimation obtained in the "complete case" condition, with the estimations obtained in the two "imputation" conditions. We found no significant differences in our results.

3.3. Measurement

We looked at the degree of satisfaction in patients using two approaches. To measure overall satisfaction indirectly. We asked the respondents to rate their first-hand EQ of the Romanian public health services. Then. We asked them to self-assess their satisfaction by category of services provided by family physicians, specialists, hospital services, and laboratories. The measurement was on a 1–5 Likert scale (1—"totally unsatisfied", 5—"very satisfied"). The latent predictors involved in our analysis were measured based on the items presented in Table 1. The items mirror similar measures used in previous studies [35,58–60]; however, in this particular form, they are our contributions.

3.4. Method

The partial least squares-path modeling approach (PLS-PM) technique [61–66] was used to explore the mediation effect of TRUST and SCS on EQ. The PLS-PM analysis performed in our paper aimed at estimating theoretically established relationships, by maximizing the explained variance of the dependent, endogenous latent variables, with EQ as the primary explained variable, and SCS and TRUST serving as mediators in our case. We found this method appropriate for testing our model as it is preferred whenever the theoretical background is insufficient, the measures do not conform to a specific model, and the variables do not fit a certain distribution [67]. A detailed description of the advantages of this method can be found in Reference [68].

The estimation method is an iterative algorithm based on ordinary least squares. Any PLS-PM model consists of two parts: an outer or measurement model and an inner or structural model. The outer model assesses the relationships of the latent constructs with their respective indicator manifest variables in terms of composite indices, while the inner model estimates the relationships among the latent variables themselves. The results of each stage are discussed in the subsequent sub-sections. We preliminary explored our data using R software version 3.4.3 (R Foundation for Statistical Computing, Vienna, Austria), with the “plsrm” package and the “plsdepot” package; then. We estimated our final models using WarpPLS version 6.0 software (<http://www.warppls.com>). The statistical inference of the results was based on a bootstrapping procedure with 999 repetitions.

The algorithm works with standardized data, namely, data transformed in such a way that each indicator has a mean zero and a standard deviation of 1, and it is able to capture linear and non-linear relationships among variables. In handling non-linear relationships, for each set of latent variables LV_1, LV_2, \dots, LV_k , WarpPLS identifies a set of functions, F_1, F_2, \dots, F_k and a set of coefficients p_1, p_2, \dots, p_k such that a concept latent variable LV_c (the outcome) can be expressed as $LV_c = p_1 \times F_1(LV_1) + p_2 \times F_2(LV_2) + \dots + p_k \times F_k(LV_k) + E$. Here, the p -values are path coefficients, and E is the error term. Depending on the estimation algorithm implemented for the inner model, the functions F_1, F_2, \dots, F_k can take U shapes (in Warp2 mode) or S shapes (in Warp3 mode) [69].

4. Results

Our final sample consisted of 1500 respondents (see Table 2 for descriptive statistics) representative of the Romanian population. The sampling was probabilistic, random, and stratified (regional, county level, and village/city level). We used a paper-and-pen approach, and the Romanian Center for Urban and Regional Sociology collected our data.

Table 2. Descriptive statistics.

Variable	Frequency
Gender	
Female	58.9%
Male	41.1%
Civil status	
Married	61.9%
Divorced	5.8%
Unmarried	14.0%
Consensual union	2.1%
Other	15.9%
Social status	
Similar to other families	61.3%
Above average	15.0%
Among the wealthiest	0.8%
Among the poorest	3.5%
Under average	16.0%
Education	
Maximum 10 years	30.5%
High school	27.5%
Vocational school	26.7%
Bachelor	12.8%
Master	2.4%
Sector	
Public	13.5%
Private	28.2%
Do not work	58.3%
Home place (# inhabitants)	
Village	58.7%
100–200	7.9%
30–100	8.9%
>200	16.9%
<30	7.5%

4.1. Measurement Stage (Outer Model)

The performance of the measurement was assessed using Cronbach's alpha, a measure of internal consistency showing how closely related the manifest variables are in a specific group, the composite reliability index, showing the amount of total true score variance capture in a latent construct out of the total variance of the scale, and average variance extracted (AVE), showing how much variance is captured by a construct in relation to the variance due to the measurement errors. Our latent variables were suitable for measurement, as evidenced by the actual and the recommended values for each reliability index (Table 3). The only exception was WTP, for which Cronbach's alpha and the average variance extracted were below the thresholds. Given the small number of items involved in this latent variable. We relied on the theoretical recommendation [70] and kept it in the analysis.

Table 3. Reliability of the measurement.

Variable ¹	Cronbach's Alpha (* > 0.7)	Composite Reliability Index (* > 0.7)	Average Variance Extracted (* > 0.5)
PII	0.949	0.975	0.951
TRUST	0.861	0.916	0.784
PED	0.895	0.935	0.827
PAN	0.891	0.932	0.822
HHS	0.935	0.969	0.939
WTP	0.579	0.760	0.446
SCS	0.791	0.865	0.616
ATT	0.819	0.881	0.649
PIR	0.691	0.866	0.764

* Recommended value. ¹ See Table 1 for definitions of variables.

After applying a reflective measurement. We found that the manifest variables loaded into their corresponding latent constructs with at least 0.7 (Table S1) and were statistically significant. The only exception was for the latent variable WTP, for which the manifest items “waiting time to family doctors” and “waiting time to laboratories” showed loadings below 0.7. Despite the minor non-conformity in the loadings, these items were still statistically significant; thus. We kept them in the analysis. This stage confirmed the convergent validity of our measurement, showing that the items belonging to a specific construct were in fact related to that construct.

For discriminant validity. We found that the correlations of the latent variables were high (Table 4). In addition, all the diagonal values were higher than the corresponding off-diagonal values, and none of the off-diagonal values were higher than 0.8 [71]. This result shows that the constructs did not share the same type of items and that they were conceptually distinct.

Table 4. Discriminant validity: correlations among latent variables with square roots of AVEs ¹.

Variable ²	PII	TRUST	PAD	PAN	HHS	WTP	SCS	ATT	PIR
PII	0.975	0.388	0.385	0.323	0.223	−0.178	0.440	0.445	0.313
TRUST	0.388	0.885	0.478	0.494	0.393	−0.264	0.520	0.548	0.402
PAD	0.385	0.478	0.909	0.752	0.441	−0.245	0.445	0.637	0.507
PAN	0.323	0.494	0.752	0.906	0.597	−0.253	0.423	0.576	0.425
HHS	0.223	0.393	0.441	0.597	0.969	−0.151	0.270	0.420	0.296
WTP	−0.178	−0.264	−0.245	−0.253	−0.151	0.667	−0.278	−0.345	−0.184
SCS	0.440	0.520	0.445	0.423	0.270	−0.278	0.785	0.584	0.379
ATT	0.445	0.548	0.637	0.576	0.420	−0.345	0.584	0.806	0.505
PIR	0.313	0.402	0.507	0.425	0.296	−0.184	0.379	0.505	0.874

¹ Average variance extracted. ² See Table 1 for definitions of variables.

4.2. The Inner (Structural) Model

Table 5 presents the coefficients of the estimated model. On the one hand. We discuss the total effect of each predictor on the perception of the overall quality; then. We deconstruct each total effect in terms of sum of direct effects and indirect effects, via mediators. On the other hand. We discuss the results in terms of effect sizes. This is important for managerial implications, as not all the statistically significant predictors are suitable for interventions, but only those with effect sizes beyond a certain threshold.

Table 5. The coefficients of the structural model.

Variable ¹	Direct Effects			Indirect Effects		Total Effects	
	TRUST	Quality by Specialization	Overall Quality	Overall Quality	Overall Quality	Overall Quality	Overall Quality
TRUST	-	-	0.182 *** (<0.001)	-	-	0.182 *** (<0.001)	0.182 *** (<0.001)
SCS	-	-	0.274 *** (<0.001)	-	-	0.274 *** (<0.001)	0.274 *** (<0.001)
PII	0.226 *** (<0.001)	-	0.039 (0.066)	0.041 * (0.012)	-	0.080 *** (<0.001)	0.080 *** (<0.001)
PAD	0.176 *** (<0.001)	-	0.086 *** (<0.001)	0.032 * (0.039)	-	0.118 *** (<0.001)	0.118 *** (<0.001)
PAN	0.194 *** (<0.001)	-	0.002 (0.463)	0.035 * (0.026)	-	0.038 (0.072)	0.038 (0.072)
HHS	0.150 *** (<0.001)	-	0.024 (0.180)	0.027 (0.067)	-	0.051 * (0.024)	0.051 * (0.024)
WTP	-	-0.140 *** (<0.001)	-0.050 * (0.027)	-0.038 * (0.017)	-	-0.088 *** (<0.001)	-0.088 *** (<0.001)
ATT	-	0.474 *** (<0.001)	0.075 ** (0.002)	0.130 *** (<0.001)	-	0.205 *** (<0.001)	0.205 *** (<0.001)
PIR	-	0.114 *** (<0.001)	0.016 (0.271)	0.031 * (0.044)	-	0.047 * (0.034)	0.047 * (0.034)
Need for medical services	-	-	-	-	-	-	-
No	-	-	Reference	Reference	Reference	Reference	Reference
Yes	-	-	-0.066 ** (0.005)	-0.066 ** (0.005)	-0.066 ** (0.005)	-0.066 ** (0.005)	-0.066 ** (0.005)
AGE	-	-	0.052 * (0.022)	-	-	0.052 * (0.022)	0.052 * (0.022)
GENDER:	-	-	-	-	-	-	-
Male	-	-	Reference	Reference	Reference	Reference	Reference
Female	-	-	-0.016 (0.270)	-0.016 (0.270)	-0.016 (0.270)	-0.016 (0.270)	-0.016 (0.270)
R ² /Adjusted R ²	37%	33%	34%	-	-	-	-

¹ See Table 1 for definitions of variables. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; $p < 0.10$.

The R^2 values reported in Table 5 indicate a good explanatory power; our structural model explained 34% of the variations in how patients perceive the overall quality of the Romanian health services, and more than 30% of the variation in each mediator. For total effects. We found that PAN was the only category that did not affect EQ. The rest of the predictors were statistically significant.

WTP was negatively correlated with EQ which confirmed hypothesis H1. ATT was positively correlated with EQ; thus, H2 was accepted. For total effect, PIR was positively correlated with EQ; thus, H3 was confirmed. PII, PAD, and HHS were positively correlated with EQ, thereby confirming H4, H5, and H7. Although PAN held a positive coefficient, the corresponding p -value showed that the relationship was not statistically significant, failing to confirm H6.

When deconstructing the total effect into direct and indirect effects via the mediators, both TRUST and SCS were statistically significant in explaining EQ, in turn, confirming H8 and H9, respectively. Each of the predictors of these mediators was statistically significant; thus, the hypotheses H10–H16 were accepted.

4.3. The Mediating Effects

Table 5 shows that, after controlling for the first mediator TRUST, the direct effect of the predictors became largely insignificant, except for PAD. The result shows that higher levels of PII, PAN, and HHS developed higher levels of TRUST, which, in turn, resulted in higher levels of EQ. Our result concurs with previous findings that proved the mediating role of the social environment in healthcare settings [72].

Similarly, after controlling for the second mediator, SCS. We found that the direct effect of PIR remained statistically insignificant. In other words, it is not the perceived information reliability per se that shaped EQ, but PIR developed SCS, which, in turn, led to higher levels of EQ. This result also concurs with previous findings, showing that, although patients' trust in healthcare professionals is not related to their health outcomes, the patients report higher satisfaction when their trust in the professionals is higher [73].

Some other relationships were only partially mediated; the direct effect of PAD on EQ did not lose its significance after extracting the indirect effect via the mediator. The same result held for WTP and ATT; the direct effects of these predictors remained significant after controlling for the mediator.

Table 6 presents the effect sizes of each predictor on the corresponding dependent variable. These values are very useful in deciding which predictor can serve as a potential target for interventions. When lower than 0.02, the effect of the corresponding predictor on the outcome variable is too small to allow for interventions; effects that range between 0.02 and 0.15 are small, those between 0.15 and 0.35 are moderate, and those above 0.35 are strong [74]. Here, the ATT had the highest effect size, 0.279, which can be classified as moderate. SCS was also important, with an effect size of 0.137. Small, but still reasonable candidates for interventions were represented by all the variables whose effect sizes listed in Table 6 were higher than 0.02. The implications of these values are discussed in terms of practical and managerial interventions in the last section of this paper.

Figures 2 and 3 capture a very important result of our research. While the initial research model assumed linear relationships among variables. We found that two of them were non-linear, including the relationship between PAD and EQ and that between WTP and EQ. Table 5 shows that the relationship between PAD and EQ was positive and statistically significant, in terms of both a direct effect and a total effect. The results imply that, as the score for PAD increased, the score for EQ increased as well, at a constant rate. What Figure 2 shows instead is that the direct relationship between these two variables held only if PAD went above a certain threshold. Moreover, the relationship was barely linear and could be characterized by two different slopes: 0.06 when the score of the perceived doctors' attitude range was between -3.30 and -1.61 (standardized values), and 0.09 beyond this value. Furthermore, since the curve was convex between -3.30 and -1.61 and concave above -1.61 . We expected that the increase in the overall satisfaction was steeper in the first case and slower in the second case.

Table 6. Effect sizes of direct effects.

Variable ¹	Effect Sizes of Direct Effects		
	TRUST	Quality by Specialization	Overall Quality
TRUST	-	-	0.083
SCS	-	-	0.137
PII	0.091	-	0.012
PAD	0.085	-	0.034
PAN	0.096	-	0.001
HHS	0.063	-	0.007
WTP	-	0.050	0.014
ATT	-	0.279	0.033
PIR	-	0.043	0.004
Need for medical services	-	-	0.004
Age	-	-	0.008
Gender	-	-	0.001

¹ See Table 1 for definitions of variables.

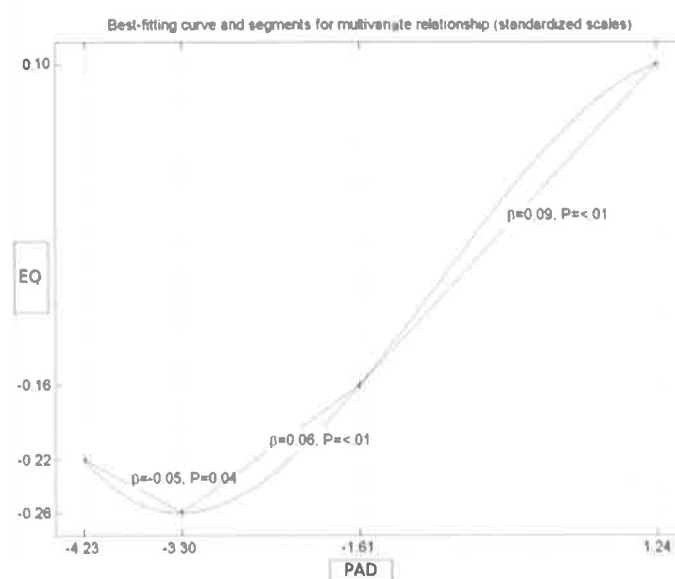


Figure 2. The non-linear relationship between procedural accuracy—doctors (PAD) and patients' perception of the experienced quality of health services (EQ).

Similarly, the assumed linear relationship between WTP and EQ was negative. Figure 3 shows, however, that there were three different regions where the negative relationships can be discussed. When the standardized score for WTP was lower than -1.49 , the relationship could be described by a decreasing convex function, with a variable slope of -0.20 , if the standardized score for WTP ranged between -2.79 and -2.25 (holding also for scores ranging between 1.82 and 2.34 , but with a concave shape), and a variable slope of -0.10 , for the interval between -2.25 and -1.49 . If the standardized score for WTP ranged between -1.49 and 1.82 , there was no statistically significant relationship. The implications of the results presented in Figures 2 and 3 are discussed in the section devoted to practical implications (Section 5.1).

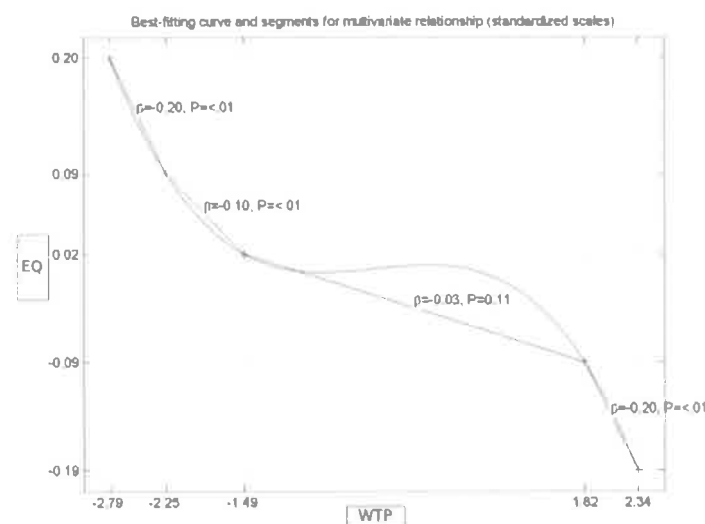


Figure 3. The non-linear relationship between the perception of overall quality and waiting time.

5. Discussion, Conclusions and Future Research

Our study explored patients' experience with the quality of the healthcare services in Romania. We considered two categories of predictors. One category was related to human capital, expressed as ATT, WTP, and PIR. The other category was related to social capital and was expressed as the PII between patients and health professionals and health professionals' procedural accuracy and provided support. We found that TRUST partially mediated the relationship between human capital dimensions and EQ of health services. Similarly, satisfaction by SCS partially mediated the relationship between social capital dimensions and patients' EQ with healthcare services.

We combined direct and indirect measurements of patients' satisfaction into a structural equation model, aiming to assess patients' EQ of health services in Romania. We found that direct assessment was a good predictor for the indirect assessment, thereby confirming the conclusion that the results of these two types of evaluations do not converge [2]. Moreover, we identified two mechanisms through which the relationship holds. Our result may confirm that there is a certain wisdom of patients that eventually makes the measurements consistent [75].

5.1. Practical and Managerial Implications

Although using patients' perspective for improvement is still debated [76], the attempt to use their feedback for simple and practical solutions is an ongoing preoccupation [77]. Given the nature of our results, our recommendations are rather concrete. The effect sizes presented in Table 6 showed that the PAN ranked first in developing trust in patients, then PAD, followed by HHS. Although the effect sizes were small, they were still suitable for practical interventions. We can advance the idea that one of the most efficient solutions to increase patients' satisfaction and their compliance is to improve nurses' communication skills. Similar arguments emphasize that reducing information asymmetry through communication with health professionals has a positive impact on patients, which, in turn, increases their satisfaction via trust as a valuable mediator. The implication of this result goes hand in hand with the previous result, pointing toward empowering the communication dimension between patients and health practitioners. Our conclusion aligns with one of the main current research trends, namely, transforming the human side of services [78] and addressing patient's concerns in a patient-centered way.

One of the most important results regards the second mediator, patients' satisfaction with health services by specialization. Although many studies emphasize the negative correlation between waiting time and patients' contentment. We found that the most relevant variable in our case was the degree of attention patients perceive that they received, once the contact with the health practitioner was

established. This result suggests that, even with scarce healthcare resources, patients' satisfaction can be sustained by the quality of attention and care they receive. Our result concurs with other findings [79] and suggests that, by turning waiting time into attention received, patients' satisfaction can increase. We propose three methods to achieve this goal: (1) informing the patient regarding the reasons for which he/she must wait, shows respect and consideration; (2) by using waiting time to answer specific questions regarding their health problems, the patients can focus on that specific task, rather than on the unpredictable end of the waiting; (3) loyal patients who return to the same medical center can valuably use their waiting time to fill questionnaires regarding their compliance with treatment. Satisfied patients are more adherent to treatment and physician recommendations and more loyal to the respective medical professional and facility. Thus, patient satisfaction contributes to the patient's experience.

All these suggestions are not only meant to engage the patients as active rather than passive participants, and enhance their involvement, but they are also very useful for the health practitioners. Although patients often miss relevant aspects in their discussion with the doctors, given the time constraints and the stress involved in medical evaluations, additional information would improve the health practitioner's medical efficiency.

Our results showed that some of the relationships involved in our model were non-linear, as illustrated in Figures 2 and 3. In turn, this suggests that, by both decreasing waiting time and improving the attitude of medical doctors, higher levels of patients' satisfaction are expected. Conversely, due to non-linearity, the efficiency of these two interventions depends on the initial values of the predictors. Practical interventions aimed at reducing waiting time need to be tailored to ensure that the result falls in the area of relevant intervention (more precisely, scores ranging between -2.79 and -1.49 , or between 1.82 and 2.34 , as Figure 3 shows). If the intervention ends up with scores between -1.49 and 1.82 , it will not have any significant impact on patients' satisfaction, although it will entail costs. A similar type of reasoning applies to the other non-linear relationships. The most important conclusion derived from our study is that, unless the nature of relationships among the predicting variables and satisfaction is understood, practical interventions could fail to yield positive results. Other studies presented the importance of accounting for non-linear relationships, in particular, when proper interventions should be tailored [80] and provide insights into the advantages of warping over segmentation analysis [81]. Our findings confirm the concerns of other researchers regarding the problems that may arise whenever the relationships among variables are not correctly specified [82].

5.2. Limitations and Future Research

Measuring patients' satisfaction is a complex task, highly dependent on the type of measurement, moment of measurement, type of services, or context [83]. Although our sample was country-representative, our results hold within the limits of the instrument we used and considering that the presence of missing data required imputation procedures. Another important limitation is that, in our attempt to combine direct and indirect measurements. We did not target very specific experiences, but rather overall perceptions. Nevertheless, we see our results as valuable in terms of theoretical contributions and practical and managerial implications.

Supplementary Materials: The following are available online at <http://www.mdpi.com/1660-4601/17/1/152/s1>, Table S1: Conceptual research model and hypotheses.

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Relationship between Service Quality on Public Health Center and Patient Satisfaction

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Abstract

Introduction: The aim of this study was to examine the relationship between services quality on public health center and patient satisfaction in Kutai Kartanegara Regency, Indonesia.

Method: This research used pilot pathfinder survey, which was done on February 23rd-25th 2017 in Kutai Kartanegara Regency, Indonesia. Two questionnaires were used in the study. During the data collection, there were 192 patients from the health service center, it was consisted two locations representing the urban and rural area in order to describe the quality of health service towards the patients' satisfaction. In order to investigate the correlation between the quality of health service and patient satisfaction, Pearson correlation test was conducted.

Result: The highest score regarding of the service quality was on the dimension of the doctors and pharmacy were 99.5%. The lowest level of patients' satisfaction on assurance and empathy dimension were 10.4%. There was a significance between the service quality of the doctors, nurses, pharmacy, and the administrators towards the patients' satisfaction. The highest score of the coefficient correlation on the nurse dimension was 0.273, which means that the nurses were giving good services quality and it affects the people's satisfaction.

Conclusion: A good service quality believes would affect the people's satisfaction which generally affects people's decision to choose health service provider. Health service center is expected to increase their environmental condition, and the professionalism of the nurses and registration officers in terms of their awareness and performance in order to create better services.

Keywords: quality of care, patient satisfaction, Indonesia

1. Introduction

Health is the prosperous state of body, soul, and social which enables individuals to live productively in social and economical aspects. In terms of reaching the goals, comprehensive health effort that can be afforded by all society is done, including the field of dental health (Marine et al., 2014). Based on Indonesian Law Number 36 of 2009 about health regulations, it is stated that everyone has equal rights in obtaining access health care, safe, qualified, affordable health service, has the rights to independently and responsibly decide the health service that they need. Meanwhile, the government is responsible for guaranteeing the healthy right to live for their people. Most people argue that the service provided by the state health service center has not been absolutely compatible with their expectation that it generates dissatisfaction; whereas the satisfaction of the users is the parameter of the quality of health service (Ministry of Health, 2014; Hidayat, 2016).

Patients are the important aspect in seeing the service quality provided in the field of health. Sometimes the service provided by health service providers and private dental clinics is still considered inadequate. There are several factors causing people feel uncomfortable of getting treatments such as hesitation of the dentists' capability to diagnose and give treatments towards the patients' illnesses, less sophisticated and less modern facilities and technology that are used, the system of treatment that takes too long, and lacking hospitality and skills of the medical resources. The success of the health service centers is influenced by the effectiveness and efficiency of the service related to the patients (Tanudjaya, 2014; Devi et al., 2016).

By the time, the increase of awareness and the importance of dental and oral health will evoke the self-satisfaction

of the patients. Patients' satisfaction towards the dental and oral health service is the comparison between the perception towards the service obtained and the patient's expectation before obtaining the service. If the expectation is fulfilled, it means that such service has given an incredible quality and will also evoke a high level of satisfaction (Mariane et al., 2014). The aspect observed from the quality of service includes the tangibles of the dental clinic, reliability aspect, fast responsiveness aspect, assurance aspect, and empathy aspect (Tanudjaya, 2014).

Patients' experience and satisfaction towards dental treatment are an important factor to increase dental and oral health. The patients' perception towards the service quality is believed to influence the patients' satisfaction positively which indicates that the patients' satisfaction is a result obtained from the provided treatments. The previous study by Mariane in Bahu Public Health Service in Manado stated that the medical service relates to the ultimate aspects such as appropriateness, effectiveness, and benefits of the service for the patients. From the result of her research, the level of patients' satisfaction based on the quality of the medical service obtained an average score of 89.1% with the category of strongly satisfied. The same situation is also found on a research conducted by Meymand in Iran which the average score obtained shows that 80% of the respondents felt satisfied with the quality provided by the hospital. Most of the questions in the research questionnaire ask about the service obtained, the response towards the patients' needs, providing information, explanation about the existing problems, and effective communication (Marine et al., 2014; Edman et al., 2017; Bahari & Azizan, 2013; Meymand et al., 2017).

On the health treatment, the patients' perception is considered as the main indicator in evaluating the service quality. Patients' satisfaction depends on their perception during the utilization of the health service. Based on previous research, in order to measure the service quality in health service center, four variables were used; doctors' service, nurses' service, operational quality, and the entire service quality. On the other hand, the service centers provide the same kind of service for the patients; however, they cannot give the same quality of service. Therefore, all health service centers are obliged to provide all diagnostic and therapeutic services as much as possible due to the fact that the high level of patients' satisfaction relates to a better health (Gopal & Bedi, 2014; Farooq et al., 2012; Asefa et al., 2014; Gharibi et al., 2016).

The limitedness of medical resources in Kutai Kartanegara Regency based on the National Statistics data influences the service quality and affects the level of people's satisfaction. Despite the limited number of health service center which is not comparable to the area complicates the people to obtain health service. It is made more difficult by the unavailability of public transportation that the people only rely on private transportation such as motorcycle to visit the public health service center. Looking at the existing situation, the researcher is interested in finding out the relation between the quality of health service and the level of people's satisfaction in Kutai Kartanegara Regency, Indonesia. (National Statistics, 2016; Department of health East Borneo, 2013).

2. Method

This research used pilot pathfinder survey by estimating the size of the sample based on age category in the location representing urban and rural area (World Health Organization, 2013). The data was collected in Kutai Kartanegara Regency, East Borneo, Indonesia on February 23rd – 25th 2017. The subject of the research was the citizen of Tenggarong and Samboja Districts, Kutai Kartanegara Regency, who were in the age of ≥ 18 years old and who had obtained medical treatments in health service center. The total of the respondents were 214 people; 103 respondents were in the urban category and 111 respondents were in rural category. Only the respondents who answered all the items in the demography questionnaire and the questionnaire of satisfaction towards service and service quality were included, that the final number of the sample was 192; 95 respondents were in the urban category and 97 respondents were in rural category.

The quality of the service was measured using SERVQUAL (Services Quality) questionnaire developed by Parasuraman. There were 5 dimensions of service (registration, doctor, nurse, pharmacy, and environment of health service center) with the total of 56 questions. Each question had 5 alternative answers which included: (Code 5 = excellent, 4 = very good, 3 = good, 2 = fair, and 1 = poor), (Parasuraman et al., 1988). The Satisfaction of the Health Service was measured using the questionnaire of Dena Ali which consisted of 5 dimensions (dimensions of tangibles, empathy, responsiveness, assurance, and reliability) and 22 questions which had 5 alternative answers (Code 5 = strongly satisfied, 4 = satisfied, 3 = neutral, 2 = dissatisfied, 1 = strongly dissatisfied), (Ali, 2016).

The score was given in order to determine the highest and lowest scores. The distribution is useful in avoiding the data which was not normally distribution. The score was given according to Likert study. The appraisal of 5 dimensions of health service quality of 56 questions had the maximum score of 280 and the minimum score of 56. The score which was less than 112 was categorized as poor, while score which was more than 112 was categorized

as good. The appraisal of 5 dimensions of satisfaction towards health service of 22 questions had the maximum score of 110 and the minimum score of 22. The score which was less than 66 was categorized as dissatisfied, while score which was more than 66 was categorized as satisfied.

The data was analyzed using SPSS 23 program and was analyzed using Pearson correlation test used to measure the strength and the linear relation direction from the two variables. The data serving in tables.

3. Result

The demographic characteristics of the patients participating in the study are summarized in Table 1.

Table 1. Demographic characteristics of the respondents

Demographic variables		Frequency	Percent
Gender	Male	48	25
	Female	144	75
	Total	192	100
Age	Adult age group 18-44	116	60.3
	Adult age group ≥ 45	76	39.7
	Total	192	100
Education	No education	6	3.1
	Primary school	29	15.1
	Junior high school	27	14.1
	Senior high school	100	52.1
	Bachelor's degree	30	15.6
	Total	192	100
Distance from house to public health center	0-5 km	144	75
	6-10 km	25	13
	≥ 11 km	23	12
	Total	192	100
Transportation to public health center	Walk	14	7.3
	Motorcycle	163	84.9
	Car	15	7.8
	Total	192	100

Table 2. The distribution of respondents answer based on health services quality on public health center

Quality of health services	The answer of respondents based on service quality			
	Good		Poor	
	Frequency	Percent	Frequency	Percent
1. Registration	188	98.0	4	2.0
2. Doctor	191	99.5	1	0.5
3. Nurse	187	97.4	5	2.6
4. Pharmacy	191	99.5	1	0.5
5. Environment of health service center	183	95.3	9	4.7

According to Table 2, the health services quality was assessed based on the dimension of registration, doctors, nurses, pharmacy, and the environment of health service center. From the five dimension assessed regarding the

quality of health service, the question which gained the highest number of 'good' answers was the one on the dimension of doctors and pharmacy, in which 99.5% of the respondents on the dimension felt that the service was good. However, the dimension of the environment in the health service center obtained the highest number of 'poor' answers, was 9 respondents (4.7%). Besides, the dimension of registration and nurses also obtained poor answers from the respondents, was 2.0% and 2.6%.

Table 3. The distribution of respondents answer based on satisfaction of health services on public health center

Satisfaction of health services	The answer of respondents based on satisfaction			
	Satisfied		Dissatisfied	
	Frequency	Percent	Frequency	Percent
1. Assurance	172	89.6	20	10.4
2. Empathy	172	89.6	20	10.4
3. Responsiveness	176	91.7	16	8.3
4. Tangibles	177	92.2	15	7.8
5. Reliability	177	92.2	15	7.8

The satisfaction of health service was assessed from 22 questions which were categorized in five dimensions; assurance, empathy, responsiveness, tangibles, and reliability. The question which obtained the highest number of 'satisfied' answers was the dimension of tangibles and reliability in which 177 (92.2%) of the respondents felt satisfied. The dimensions of assurance and empathy obtained the highest number of 'dissatisfied' answers was 20 (10.4%) respondents. Meanwhile, the dimension of responsiveness obtained the second smallest number of respondents who felt dissatisfied, was 16 (8.3%) respondents.

Table 4. Correlation between the dimensions of health service quality and patient satisfaction

Correlation between the dimensions of health service quality and patient satisfaction	P-value	The correlation coefficient
1. Registration	0.001*	0.244
2. Doctor	0.001*	0.247
3. Nurse	0.000*	0.273 ^β
4. Pharmacy	0.004*	0.205
5. Environment of health service center	0.202	0.092

Note. * = significance ($p < 0.05$), β = the highest score of coefficient correlation.

From Table 4, it shows that the significance score was on the dimensions of registration 0.001, doctors 0.001, nurses 0.000, and pharmacy 0.004. The significance score of the variable was $p < 0.05$, which means that registration, doctors, nurses, and pharmacy significantly influenced the level of people's satisfaction. Pearson analysis showed that the highest correlation relation was on the nurses (0.273) which mean that nurses had a good quality of service and affected the high level of people's satisfaction.

4. Discussion

Based on this research's result in Kutai Kurtanegara, it indicates that the patients who obtain dental treatments in a health care center show highest number are women. Women and young adults visit the dental clinics more than man and elderly. Basically, there is no relation between the average value of the patients' expectation and their perception based on the categories of age, gender, education level, and marital status (Mthethwa & Chabikuli, 2016).

An adult believes have a higher level of satisfaction towards a quality of service compared to youth because the older the person is, the more critical his or her way of thinking is, and they are able to assess something better. In this research, the patients with the age above 45 years old were as much as 39.7%. There is only a small number of

research that reports the relation of age and the patients' satisfaction in obtaining treatments. The most research stated that there is no significant relation associated with the age of the patient (Jalimun et al., 2014; Hasalli et al., 2014).

The higher education level of a person is, the bigger the chance to obtain information and knowledge is. Through the duration of education, the respondents or the patients will also obtain more information and knowledge compared to those who had never obtained an education, that in assessing the satisfaction of a service quality, knowledge will influence the attitude and behavior of a person. People who have low education level are not critical and even do not care about the health service that they obtained. The most respondents in this research were those of senior high school graduated, were 52.1%. The small number of respondents with bachelor's degree education level was possible because the respondents were busy with their own business or other activities (Jalimun et al., 2014; Wang et al., 2015).

In this research, the best service quality was on the dimensions of doctor and pharmacy; 99.5% of the respondents felt that the service provided was good. This is in line with the research conducted by Maino et al., in 2017, which stated that the relation between the doctors, patients, and pharmacy staffs is positive and significant towards the quality of service and patients' satisfaction. A doctor who provides service should be discipline, give a clear explanation, and a sincere attitude towards the problems that the patients experience. In the other hand, the technical competence in giving treatments and the 24 hours availability of the doctors in health service center also influence the patients' satisfaction. A doctor should not only have the ability to give treatments or a good discipline, but he or she should also be able to establish a good relationship with the patients that the doctors can help the patients in facing their problems or illnesses (Warda et al., 2016; Maino et al., 2014).

Nurses and pharmacy staffs should give an excellent health service that it can create the patients' satisfaction towards the quality of service. Patients want trained staffs for giving information. Patients also want the health service providers to work as a collaborative team and an effective communication in order to give a good service quality. Therefore, in order to guarantee an optimal quality of service, the health service provider has to be more aware and responsive towards the patients' satisfaction because it is one of the factors that can help increasing the result of provided treatments (Hasali et al., 2014; Mainoo et al., 2014).

The medical staffs are the take an important role in a service system. Medical staffs are expected to be fast, polite, and efficient in doing their operational tasks in helping the patients. The administration or registration staffs work in giving administrative service for the patients. The administration procedure in the health service center includes the process of registration, hospitalization, waiting for consultation, and paying for the treatment. The easiness of administration procedure is important in ensuring the patients' satisfaction towards a service quality in the hospital (Warda et al., 2016; Ratnam, 2015).

The environment of the health service center can indirectly become a parameter in seeing the quality of health service. In this research, the environment of the health service center had the highest number of respondents who felt dissatisfied with the service provided. Basically, an environment is associated with tools, the appearance of health service center, the facility provided, the availability of a resource, and the comfort of the environment. The facilities influencing the environment is provided by the service provider, such as parking lot, and interior instrumentation such as information board, maps of the health service center, recycle bins and medical waste. In this research, only the factor of environment that did not have significant relation towards the patients' satisfaction, which means that even though the quality of the environment of the health service center is still low, it did not influence the patients' satisfaction in obtaining the health service (Bahari & Aziza, 2013).

The better of quality service increase the satisfaction level. The patients' perception of a good service quality is believed to influence their satisfaction, which respectively influences their decision to choose a certain health service provider. Patients' satisfaction is a common factor in determining health service center. Many efforts can be done in increasing the quality of health service, from the side of quality improvement of either the staffs or the facility and the environment around the health service, that such good service quality can create healthy and prosperous people (Fraih, 2016).

In this global era competition, health service providers have to be successful in improving their process of service. Therefore, it is very important to know the way to improve the quality of all service dimensions which meets the expectation and perception of the patients. Doctors' behavior has an important role regarding the patients' satisfaction; it is then followed by the availability of medicines, the infrastructure of health service center, staffs' attitude, and medical information. The main reason why patients return to a health facility is the satisfaction associated with the doctors, interaction with patients, nurses, and the facility of the health service center. Therefore, identifying the factors that can improve the patients' satisfaction is beneficial in order to improve the service

quality; it is very important to do, especially in a health facility (Devi & Muthuswamy, 2016; Makarem et al., 2016; Chang, 2013).

5. Conclusion

Patient satisfaction related to the health care services quality. A good service quality believes that to affect the people's satisfaction which generally affects people's decision to choose health service provider. Health service centers are expected to increase their environmental condition, and the professionalism of the nurses and registration officers in terms of their awareness and performance in order to create better services. Registration, doctors, nurses, pharmacy, and environmental health service center in Kutai Kartanegara Regency have a positive correlation on patient satisfaction.

Competing Interests Statement

The authors declare that there is no conflict of interests regarding the publication of this paper.

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Patient Self-Reported Health, Clinical Quality, and Patient Satisfaction in English Primary Care: Practice-Level Longitudinal Observational Study

Yan Feng, PhD, Hugh Gravelle, PhD

ABSTRACT

Objectives: To examine the association of self-reported health of patients in general practices, as measured by the EQ-5D-5L, with practice clinical quality and patient-reported satisfaction with accessibility and consultations.

Methods: We used data from the General Practitioner (GP) Patient Survey to construct a practice-level EQ-5D-5L index as the health outcome. Key explanatory variables were patient-reported measures of satisfaction with access and consultations (also derived from the GP Patient Survey) and clinical quality measured by the achievement of clinical quality indicators reported in the Quality and Outcomes Framework. We estimated practice-level linear panel data models with random and fixed practice effects and practice and patient covariates using 2012/13 to 2016/17 data on more than 7500 English general practices.

Results: Bivariate correlations of the EQ-5D-5L index with quality measures were 0.048 for clinical quality, 0.071 for satisfaction with access, and 0.107 for satisfaction with GP consultations (all with $P < .001$). In both fixed effects regressions, which allow for unobserved time invariant practice characteristics, and random effects regressions which do not, the EQ-5D-5L index was positively associated with 1-year lags of patient satisfaction with access and GP consultations. Patient-reported health was positively associated with clinical quality in the fixed effects regressions. The implied effects were small in all cases.

Conclusion: Practice-level EQ-5D-5L is positively associated with clinical quality and with 1-year lags of patient-reported satisfaction with access and GP consultations.

Keywords: clinical quality, EQ-5D-5L, patient-reported health outcomes, patient satisfaction, primary care.

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Introduction

General practices manage long-term chronic conditions, provide preventive services, and often act as gatekeepers to other parts of the healthcare system. In most systems, they are the most frequent point of contact between patients and healthcare providers. It is therefore plausible that the quality of general (family) practices is important for population health.^{1,2}

Studies of the relationship between health outcomes and primary care quality have typically used objective measures of health, such as emergency admissions for ambulatory care sensitive conditions,^{3–5} hospital costs,⁶ or mortality⁷ and have defined quality as clinical quality. Results from these studies are mixed, with some finding that better clinical quality is associated with better health outcomes and others finding no relationship. There seem to be no studies in which the health outcome for general practice patients is derived from a validated measure of overall patient-reported health, such as the EQ-5D instrument.

It is plausible that health is improved, for a given clinical quality, when patients report better experience with access to primary care and with interactions with primary care staff. Although there is evidence of weak positive or no correlations between clinical quality and patient experience,^{8–13} there have been no studies that examine the effect on health outcomes of clinical quality and patient experience.

In this article, we make use of recently available data from the General Practitioner (GP) Patient Survey (GPPS) on a patient-reported general health measure—5-level EQ-5D (EQ-5D-5L)—for patients in more than 7500 English general practices. The GPPS also collects patient views on the quality of their practice. We combine these data with information from the Quality and Outcomes Framework (QOF) on the clinical quality of each general practice. Thus, we are able to investigate, for the first time, whether the self-reported health of the practice population, as measured by the EQ-5D-5L, is associated with the clinical quality and patient views on the accessibility of their general practice and their satisfaction with their consultations with GPs.

Methods

Background—Primary Care in the English National Health Services

The English National Health Service (NHS) provides healthcare that is tax-financed and free at the point of use (apart from a small charge for approximately 10% of prescriptions). NHS primary care is provided by general practices owned and run by family doctors (GPs). All individuals residing in England are entitled to register with a general practice, and almost all do so because practices provide primary care and are gatekeepers for elective (non-emergency) hospital care. In September 2015, there were 7674 general practices with an average list of 7450 patients and 3.8 full time equivalent GPs. Practices are paid by a mix of capitation, lump sums, items of service fees, and quality incentives. Approximately 8% of the practice income is from the QOF that rewards practices for achievement of quality indicators, mainly for the management of chronic conditions and prevention.¹⁴ Practices are reimbursed for the costs of their premises but have to fund all other expenses, such as the employment of nurses and clerical staff, from their revenue.

Data Source—GPPS

Our main data source is the GPPS - an England-wide repeated annual cross-sectional survey of patients in general practices. It was developed to provide patients the opportunity to provide feedback about their experiences of their GP practice. In each financial year (April-March), the questionnaire is sent to a random sample of approximately 5% of adult patients (different in each year and registered with their practice for at least 6 months) in every general practice. Response rates were between 33% and 39% during the 5-year period from 2012/13 to 2016/17 that we used. The survey was distributed in 2 waves (July-September and January-March) in the 4 years from 2012/13 to 2015/16 and in one wave (January-March in 2016/17). Data collection was mainly by postal paper questionnaires with options to respond online or over the telephone. The survey data are publicly available at GP practice level.¹⁵

Outcome: EQ-5D-5L Index Measure of Patient-Reported Health

During the period from 2012/13 to 2016/17, patients were asked to self-report their health using the EQ-5D-5L instrument over 5 dimensions (mobility, self-care, usual activities, pain/discomfort, anxiety/depression) with 5 severity levels for each dimension (no, slight, moderate, severe, extreme problems). The instrument was dropped from the GPPS from 2017/18 onwards.

The average response rates for the EQ-5D related questions were similar to those for the GPPS as a whole and ranged between 31% and 38% over this period. Although the EQ visual analog scale is part of the EQ-5D descriptive system, it was not included in the GPPS.

We used responses to the EQ-5D-5L instrument from the annual GPPS to construct a practice-level measure of patient health y_{gt} as

$$y_{gt} = 1 - \sum_{d=1}^5 \sum_{l=2}^5 w_{dl} p_{gdtl} \quad (1)$$

p_{gdtl} is the proportion of patients reporting level l in dimension d in practice g in financial year t . w_{dl} is the reduction in health for level l of dimension d compared with the best possible level 1 of

dimension d . Because lower levels l within a dimension imply worse health, the weights are larger for lower levels. The weights w_{dl} are those suggested by Devlin et al.¹⁶ Higher values of y_{gt} indicate better practice population health, ranging from 1 if all patients reported the best possible health state (11111) to -0.285 if all patients reported the worst possible health state (55555). y_{gt} is used as the dependent variable in main regression modeling.

As sensitivity tests, we apply 2 other sets of value weights to the raw data on the patient proportions p_{gdtl} to produce alternative summary measures of patient-reported health. The first alternative health measure is the crosswalk produced by van Hout et al.¹⁷ which collapses the 5 health levels in EQ-5D-5L to 3 levels and applies the Dolan¹⁸ value weights for EQ-5D-3L (Details are in the Appendix in Supplemental Materials at <https://doi.org/10.1016/j.jval.2021.05.019>.)

The second alternative health measure is the level sum score that does not use value weights derived from valuation studies but instead makes the simple but not implausible assumption that the value weights decline linearly with health levels:

$$m_{gt} = \sum_{l=1}^5 \sum_{d=1}^5 l p_{gdtl} \quad (2)$$

The level sum score m_{gt} for practice g at year t has a range of 5 ($5 = 1 + 1 + 1 + 1 + 1$) for the best health state to 25 ($25 = 5 + 5 + 5 + 5 + 5$) for the worst health state. This range is very different from that (1 to -0.285) for the practice-level EQ-5D-5L index in (1). To make regression results more easily comparable with those that have the EQ-5D-5L index as the dependent variable, we rescale m_{gt} as $r(m_{gt}) = 1.32125 - 0.06425m_{gt}$, so that the minimum and maximum of the rescaled level sum score are the same as the maximum and minimum of the EQ-5D-5L index: $r(5) = 1$, $r(25) = -0.285$.

Patient-Reported Quality Measures

Patient health may be affected by how easy it is for them to access the practice and by the quality of their interactions with the practice. We measure these attributes using responses to GPPS questions about patients' experiences with their practice. We measure the accessibility of the practice as the mean of the sums of the proportions of GPPS respondents reporting that their last appointment was very or fairly convenient (Q15), that their experience in making the appointment was very or fairly good (Q18), and that they were very or fairly satisfied with surgery opening hours (Q25). We measure satisfaction with GPs consultations as the average proportion of respondents saying that in their last appointment the GP was very good or good at giving enough time, listening, explaining, involving them in decisions, and treating them with care and concern (Q21) and definitely or to some extent having confidence and trust in the GP (Q22).

Clinical Quality

The QOF rewards practices for their achievement of a range of quality indicators. The indicators are for activities intended to improve the management of patients with chronic conditions. We use the ratio clinical quality indicators that are measured as the ratio of patients for whom an indicator was achieved to the number of patients declared eligible for the indicator. For example, indicator CHD06 in 2012/13 was the proportion of eligible patients with chronic heart disease whose blood pressure was 150/90 mmHg or less. Points awarded increased linearly with achievement between a lower threshold (40% for most indicators) and an upper threshold (varying between 50% and 90% across indicators and years). Practices were paid a price per point (on average

Table 1. Summary statistics.

Variables	Mean	SD	Min	Max	Observations
EQ-5D-5L index					
Overall	0.8437	0.0396	0.5709	0.9581	34 625
Between	-	0.0358	0.6000	0.9422	7942
Within	-	0.0177	-	-	4.36
QOF population achievement (proportion)					
Overall	0.8223	0.0447	0.0000	1.0000	34 625
Between	-	0.0381	0.5181	0.9501	7942
Within	-	0.0254	-	-	4.36
QOF points (proportion of max)					
Overall	0.9563	0.0613	0.0250	1.0000	34 469
Between	-	0.0520	0.4695	1.0000	7894
Within	-	0.0373	-	-	4.37
Accessibility (proportion)					
Overall	0.8364	0.0759	0.4367	1.0000	34 625
Between	-	0.0705	0.5217	0.9967	7942
Within	-	0.0300	-	-	4.36
GP consultation satisfaction (proportion)					
Overall	0.8567	0.0615	0.4167	0.9967	34 625
Between	-	0.0568	0.4458	0.9900	7942
Within	-	0.0271	-	-	4.36

Note. QOF PA: max points weighted average population achievement rate for 33 clinical indicators. QOF points: proportions of max points achieved. Accessibility: average of proportions of GPPS respondents reporting very or fairly convenient to get an appointment, very or fairly good experience of making an appointment, very or fairly satisfied with GP surgery opening hours. GP consultation satisfaction: average of proportions of GPPS respondents reporting their GPs were very good or good at "giving you enough time," "listening to you," "explaining tests and treatments," "improving you in decisions about your care," and "treating you with care and concern" and reporting they have confidence and trust in the GPs they saw or spoke to. Between observations: N practices; Within observations: average number of years per practice.

around £125), which varied with the number of patients with the relevant condition.

We use the QOF ratio clinical indicators to construct a summary measure of the clinical quality of the practice. Points are a crude measure of clinical quality because increases in the achievement ratio above the upper threshold do not affect the number of points earned. Instead, we measured clinical quality as population achievement: the number of patients for whom the indicator was achieved divided by the total number of patients with the condition for whom the indicator was relevant.¹⁹ We used a weighted average of population achievement, where the weights were the maximum points available for the indicators.

The QOF incentive scheme changed over time as new indicators were added, old indicators retired, and the number of QOF points and incentive thresholds attached to some indicators changed. We use 33 QOF clinical ratio indicators that were consistently defined from 2012/13 to 2016/17 (see Appendix Table A1 in Supplemental Materials at <https://doi.org/10.1016/j.jval.2021.05.019>). Ten indicators were for intermediate outcomes, such as the proportion of patients with diabetes whose last blood pressure was 150/90 mm Hg or less. The other 23 indicators were for process outcomes that were linked to interventions known to improve patients' health outcomes, such as the proportion of patients with peripheral arterial disease taking aspirin or an alternative antiplatelet.

Covariates

In addition to the 3 quality measures, we used a rich set of covariates as explanatories in the regression models. We included data on practice characteristics from General Medical Statistics: include list size, the number of GPs, their age, gender, and country of qualification, the number of nurses, and the type of contract the

practice has with the NHS. We used the practice location to attribute the Office for National Statistics Rural-Urban Classification 2011²⁰ and a measure of small area deprivation from the 2015 Index of Multiple Deprivation.²¹

We use information from the GPPS on the characteristics of the respondents in each practice: age and gender proportions, ethnicity, employment status, travel to work time, proportion who can take time from work to visit GP, smoking status, provision of informal care, sexual orientation, and proportions with 16 types of long-standing health problems. We used unweighted GPPS data because explanatories were either at practice level and could not be attached to individual patients or were means across the mix of GPPS respondents in the practice.

Sample

We had initial data on 7500 to 8000 practices in England for 5 financial years from 2012/13 to 2016/17, with 38150 practice-year observations. We exclude observations with missing items. We also dropped observations from small practices with less than 1000 patients because these practices were likely to be new, in the process of closing, serving specific populations, or providing specialised services.^{22,23} The final sample had 34 625 practice-year observations.

Model Specification

Our baseline specification is

$$y_{gt} = \beta_0 + Q'_{gt}\beta^Q + Q'_{g(t-1)}\beta^{Q-1} + x'_{gt}\beta^G + x'_{gt}\beta^P + D^T\beta^T + \alpha_g + \varepsilon_{gt} \quad (3)$$

where y_{gt} is the EQ-5D-5L index for practice g in year t . Q_{gt} is a vector of quality measures (QOF population achievement, patient

Table 2. Practice quality and EQ-5D-5L.

Variables	Random effects (1)	Fixed effects (2)
QOF PA (proportion)	0.0064* (0.0037)	0.0092† (0.0046)
Lagged QOF PA (proportion)	0.0067* (0.0039)	0.0008 (0.0051)
Access satisfaction (proportion)	−0.0006 (0.0033)	−0.0063 (0.0043)
Lagged access satisfaction (proportion)	0.0168‡ (0.0033)	0.0184‡ (0.0040)
GP consultation satisfaction (proportion)	−0.0021 (0.0036)	0.0021 (0.0048)
Lagged GP consultation satisfaction (proportion)	0.0119§ (0.0036)	0.0153§ (0.0045)
R ² overall	0.7884	0.6830
R ² within	0.3672	0.3840
Observations	26 683	26 683
Practices	7773	7773

Note. Dependent variable: EQ-5D-5L index. Models also include patient and practice covariate and year effects. QOF PA is the maximum points weighted average population achievement rate for 33 clinical indicators. Robust standard errors (in parenthesis) clustered on practices.

* $P < .1$; † $P < .05$; ‡ $P < .01$; § $P < .001$.

satisfaction with access and with last GP consultation). $Q_{gt(t-1)}$ is a vector of 1-year lags of the 3 quality measures. x_{gt}^C and x_{gt}^P are vectors of the characteristics of the practice and its GPPS respondents. D^T is a vector of year dummies, α_g is a practice effect, and ϵ_{gt} is a zero mean error term. Using 1-year lags of the quality measures reduced the estimation sample to 26 683 practice-year observations on 7773 practices.

The model allowed for the possibility that current patient health may depend on both current and past practice quality because quality has persistent effects. Using current and 1-year lags of quality also allowed for the fact that the QOF-based clinical quality measure was on the basis of practice activity over the whole year, whereas the GPPS was administered part way through the year and its timing changed during our study period.

We also included a large set of practice and patient characteristic covariates to reduce the risk of omitted variable bias from unobservable time-varying factors. To reduce the risk of bias from unobserved time invariant factors correlated with quality and health, we estimated models with random and fixed practice effects. The random effects specification assumes that the time-varying explanatories are uncorrelated with unobserved time invariant practice factors. If the assumption is valid, it is more efficient than the fixed effects specification because it makes use of both within- and between-practice variation in the data, whereas fixed effects specification relies on the within variation. We tested this assumption using the auxiliary regression test.²⁴

We also estimated random and fixed effects specifications in 2 sensitivity analyses in which we replaced the practice-level

EQ-5D-5L index y_{gt} with the level sum score (2) and with the 5 levels in EQ-5D-5L collapsed to 3 levels and valued with EQ-5D-3L weights.

All models were estimated with Stata 16 (StataCorp LLC, College Station, TX), and we reported robust standard errors clustered at practice level.

Results

Summary Statistics

Table 1 has summary statistics for the EQ-5D-5L index and the practice quality measures. Further statistics on these variables and the covariates are in Appendix Tables A2 and A3 in Supplemental Materials at <https://doi.org/10.1016/j.jval.2021.05.019>. Over the 5-year study period, the average practice-level EQ-5D-5L index was 0.844. This is slightly lower than the EQ-5D-5L index English population norm (0.876).²⁵ The distribution of self-reported health across EQ-5D-5L dimensions and levels changed little over the five years. The self-care dimension had the largest proportion (0.90) of level 1 (no problem) reports, and the pain/discomfort dimension had the smallest proportion (0.52). There were considerable differences in patients' self-reported health in EQ-5D-5L between practices, and the between-practice standard deviation was approximately twice as large as the within-practice standard deviation.

In each year, approximately 90% of practices achieved at least 90% of the total available QOF points (with a mean proportion of total points achieved of 0.96). The QOF population achievement rate averaged 0.82. On average, 83.64% of the GPPS respondents reported good or very good experience with accessibility of the practice, and 85.67% of the respondents reported good or very good experience with the quality of communication with their GPs. Like the health measure, most of the variation in clinical quality, and satisfaction with access and GP consultations was between practices rather than within them over time.

The bivariate correlations of the EQ-5D-5L index with the quality measures were 0.048 for clinical quality, 0.052 for 1-year lag of clinical quality, 0.071 for satisfaction with access, 0.068 for 1-year lag of satisfaction with access, 0.107 for satisfaction with GP consultations, and 0.106 for 1-year lag of satisfaction with GP consultations (all with $P < .001$).

Baseline Results

The results from modelling the relationship of EQ-5D-5L with clinical quality, access satisfaction, and satisfaction with consultations are reported in Table 2 for our baseline specification (equation (3)). The full results are given in Appendix Table A4 in the Supplemental Materials at <https://doi.org/10.1016/j.jval.2021.05.019>. The auxiliary regression test²⁴ rejected ($P < .0001$) the random effects assumption that unobserved time invariant practice factors are uncorrelated with the time varying explanatories. The fixed effects specification is our preferred estimator, but because the assumptions justifying random effects are extremely strong, we report results from both random and fixed effects models.

The random effects model has positive and statistically significant coefficients (at 5% level) on lagged patient-reported satisfaction with access and GP consultations. In the model with practice fixed effects, the coefficients on lagged patient-reported satisfaction with access and GP consultations are positive and

Table 3. Practice quality and alternative health outcome measures.

Variables	EQ-5D-3L index		Rescaled EQ-5D-5L level sum score	
	Random effects (1)	Fixed effects (2)	Random effects (3)	Fixed effects (4)
QOF PA (proportion)	0.0068* (0.0039)	0.0117† (0.0047)	0.0069* (0.0038)	0.0100† (0.0045)
Lagged QOF PA (proportion)	0.0061 (0.0040)	0.0018 (0.0052)	0.0059 (0.0040)	-0.0004 (0.0052)
Access satisfaction (proportion)	0.0004 (0.0034)	-0.0066 (0.0045)	0.0001 (0.0034)	-0.0059 (0.0045)
Lagged access satisfaction (proportion)	0.0153‡ (0.0034)	0.0158‡ (0.0042)	0.0192‡ (0.0035)	0.0216‡ (0.0041)
GP consultation satisfaction (proportion)	-0.0020 (0.0037)	0.0026 (0.0049)	-0.0018 (0.0037)	0.0025 (0.0049)
Lagged GP consultation satisfaction (proportion)	0.0145‡ (0.0037)	0.0180‡ (0.0046)	0.0124‡ (0.0037)	0.0156‡ (0.0046)
R ² overall	0.7837	0.6745	0.8023	0.6972
R ² within	0.3582	0.3759	0.3909	0.4093
Observations	26 683	26 683	26 683	26 683
Practices	7773	7773	7773	7773

Note. Models also include patient and practice covariate and year effects. EQ-5D-5L level sum scores are rescaled to have the same range of values [-0.285, 1] as the EQ-5D-3L index. QOF PA is the maximum points weighted average population achievement rate for 33 clinical indicators. Robust standard errors (in parenthesis) clustered on practices.

* $P < .1$; † $P < .05$; ‡ $P < .01$; § $P < .001$.

statistically significant, and slightly larger than in the random effects model. Current QOF clinical quality is also positively and significantly associated with EQ-5D-5L in the fixed effects model, and its coefficient is again larger than in the random effects specification.

The full set of fixed effects results (see Appendix Table A4 in Supplemental Materials at <https://doi.org/10.1016/j.jval.2021.05.019>) suggested that patient health was not associated with the characteristics of practice GPs (age, gender, country of qualification) or the list size of the practice, possibly because they change relatively little over time within practices. The coefficients on the characteristics of the patients responding to the GPPS were generally plausible: practices in which there was an increase in the proportion of respondents who were old, who reported chronic conditions, or who smoked experienced a reduction in the EQ-5D-5L index. There was no association between changes in the proportions of respondents in 4 categories of non-white ethnicity and changes in health. Practices in which there was an increase in the proportion of respondents who took full-time or part-time jobs had an increase in average health.

Sensitivity Analyses

In Table 3, we report results from models using alternative scoring systems to summarize the EQ-5D-5L practice profiles: the EQ-5D-3L crosswalk index values and the rescaled EQ-5D-5L level sum score. The alternative health outcome measures were very highly correlated with the practice EQ-5D-5L measures: $\text{corr}(\text{EQ-5D-3L crosswalk, EQ-5D-5L index}) = 0.994$, $\text{corr}(\text{EQ-5D-5L index, EQ-5D-5L level sum score}) = 0.991$, $\text{corr}(\text{EQ-5D-3L crosswalk, EQ-5D-5L level sum score}) = 0.986$. Thus, the results with the alternative health measures were very similar to those for the baseline model using the EQ-5D-5L index health measure: health was positively and statistically significantly associated with lagged patient satisfaction with access and lagged satisfaction with GP consultations in both fixed and random effects specifications, and current QOF clinical quality was positive and statistically significant in the fixed effects specifications.

Magnitudes of Effects of Quality Measures

The results in all the models imply small effects of the quality measures on patient health for all 3 measures based on the EQ-5D instrument. The estimated coefficients from the preferred fixed effects model using EQ-5D-5L index values in column (2) of Table 2 imply that the elasticities with respect to the quality measures evaluated at the mean of EQ-5D-5L ($(dy/dx)\bar{x}/\bar{y} = \hat{\beta}\bar{x}/\bar{y}$) are 0.009 (95% confidence interval [CI]: 0.000 to 0.018) for QOF population achievement, 0.019 (95% CI: 0.010 to 0.026) for lagged access satisfaction, and 0.015 (95% CI: 0.007 to 0.025) for lagged satisfaction with GP consultations.

Discussion

This is the first study to examine the relationship of a widely used measure of patient-reported general health with clinical and patient-reported measures of the quality of care provided in

general practices. Using a panel of all English general practices, we found small positive statistically significant associations of changes in the practice-level EQ-5D-5L health outcome measure with changes in current practice clinical quality as measured by the achievement of clinical indicators in the QOF and with changes in 1-year lags of patient-reported satisfaction with access and consultations with GPs. Results are robust to applying 2 sets of alternative value weights to the raw EQ-5D-5L data to produce alternative summary measures of general patient health.

A limitation of the study is that we only had access to practice level rather than individual patient level data. This means, for example, that we could not examine the relationship between measures of QOF clinical quality for care of patients with specific condition and the health of patients with those conditions. We also had retrospective observational data but reduced potential confounding by using a rich set of covariates on the characteristics of general practices and their patient populations over 5 years, and we used practice fixed effects to control for unobserved time invariant practice factors which may be associated with health and quality.

It has been suggested that EQ-5D is not a useful measure of patient outcome in general practice: patients may present more than one condition at a time, they may require referral to other healthcare providers, much of primary care treatment is preventive, and there may be lags in the improvement in outcomes after treatment.²⁶ These characteristics may make it more difficult to measure the impact of specific interventions, but they are not unique to primary care. Moreover, they do not remove the need for a generic measure of population health to be employed in resource allocation decisions across the health sectors.²⁷

Policies to improve primary care, such as the UK QOF, have focused on measures of clinical quality of care for specific conditions. Our findings, that patient-reported accessibility and quality of interactions with GPs are positively associated with EQ-5D-5L, suggest that it would also be worthwhile to evaluate policies to improve these patient-reported aspects of quality.

Supplemental Material

Supplementary data associated with this article can be found in the online version at <https://doi.org/10.1016/j.jval.2021.05.019>.

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Safety and satisfaction of patients with nurse's care in the perioperative*

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Objective: to investigate the safety and satisfaction of patients and their relationship with nurse's care in the perioperative period. **Method:** cross-sectional, multi-level, correlational study with 105 nurses in the surgical area and 150 patients operated in a Spanish tertiary hospital. For the nurses the sociodemographic variables, the perception of the work environment, the professional burnout and the satisfaction in the work were collected. For patients, the safety of adverse events and level of satisfaction, through the application of questionnaires. Univariate and multivariate analysis were used. **Results:** job satisfaction, professional commitment, and participation in hospital issues were negative predictors for adverse events related to the patient, while postoperative nurse care was a positive predictor. **Conclusion:** there is an increase in adverse events when nurses are dissatisfied at work, less professional commitment and low availability to participate in the subjects of their unit. On the other hand, adverse events decrease when nurses perform the care in the postoperative period. Satisfaction was good and there was no association with the characteristics of nurses' attention. It is recommended to improve these predictors to increase the safety of surgical patients.





Descriptors: Perioperative Nursing; Patient Safety; Patient Satisfaction; Adverse Events; Perioperative Care; Health Facility Environment.

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Introduction

The goal of a healthcare system is to ensure safe and quality health care. In this context, patient safety is a major concern today. In the context of the Patient Safety Program, the World Health Organization (WHO), develops programs that address the different risks to patients around the world⁽¹⁾. In Spain, the Ministry of Health has placed patient safety as one of the key elements to improve the quality of care, according to the 2015-2020 Patient Safety Strategy. This guide describes details of the recommendations applicable to the different areas of care and to all professionals in the health team⁽²⁾. Nurses stand out as members of health care teams because they play a key role in direct patient care and an important role in the detection and prevention of adverse events (AE). An adverse event corresponds to any unintentional injury or complication resulting from healthcare. AE are indicators of patient safety and quality of care⁽³⁾. In the nursing field, AE are called nursing-sensitive outcomes⁽⁴⁾. The most common indicators of AE related to nursing care are errors in medication administration, falls, pressure ulcers, resuscitation failures, rescue failures, nosocomial infections, and follow-up of procedures⁽⁵⁾.

On the other hand, patient satisfaction about the care received is considered an indicator of quality⁽⁶⁾. The main causes of AE in healthcare are related to human factors, such as professional competence to assess risks, and also factors related to the system, such as conditions and characteristics of the environment in which the nurses develop their work⁽⁷⁾. The personal and environmental characteristics of their practice are critical predictors of patient care quality⁽⁸⁾. The association between the characteristics of the nurses' work environment and higher levels of training and personal endowment creates a better working environment and promote favorable outcomes in patient health, even with respect to mortality⁽⁹⁾. Other factors in the work environment have been associated to the quality and safety of patient care, including the physical environment, working hours, and the extent of exhaustion of nursing professionals⁽¹⁰⁾.

Most investigations have been carried out at the hospital level⁽¹¹⁾. However, research in complex areas such as in the surgery context, is very scarce and yet a very important focus due to the volume of interventions performed worldwide each year (234 million). Surgical care leads to a considerable risk of AE that contributes to increasing the burden of morbidity. However, 50% of the complications that arise can be avoided through strategies such as "safe surgery saves lives"⁽¹²⁾. To avoid complications and AE in the surgical area, nursing

interventions should cover the entire perioperative period, i.e. before, during, and after surgery⁽¹³⁾. In this sense, the impact of interventions provided by perioperative nurses on patient health outcomes, although relatively little known, seems to be of great importance. Some authors have investigated the relationship between the nursing team and complications in surgical patients⁽¹⁴⁾, as well as the phenomenon of Burnout in the surgical center⁽¹⁵⁾. However, the relationship between perioperative nursing and patient outcomes has not been studied. For this reason, the present research raises questions about the impact of perioperative nurses and of the environment of their practice on the outcomes of surgical patients? This study has therefore the objective to investigate the safety and satisfaction of patients and their relationship with nurse's care in the perioperative period.

Method

This work applied a cross-sectional and correlational design with two convenience samples. The first includes nurses from the surgical area, $n = 105$.

All the nurses who worked in the perioperative, transoperative and postoperative unit of the surgical area were contacted to participate. Nurses who were absent due to vacations or sick leave during the study period were not included. The second sample, $n = 150$, was composed of patients operated in different specialties: general surgery, orthopedic surgery and traumatology, thoracic surgery, gynecological surgery, neurosurgery, and plastic surgery. The patients excluded from the study were those under 18 years of age, with cognitive deficits, who had undergone endotracheal intubation for more than 48 hours, or those who had been discharged within 24 hours after the intervention. The sample size was calculated considering a confidence interval (CI) of 95 under the hypothesis of maximum intermissions ($p = q = 50\%$) and a margin of error of $\pm 1.19\%$ in the sample of nurses and $\pm 1.13\%$ in the sample of patients. Data were collected during the period 2014-2015 at the Hospital de la Santa Creu i Sant Pau, Barcelona. Spain

The study combines data collected from the perioperative nursing unit at the level of individual nurses and at the level of patient through various data sources. The first source was a questionnaire applied to nurses to collect information on the characteristics of the organization and of the perioperative unit (nurses' practice environment), and on sociodemographic (age and sex) and work (academic training, work experience, type of contract, job satisfaction, intention to leave the hospital, and burnout) aspects. The second source came from the patient satisfaction questionnaire, and the third

source was patient data on management, adverse event reports, mortality, and clinical outcomes.

The Spanish version of the Practice Environment Scale of the Nursing Work Index (PES-NWI), which presented Cronbach's alpha values of 0.90 (95% CI: 0.87-0.93), was used to measure the environment or the practice environment of the nurses⁽¹⁶⁾. The index is composed of 31 items and is structured in five factors: (1) personal and resources; (2) working relationships between nurses and physicians; (3) leadership and support from supervisors; (4) nursing bases for quality care; and (5) nurses' participation in hospital matters. The professionals had to assess their relevance in a Likert-type scale varying from 1 to 4 (1 = totally disagree, 2 = disagree, 3 = agree, and 4 = totally agree). Once the evaluations were obtained, the work environment was classified as favorable when presenting 4 or 5 factors with an average score higher than 2.5, mixed in the case of having 2 or 3 factors, and unfavorable in case of having 1 or no factor.

The Spanish version of the Maslach Burnout Inventory (MBI)⁽¹⁷⁾ was used to measure professional burnout of the nursing staff. MBI is the most frequently used tool to measure burnout caused by work and consists of three dimensions: emotional exhaustion (EE), depersonalization (DP) and personal accomplishment (PA). The inventory contains 22 items measured on a Likert-type scale with scores from 1 to 7 points (from «never» to «every day»). The MBI established that the three dimensions are categorized into three groups each (low, medium and high) according to the following values: EE: low ≤ 18 , medium [19-26], high ≥ 27 ; DP: low ≤ 5 , medium [6-9], high ≥ 10 ; PA: low ≥ 40 , medium [39-34], high ≤ 33 . The reliability and validity of this tool, obtained in another study, demonstrated its applicability⁽¹⁸⁾.

To measure the nurses' satisfaction, we followed the methodology used in the RN4CAST project. A single question with Likert-type scale (1 "Very dissatisfied" to 4 "Very satisfied") was used to evaluate satisfaction with the current work (coefficient of reliability 0.7). The satisfaction questionnaire was also applied to nine specific aspects of the work: flexibility of time, professional development, autonomy at work, salary, training, vacations, commitment, sick leave, and permission to study⁽¹⁹⁻²⁰⁾. As to patients, data on sociodemographic aspects (age and sex), the specialty of the surgery to which they were submitted, the presence of comorbidities, and the length of hospital stay were collected. Patient safety outcomes were analyzed by assessing the presence of adverse events, including mortality and rescue failure. The indicators of EA of the 150 patients were collected from records

of adverse events reported in the surgical area and in medical records. The criteria and data sources for each outcome were based on the SENECA100 model: pressure injuries, nosocomial infections, phlebitis, medication-related AE, postoperative complications and pain. This model was used in another study at the national level⁽²¹⁾, which coincided with reliable and valid indicators in international studies⁽²²⁾. For this study, the AE were recoded in a dichotomous variable (absence/presence of AE) to relate them to the characteristics of the nurses.

LaMonica-Oberst Patient Satisfaction Scale 12 (LOPSS-12) adapted in Spanish⁽²³⁾, with Likert-type scale responses ranging from 1 (totally agree) to 5 (totally disagree) was used to analyze the satisfaction of patients with nursing care. All elements are related to the care provided by the nursing staff, for example: "They help me understand my illness". The original scale was structured in two satisfaction factors: the positive and the negative factor, which were difficult to measure. For this reason, we chose to recodify it in one direction, calculating the arithmetic mean of the responses given to the 12 items: the higher the score obtained, the higher the degree of patient satisfaction, as in another study⁽²⁴⁾. The internal consistency of the LOPPS questionnaire was 0.81 (Cronbach's alpha). In addition, patients were asked if they would recommend the hospital to others. The questionnaires were self-completed, after signing the Informed Consent Form.

Regarding the treatment and analysis of data, the descriptive analysis of the characteristics of nurses and patients was done using absolute frequencies and percentages for the qualitative variables, and means and standard deviation (SD) for the quantitative variables. Considering that there were set of patients assisted by the same nurse (105 nurses for 150 patients), multiple-level analyses were performed incorporating the hierarchical structure of the data, that is, patients nested within nurses. The multilevel full regression model assumes a set of hierarchical data with the dependent variable (presence/absence of AE) measured at the lowest level (patients) and the explanatory variables that exist at both levels. In the present study, the efficient way to correct the variable nurse that assists the patient is to use the multilevel analysis, that is, the nurse variable as the second level. Observations made at the level of patient are nested at the level of nurse.

Taking into account this hierarchical structure of the data, the following analysis were made: estimation of the mean in different variables through the models that include the variable of random effects and variable of fixed effects. A univariate analysis was performed between each of the independent variables (fixed effects)

and the scores of the dependent variables through simple multilevel linear regression models. In turn, a multivariate analysis was made using multilevel multiple linear regression models for the independent variables (fixed effects) that were taken to the multivariate models that were those that obtained a level of significance $p < 0.001$ in the univariate analysis. A hierarchical structure of the data was established and the variables were inserted in the model to estimate the effect of the two levels, where the individual level 1 or base level is the patient, and the level 2 or the higher level is the group of nurses in the surgical area. Thus, there were 150 surgical patients (level 1) attended in the surgical area by the group of 105 nurses (level 2). In our models, the response or dependent variables were AE within the 30 days after the intervention, on the one hand (considered dichotomized, i.e. presence/absence), and satisfaction of surgical patients on the other. The variables of random and fixed effects were those related to the characteristics of patients and nurses. Each of the 150 patients was treated in the surgical area by more than one nursing professional. Our data indicate that at least five and at most 12 professionals assisted each patient. The group of 105 nurses from the surgical area was included because they assisted the 150 patients submitted to surgery. The most usual number of patients assisted by a nursing professional was four (14 times), but it was also noticed that there were professionals who observed two patients (11 times), eight patients (10 times), and 12 patients (10 times). Each of the 150 patients assisted by the group of 105 nurses generated a database of 1422 records. This, therefore, is the valid N of the analysis. This N is highly representative (95% confidence, $p = q = 50\%$) with a margin of error of 0.37%.

In the first part of the statistical analyses, a univariate analysis was performed with the objective of predicting the appearance of AE based on the independent variables of the patients and the variables of nurses who assisted such patients. Then, the multivariate and multilevel analysis procedure was applied to determine the factors of patients and nurses that were significant predictors of the presence variable of AE. To this end, only those factors that were statistically significant at least for $p < 0.001$ in the previous univariate analysis were considered. For the multivariate analysis, null model tests determined whether a predictive model of multiple levels was possible⁽²⁵⁾. The null model for baseline analysis (patients) presented a statistical value of $\text{Chi}^2 = 1718.66$, with $p < 0.001$ model were performed; highly significant; and the null model for the higher level (nurses) had a value of $\text{Chi}^2 = 161.52$ with $p < 0.001$; both highly significant. Therefore, a multilevel predictive model was made, based on the variables of

the patients and on the variables of the nurses who assisted them. Significance was considered when the p value was lower than 5% ($p < 0.05$). However, given the high N, high significance was only considered when the variables reached significance ($p < 0.001$).

The statistical package STATA Statistics Data Analysis v.12.0 was used for the multilevel analysis. For the rest of the analyses, the statistical application IBM SPSS Statistics v-22.0 was used.

International ethical recommendations for medical research in human subjects were followed closely in this study. The study was approved by the Ethics Committee of the Hospital de la Santa Creu i Sant Pau (CEIC Code: 42/2014). The security and confidentiality of the study data were guaranteed in accordance with the provisions of Organic Law 15/1999 of 13 December on the Protection of Personal Data.

Results

Description of the results concerning nurses: 105 questionnaires filled out by the perioperative nurses were collected. A total of 91.5% (96) of the nursing professionals were women. The mean age of the women was 44.0 years (standard deviation of 11.90), higher than that of men who was 36.7 years (10.26), the most significant difference ($p = 0.51$). The average professional experience of the professionals was 21.6 years (SD 12.13) in total and 14.0 years (SD 11.14) in the current working environment. With respect to training, 98.4% (103) of the nurses had specialization, among them 33.4% (35) had master's degree and 66.6% (70) had post-graduate degree. Description of patient outcomes: 150 surgical patients were included until the sample size was reached. A total of 45.3% (68) underwent general surgery, 19.3% (29) orthopedic surgery, 9.3% (14) thoracic surgery, 8% (12) vascular surgery, 10% (15) gynecology, 6.7% (10) neurosurgery, and 1.3% (2) plastic surgery. The study had 77 men (51.3%) and 73 women (48.6%), with a mean age of 63.6 years (SD 16.05). The discharge destination was the patient's home in the case of 94.5% (141.75) of the cases, and the mean time of hospital stay was 24.9 hours (SD 3.7). As for comorbidities, 46% (69) of the patients presented some type of comorbidity.

Regarding AE, 38% (57) of the surgical patients in the study presented some type of AE during the surgical process, from the time of admission up to 30 days after the intervention. The most frequent AE was the presence of pain, present in 23.3% of the cases (35). Postoperative complications included reintervention or bleeding in 8% (12) patients, wound infection in 6.4% (10), followed by position or pressure injuries

in 3.3% (5), urinary infection in 2% (3), respiratory infection in 1.3% (2) and medication error in 0.6% (1). There were no other types of AE in these patients.

The results for the variables of patient characteristics (predictive factors) of the presence/absence of adverse events within 30 days postintervention are presented in Table 1.

The association between the existence of comorbidity and the appearance of AE in operated patients was highly significant. The relationship between

the type of surgical specialty and the presence/absence of AE was also significant. The appearance of AE was more frequent in cases of neurosurgery (52.4%) than in the rest of the specialties (between 28.6% in thoracic surgery and 41.8% in general surgery). No association was found among the other analyzed variables.

In the second analysis, an association was made between the variables characteristics of the nursing work environment and presence/absence of AE within 30 days post-intervention. (Table 2)

Table 1 - Univariate multilevel analysis. Variables of patients' characteristics and presence/absence of AE* in patients within 30 days post-intervention (N = 1422) Barcelona, Spain 2014-2015

Patient Variables		Presence of AE*	Absence of AE*	p [†]
		%	%	
Sex	Female	38.0	62.0	0.408
	Male	40.1	59.9	
Comorbidity	Yes	43.5	58.6	<0.001 [†]
	No	35.2	64.8	
Expertise	General surgery	41.8	58.2	<0.001 [†]
	Traumatology	41.2	58.8	
	Gynecology	31.7	68.3	
	Thoracic surgery	28.6	71.4	
	Vascular surgery	33.3	66.7	
	Neurosurgery	52.4	47.6	
	Plastic surgery	0	100	
Age (years)	Mean (SD) [‡]	63.5(14.33)	63.3(17.17)	0.900
Stay (hours)	Mean (SD) [‡]	25.04(3.73)	24.8 (4.0)	0.321

*AE: Adverse Event, †p: p-value significance, ‡SD: Standard deviation.

Table 2 - Univariate multilevel analysis. Significance in the relation of variables with the nurses' characteristics and presence/absence of AE* in patients within 30 days post-intervention (N = 1422) Barcelona, Spain, 2014-2015

Nurses' variables		Presence of AE*	Absence of AE*	p [†]
Age (years)	Mean (SD) [‡]	47.21 (12.23)	45.23 (13.09)	0.004
Nurse - Pre-operative	Yes	27.1 %	73 %	<0.001 [†]
	No	40.8 %	59.2%	
Nurse - Post-operative	Yes	44.7 %	55%	<0.001 [†]
	No	34.8 %	65.2 %	
Type of contract	Eventual	40.4 %	59.6%	0.004
PES-NWI [§] factor1	Mean (SD) [‡]	2.08 (0.62)	2.27 (0.57)	<0.001 [†]
PES-NWI [§] factor2	Mean (SD) [‡]	2.28 (0.78)	2.50 (0.67)	<0.001 [†]
PES-NWI [§] factor3	Mean (SD) [‡]	2.20 (0.79)	2.55 (0.66)	<0.001 [†]
PES-NWI [§] factor4	Mean (SD) [‡]	2.53 (0.58)	2.80 (0.55)	<0.001 [†]
PES-NWI [§] factor5	Mean (SD) [‡]	1.91 (0.46)	2.16 (0.48)	<0.001 [†]
MBI Emotional Exhaustion	Mean (SD) [‡]	1.92 (0.87)	1.56 (0.81)	<0.001 [†]
Current satisfaction	Mean (SD) [‡]	2.10 (0.35)	2.24 (0.47)	<0.001 [†]
Flexibility of time	Mean (SD) [‡]	2.42 (0.65)	2.59 (0.74)	<0.001 [†]
Professional development	Mean (SD) [‡]	2.15 (0.56)	2.24 (0.69)	<0.001 [†]
Autonomy at work	Mean (SD) [‡]	2.15 (0.74)	2.41 (0.81)	<0.001 [†]
Salary	Mean (SD) [‡]	2.04 (0.24)	2.02 (0.22)	0.351
Training	Mean (SD) [‡]	1.99 (0.21)	2.04 (0.31)	<0.001 [†]
Vacations	Mean (SD) [‡]	2.10 (0.35)	2.24 (0.47)	<0.001 [†]
Sick leave	Mean (SD) [‡]	2.04 (0.26)	2.08 (0.31)	0.042
Permission to study	Mean (SD) [‡]	2.13 (0.43)	2.22 (0.50)	<0.001 [†]
Professional commitment	Mean (SD) [‡]	3.37 (1.20)	3.92 (1.14)	<0.001 [†]

*AE: Adverse Event; †p: p-value significance; ‡SD: standard deviation; §PES-NWI: Scale of the nurse's practice environment; ||MBI: Maslach Burnout Inventory.

The frequency of onset of AE in patients was significantly lower when nurses assisted them in the preoperative period (27.1% vs. 40.8%). On the other hand, a higher frequency of patients with AE was significantly associated with less care of nurses in the postoperative unit (44.7% vs. 34.8%). The mean of the five PES-NWI factors was also significantly lower in nurses who treated patients with AE. Of the three dimensions of the MBI, there was a greater emotional exhaustion of nurses assisting patients with some AE. Finally, all variables related to job satisfaction, with the exception of salary, obtained lower scores in nurses who assisted patients with AE.

After this, a multivariate analysis was performed. The coefficients (r) are presented in the univariate way for all the independent variables analyzed and adjusted for those variables that were included in the final multivariate model (Table 3).

Table 3 - Multivariate multilevel analysis. Significance of predictive factors (nurses and patients) on the presence of adverse events within 30 days after the intervention (N = 1422). Barcelona, Spain 2014-2015

Predictors (fixed effects factors)	Unadjusted values			Adjusted values		
	Coe*	S.E†	p-value‡	Coe*	S.E†	p‡
Age	0.250	0.232	0.325	—	—	—
Preoperative nurse	-0.481	0.467	0.302	—	—	—
Postoperative nurse	0.903	0.248	<0.001‡	0.710	0.217	<0.001‡
Type of eventual contract	-0.722	0.684	0.295	—	—	—
PESNW‡ Factor1	-0.367	0.183	0.044	-0.124	0.175	0.477
PESNW‡ Factor2	-0.224	0.175	0.200	—	—	—
PESNW‡ Factor3	-0.527	0.157	<0.001‡	-0.014	0.198	0.942
PESNW‡ Factor4	-0.504	0.217	0.020	0.254	0.254	0.319
PESNW‡ Factor5	-0.888	0.252	<0.001‡	-0.640	0.235	0.007
MBI Exhaustion	0.511	0.140	<0.001‡	0.152	0.135	0.260
Current satisfaction	-0.656	0.289	0.023	-0.780	0.270	0.004
Flexibility of time	-0.377	0.173	0.030	-0.261	0.155	0.094
Professional development	-0.348	0.156	0.025	0.215	0.144	0.136
Autonomy at work	-0.212	0.203	0.296	—	—	—
Training	-0.518	0.505	0.305	—	—	—
Vacations	-0.448	0.235	0.057	—	—	—
Sick leave	0.695	0.361	0.054	—	—	—
Permission to study	1.136	0.805	0.158	—	—	—
Professional commitment	0.392	0.103	<0.001‡	-0.280	0.098	0.004
Patient Comorbidity	0.274	0.129	0.033	0.230	0.128	0.074
Neurosurgery Patient	0.946	0.242	<0.001‡	0.880	0.240	<0.01

*Coe: Regression coefficient; †S.E: Standard error; ‡p: p-value: significance; §PES-NWI: Scale of nurses' practice environment; ||MBI: Maslach Burnout Inventory.

The final result presented four significant factors: Participation in hospital matters ($r = -0.640$, $p = 0.007$); Job satisfaction ($r = -0.780$, $p = 0.004$) and professional commitment ($r = -0.280$; $p = 0.004$) resulted to be negative predictive factors. On the other hand, care from nurses in the postoperative period ($r = 0.710$, $p = 0.001$) was a positive predictive factor for the presence of AE in the patients. For the significant variables, the percentages were: Participation in hospital matters 4.1%; job satisfaction 2.6%; professional commitment 1.7%; and nurses in the postoperative period 1.2%. The complete model reached an explained variance of 14.6%.

For the analysis of patient satisfaction with nursing care, the dependent variable *Total Satisfaction* was previously calculated based on the patients' responses on the LOPPS scale 12. They were recoded in the same direction and the highest score corresponded to the highest patient satisfaction. The dependent variable of *total patient satisfaction* was calculated as the arithmetic mean of the 12 questions. This variable had a nearly normal distribution, with a good degree of symmetry, but with a higher height (kurtosis) in the central values. The mean of this variable was 3.66 (SD 0.37) within a range between 2.75 and 5.00 (median 3.58).

In general, the degree of satisfaction was high in all the questions. The average values were above four points; the most valued questions were the 11 "carry out their work with responsibility" and 2 "interest in listening". And the most valued questions were the 8 "they show empathy" and the 7 "they give useful advice".

In the analysis of the association of the variables patients' characteristics with *total patient satisfaction*, statistical significance ($p < 0.001$) was obtained for all, except for the patient age. However, the Pearson coefficient (r) values of the quantitative and categorical factors indicated that, although the associations were significant due to the large sample size, the intensity of the association was very low. The results for the variables (predictive factors) of the patients are summarized in Table 4.

No variable was found to be significantly associated ($p > 0.05$) when the variables of nurses' characteristic were crossed with *total patient satisfaction*. Consequently, none of the nurses' characteristics was able to effectively predict patient satisfaction, as described in the table below (Table 5).

Table 4 - Associative Analysis. Relationship between variables of the patients' characteristic and total patient satisfaction (mean of the items of the LOPSS 12) (N = 1422). Barcelona, Spain 2014-2015

Patient variable		Satisfacción total (Media 3.66; DE* 0.37)	P
Sex	Female	3.68 (0.39)	0.008 [†]
	Male	3.63 (0.35)	
Comorbidity	Yes	3.63 (0.42)	0.007 [†]
	No	3.68 (0.33)	
Specialty of the surgery	General surgery	3.65	<0.001 [†]
	Traumatology	3.66	
	Gynecological surgery	3.64	
	Surgery Thoracic	3.68	
	Vascular surgery	3.57	
	Neurosurgery	3.82	
	Plastic surgery	3.39	
Age (years)		r -0.050 [§]	0.057
Length of stay (hours)		r -0.140 [§]	<0.001

*SD: Standard deviation; †p-value: Student t test; ‡P value: chi-square test; §r: Pearson's correlation coefficient; ||Z normal.

Table 5 - Associative Analysis. Relationship between variables characteristic of nurses and total patient satisfaction (N = 1422) Barcelona, Spain 2014-2015

Nurses' variables		Satisfacción total (Mean 3.66, SD* 0.37)	Contrast test p-value
Sex	Fémale	3.66 (0.37)	0.687 [†]
	Male	3.67 (0.41)	
Postgraduate/master's degree	Yes/No	3.66 (0.37)	0.855 [†]
Transoperative nurse	Yes/No	3.66 (0.40)	0.826 [†]
Preoperative nurse	Yes/No	3.66 (0.37)	0.213 [†]
Postoperative nurse	Yes/No	3.66 (0.37)	0.908 [†]
Contract Type	Permanent/ Eventual	3.66 (0.37)	0.675 [†]
Age		-0.006 [‡]	0.812 [§]
Work experience		0.001 [‡]	0.982 [§]
Current work experience		0.020 [‡]	0.441 [§]
PES-NWI factor1		0.004 [‡]	0.889 [§]
PES-NWI factor2		-0.025 [‡]	0.339 [§]
PES-NWI factor3		-0.038 [‡]	0.148 [§]
PES-NWI factor4		0.002 [‡]	0.938 [§]
PES-NWI factor5		-0.013 [‡]	0.627 [§]
MBI [¶] Depersonalization		0.015 [‡]	0.581 [§]
MBI [¶] Personal accomplishment		0.006 [‡]	0.824 [§]
Satisfaction in the current job		0.003 [‡]	0.909 [§]
Flexibility of time		-0.029 [‡]	0.276 [§]
Professional development		-0.044 [‡]	0.100 [§]
Autonomy at work		-0.010 [‡]	0.708 [§]
Salary		0.003 [‡]	0.906 [§]
Training		-0.012 [‡]	0.649 [§]
Vacations		-0.029 [‡]	0.276 [§]
Sick leave		-0.013 [‡]	0.630 [§]
Permission to study		-0.026 [‡]	0.328 [§]
Professional commitment		-0.034 [‡]	0.199 [§]

*SD: Standard deviation; †p-value of Student t test; ‡r: Pearson's correlation coefficient; ||PES-NWI: Nursing Practice Environment Scale ¶MBI: Burnout Maslach Inventory

The results showed no relations between the variables. In order to propose a multilevel analysis, there must be a correlation between the variables. The study led to the conclusion that it makes no sense to consider a multilevel analysis since the only factors associated with patient satisfaction are variables of patients' characteristics alone (although their limited effect was mentioned despite their significance). We also analyzed the possibility of running a multiple regression model with the patients' predictors that were significant in Table 4. However, the quality was very low because the total predictive capacity was only 2.2%, totally irrelevant from the point of view of its effectiveness.

Regarding the question made to the patients about whether they would recommend the hospital to other patients, 91.3% (119) said they would do so. Thus, only 8.7% (11) would not recommend.

Discussion

In this study, the multilevel methodology was used to investigate the safety and satisfaction of patients and their relationship with nurse's care in the perioperative period. The results were collected, as in other studies, analyzing the presence of adverse events and the patients' perception about nursing care⁽²⁶⁻²⁷⁾, which may have positive and negative effects. In relation to the nursing team, the main associations with AE are the nurses' practice environment, emotional exhaustion, job satisfaction, years of experience, and type of contract. Regarding patients, it is worth mentioning the presence of comorbidity and type of surgery (neurosurgery). Working conditions, as a result of increased surgical activity, cause a heavy workload. Problems related to the maintenance of personnel, such as personnel changes and excessive use of temporary staff due to the generational change in our perioperative area influenced these associations. We agree that these problems are risk factors for patient safety^(22,28-29). Confirming the present results, the predictors of AE are job satisfaction, participation in hospital matters, professional commitments, and postoperative care, coinciding with other studies^(27,30-31). The importance of having a positive practice environment for the work of nurses was clear. Such aspect increases the job satisfaction, commitment, and retention of nurses and the best outcomes for patients. Research in magnetic hospitals has extensively documented the impact of nursing care on both nurse and patient outcomes⁽³²⁾. The record of the reported events was 38%. It is a value that is not high in relation to other investigations⁽³³⁾, although it includes the presence of all the AE attributable to patients during the perioperative period. However, the analysis of six or less AE is more

usual in other studies⁽³⁴⁻³⁵⁾. There is another difference between our study and the others in which there was no mortality^(9,36). The most reported AE was the presence of pain, followed by postoperative complications (bleeding and wound infection). This is similar to national^(21,37) and international⁽³⁸⁾ studies and suggest that efficient measures should be taken and safe practices applied⁽¹²⁾. It is important to note that most AE, such as pain, can be prevented or eliminated if detected early.

Regarding patient satisfaction, the characteristics of the nurses did not present a significant association with it. The current findings may have been influenced by confounding factors that were not assessed, such as other individual or organizational characteristics that were not considered. However, the behaviors of nurses during perioperative care were positively evaluated by the patients⁽²⁴⁾. This is a very positive aspect because the patient's experience results from the actual quality of care and from their perception⁽³⁹⁾. One of the most important results was that the vast majority of patients (119), i.e. 91.3%, answered that they would recommend the hospital to others (for example, friends or relatives). Patients had positive perceptions of the nursing care and a greater likelihood of satisfaction with general care. As different studies suggest that satisfaction with the care provided represents an important part of the quality of hospital care, the present findings are a good result for perioperative nurses and for the organization⁽⁴⁰⁻⁴¹⁾.

The main limitation of the study is that data collection was restricted to a single hospital, convenience samples were used, and studies in the surgical field to allow a comparison are missing. Furthermore, most studies on patient outcomes did not examine all AE; they present rather an incomplete picture of safety. Differences in the methodology of the studies make it difficult to compare the outcomes. Despite these limitations, there are no recent studies examining the impact of perioperative nurses on the safety and satisfaction of surgical patients. For the first time, the effect of perioperative nursing care in the unit of work was related to safety outcomes of surgical patients. In fact, we related the presence of AE and complications with the care provided by nurses. The multilevel analysis allowed to incorporate in the same model the independent variables belonging to different levels, the variables of individual patients (first level) and the variables of nurses and of the unit (second level). This study contributed to the identification of areas of improvement in the context of safety culture. It also showed the impact that different aspects such as job satisfaction, professional commitment, and work the environment have over the quality of care.

Conclusion

Job satisfaction, professional commitment, and participation in hospital matters were negative predictors of adverse events in patients, especially pain and postoperative bleeding complications. In turn, care from postoperative nurses acted as a positive predictor. If nurses are dissatisfied at work, have less professional commitment, and have a low perception of participation in matters taking place in their unit, the adverse events in the patients cared for by them increase. On the other hand, nurses who perform postoperative care help to decrease them. There was no association with satisfaction outcomes. Therefore, perioperative nurses have an impact on safety outcomes, but not on satisfaction of surgical patients. The key to ensuring the quality of care for surgical patient is a positive work environment that promotes job satisfaction, professional commitment, quality of nursing care throughout the perioperative process, and active participation of the nurse in the unit and hospital matters. It is recommended that administrators and managers of the surgical field implement strategies to improve these aspects so as to improve safety. Researchers are encouraged to conduct further research in this field of nursing practice with comparable samples in perioperative units.

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