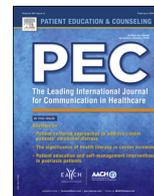




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Patient Perception, Preference and Participation

Relatives' perspectives on the quality of care in an Intensive Care Unit: The theoretical concept of a new tool

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ABSTRACT

Objective: To examine the potential of a questionnaire (CQI 'R-ICU') to measure the quality of care from the perspective of relatives in the Intensive Care Unit (ICU).

Methods: A quantitative survey study has been undertaken to explore the psychometric properties of the instrument, which was sent to 282 relatives of ICU patients from the Erasmus MC, an academic hospital in Rotterdam, the Netherlands. Factor-analyses were performed to explore the underlying theoretical structure.

Results: Survey data from 211 relatives (response rate 78%) were used for the analysis. The overall reliability of the questionnaire was sufficiently high; two of the four underlying factors, namely 'Communication' and 'Involvement', were significant predictors. Two specific aspects of care that needed the most improvement were missing information about meals and offering an ICU diary. There is a significant difference in mean communication with nurses among the four wards in Erasmus MC.

Conclusions: The CQI 'R-ICU' seems to be a valid, reliable and usable instrument. The theoretical fundament appears to be related to communication.

Practice implications: The newly developed instrument can be used to provide feedback to health care professionals and policy makers in order to evaluate quality improvement projects with regard to relatives in the ICU.

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1. Introduction

Severe illness and subsequent admission of a family member or friend to an Intensive Care Unit (ICU) can have a serious impact on the psycho-social well-being of the relatives/friends. They can become confused and anxious, may experience severe sadness and depression or even develop a 'Post intensive care syndrome-family' [1–3]. The mental distress may be caused by the gravity of the situation, uncertainty about the course of the medical situation or the unexpected death of the patient. In addition, the ICU environment with a multitude of unfamiliar equipment, sounds, smells, staff and other patients might contribute to the level of

stress. Health care providers should develop the skills to observe this stress to address the needs of relatives.

Relatives could have an important role in the physical and psycho-social recovery process of the ICU-patient [4,5]. They can support their beloved ones in an emotional, cognitive and practical way, provided that they themselves are able to cope with the stressful situation. They also might enhance the trust of the patient, a significant aid in the recovery process [6]. Most ICU-patients are not able to receive information or make decisions, due to the severity of their medical condition and/or the administration of sedative medication, leaving the relatives as surrogate decision makers [7]. This role requires a careful communication process that begins immediately after hospitalization.

Both nurses and doctors seem to underestimate the relatives' need for information [8–10]. Inadequate communication might lead to dissatisfied patients and/or relatives, resulting in formal and informal complaints about the provided care [11]. Moreover, ideally patient and family communication leads to an elevated level of knowledge, less fear and decreases in insecurity and stress [12]. From the relatives' perspective, communication is assumed to

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be one of the most important factors in the perceived quality of care in the ICU, whereas most caregivers think the physical aspects of patient care are the most important factors for the relatives of ICU patients.

Currently, there is insufficient insight into the quality of care offered to relatives in the ICU because an evidence-based measurement tool is missing in the Netherlands [13]. The ‘Family Satisfaction in the ICU Survey’ (FS-ICU) [14] and the ‘Care Family Satisfaction Survey’ (CCFSS) [15] were developed previously to measure the satisfaction of relatives in the ICU. However, these instruments were developed in non-Dutch situations. It seems reasonable that some items will be experienced as more or less important by relatives from different countries or even continents [16]. Moreover, although these instruments proved to be valid and reliable, the utilized concept of satisfaction might raise some bottlenecks such as ceiling effects, cognitive dissonance and socially desirable answers [17]. A discrepancy model, which describes satisfaction as a result of expectation minus the perceived experience, could overcome these problems [18]. Accordingly, developing a measurement instrument to establish the quality of care to relatives in ICUs in the Netherlands is a logical follow-up of these previous studies.

The development of the new instrument was built upon the Consumer Quality Index (CQI), which is a scientific and standardized method to determine the experiences of customers with the provided care [19–21]. The CQI instruments are theoretically founded by the CAHPS[®] instruments and QUOTE[®] methodology [22], both based on a discrepancy model [23]. To meet a sufficient quality of care, the expectations regarding the quality should be in accordance with the perceptions of the actual experiences according to these methodologies [24,25]. Although this method judges the quality of care, there is no instrument under the umbrella of the CQI instruments available addressed to relatives in

the ICU. Therefore, a CQI ‘Relatives on Intensive Care Unit’, in short CQI ‘R-ICU’, was accordingly developed within the Netherlands as a co-creation among HAN University of Applied Sciences, three hospitals (Erasmus MC, Rotterdam, Gelderse Vallei and Kennemer Gasthuis), and Open University of the Netherlands [26].

The theoretical framework of the CQI ‘R-ICU’ is partly derived from the ‘Theoretical Model for Patient Focused Communication’ [27], which is applied to the communication between relatives and caregivers. This model distinguishes between an instrumental need, ‘the need to know and to understand’, and in an emotional need, ‘the need to be known and understood’. Subsequently, the caregivers should respond appropriately to these needs to influence coping mechanisms of the relatives. Communication is stated to consist of content aspects, such as information on medical treatment or visiting hours, and relational aspects such as respectfulness and hopefulness [28]. Both clusters of elements are expected to influence the quality of care given to relatives. This manuscript describes the theoretical framework and developmental process of the CQI ‘R-ICU’ instrument and explores the psychometric properties of this new tool.

2. Methods

The research protocol for the study was approved by the Medical Ethics Committee (MEC) of Erasmus MC, Rotterdam (MEC-2011-189). The committee judged that the study complied with the Dutch law on Medical Research in Humans (WMO).

2.1. Study design

The total process of development and validation was performed by the HAN University of Applied Sciences. The overall research plan, which was based on the Manual CQI, consisted of qualitative

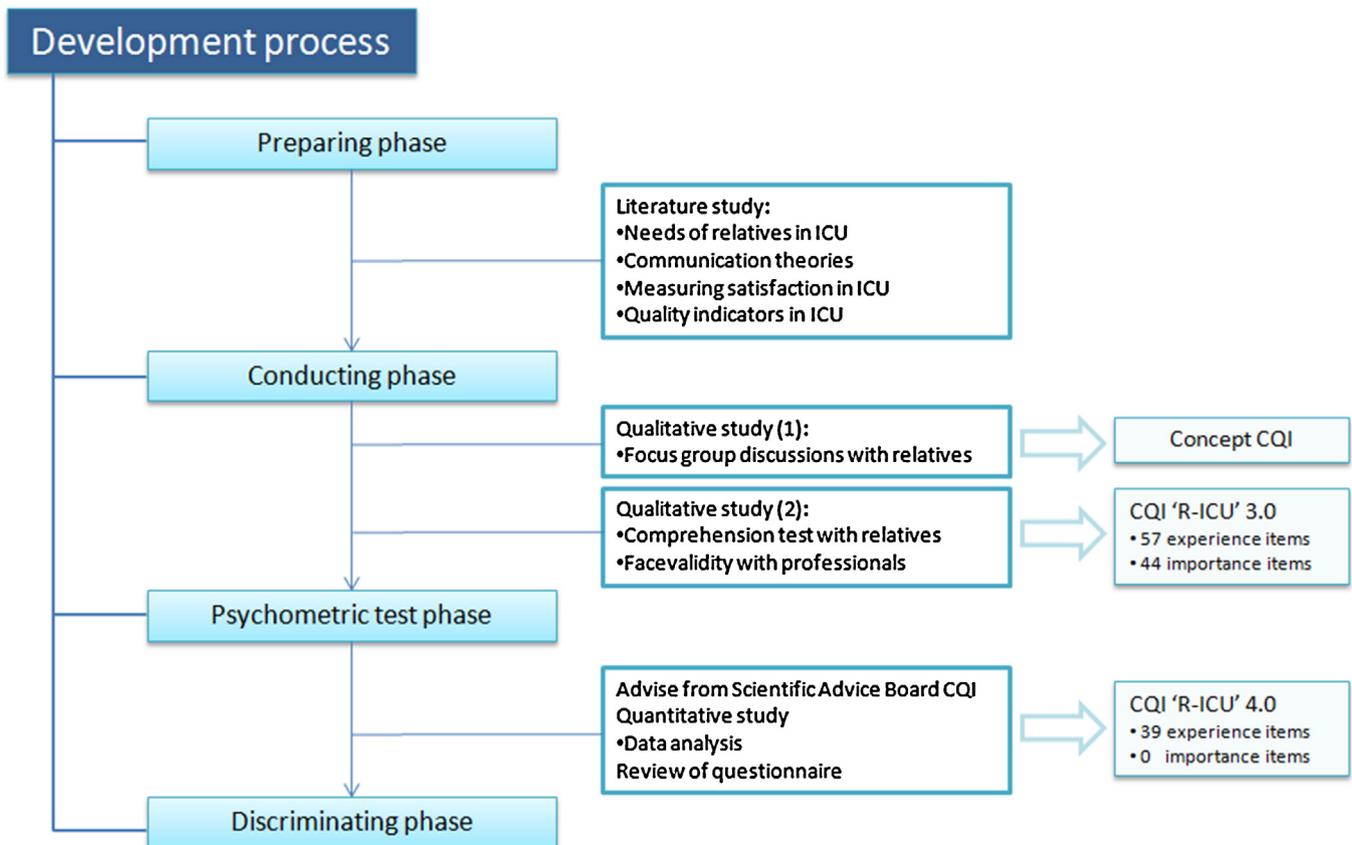


Fig. 1. Flow chart of the total development process which is carried out by the HAN University of Applied Sciences in order to meet the CQI method.

and quantitative survey studies [21]. This method, as shown in Fig. 1, contains four phases: the preparation, performance, psychometric and discriminatory phases.

The preparation phase started with a literature research to create a list of quality of care domains for the relatives of ICU-patients. To determine relevant topics, some previous questionnaires were studied for useful content, including the ‘Critical Care Family Needs Inventory’ (CCFNI) [29,30], the FS/ICU, the CCFSS and the CQI-palliative care Relatives [31].

Subsequently, in the performance phase, focus group interviews with relatives were held to verify the quality items according to their perceptions. The answers and spontaneous statements formed the foundation of the items in the concept questionnaire. Some aspects in the draft of the CQI ‘R-ICU’ were prescribed by the CQI Manual, such as obligatory general questions and the layout. Questions relating to the experiences of relatives with communication, already clustered by subject, formed the core of the instrument. These experience items (57) were formulated with respect to how often the quality aspect occurred; ‘never’, ‘sometimes’, ‘often’ or ‘always’ (e.g., “The caregiver takes me seriously”). Other questions referred to more general aspects of care (e.g., “Communication by nurses”) using a scale from 1 (poor) to 10 (excellent). Finally, the respondents scored the relative importance of the quality of care aspects; these important items (44) were rated as ‘not important’, ‘somewhat important’, ‘important’ or ‘very important’. The questionnaire was subsequently tested for comprehensiveness by the relatives and face validity by the health care professionals. With all the feedback, the concept CQI was revised in version 3.0 of the CQI ‘R-ICU’ which consists of 116 items in total.

Then, in the psychometric phase, this questionnaire was tested among the relatives of patients. The resulting quantitative dataset provided insight into the validity and reliability of the CQI ‘R-ICU’.

Finally, in the last phase, the instrument will be tested with respect to its discriminatory power. The total process of development, including the qualitative study results, and validation of the instrument will be described in a separate article. The current study, which was conducted from October 2011 to April 2012 in Erasmus MC, Rotterdam, comprises data from the quantitative psychometric phase to pretest the potential of the questionnaire and support the theoretical foundation.

2.2. Study population

Erasmus MC is a university medical center with one of the largest ICUs in the Netherlands. The level III ICU for adult patients contains 32 operational beds and is divided into four units: the cardiological ICU (ICCU), thoracic surgery ICU (ICV-1) and two mixed units for neurological, neurosurgical, transplantation surgery and medical patients (ICV-2 and ICV-3). Relatives who were included in the psychometric phase met the following criteria: older than 18 years, understanding the Dutch language and related to an ICU patient who did not die within 24 h after admission. Fig. 2, the study flowchart, illustrates that a total of 420 relatives met the inclusion criteria. All relatives were recruited based upon availability, and a convenience sample of 282 respondents (67.1%) agreed to participate.

The CQI ‘R-ICU’, accompanied by a cover letter, was sent to the home address after receiving Informed Consent and discharge of the patient from the ICU. According to the Total Design Method this contact was followed by first and second reminders when there was no response after two and four weeks respectively [32]. A strict separation between the files with research data and with personal data files was maintained throughout the entire process, and the completed questionnaires included no traceable private data.

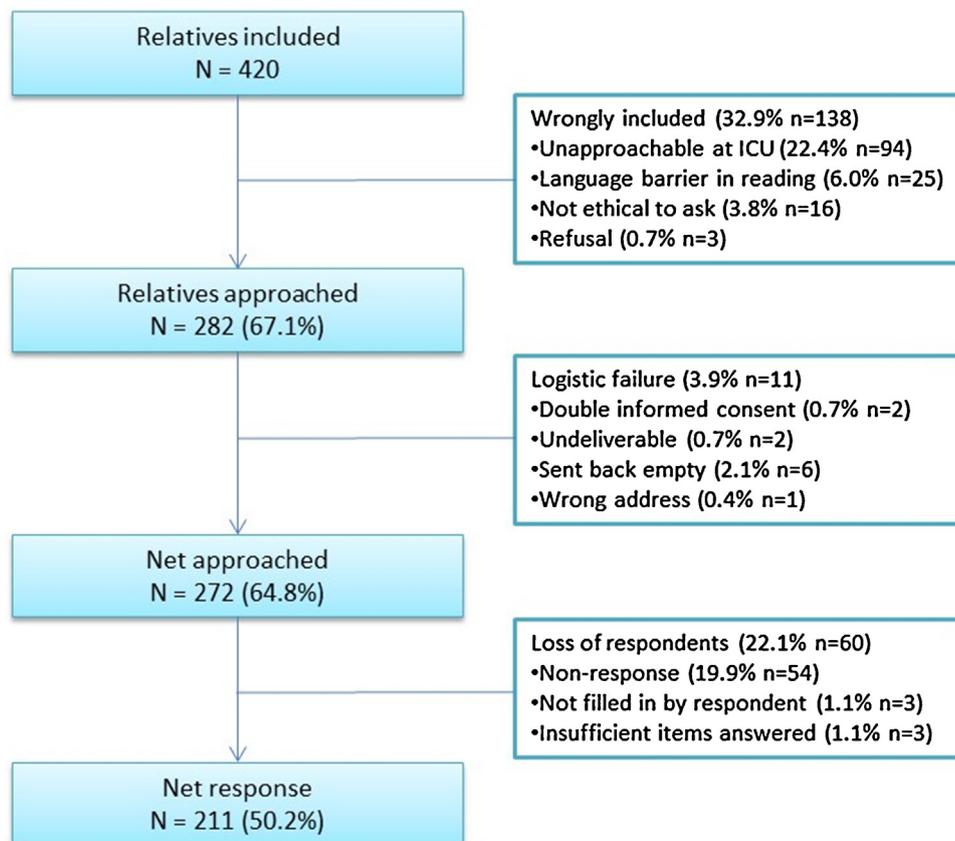


Fig. 2. Flowchart of the respondents in Erasmus MC, Rotterdam.

2.3. Statistical analysis

The data were analyzed using Microsoft SPSS (version 18.0). An item was removed when a single answer category accounted for more than 90% of its score [21]. In addition, the non-response per item revealed the relevance and understanding by the respondents; if the non-response rate was higher than 5%, the item was considered for removal. For an inter item correlation between two items of greater than .85, one of the items was removed because of a non-unique contribution.

Subsequently, an explorative factor analysis, a Principal Component Analysis (PCA), was conducted to examine the coherence of the items with respect to certain factors. An oblique rotation was used because some factors were presumed to potentially be related to each other. The oblique rotation was also meant to load a larger number of items into one factor. The aim of this analysis was to explore the underlying theoretical structure of the questionnaire. The preliminary requirements were a Kaiser-Maier-Olkin Measure of Sampling Adequacy (KMO-value) ≥ 0.60 and significant results of Bartlett's test of sphericity ($p > .05$), indicating that the number of respondents was sufficiently large and the correlations between the variables was high enough to detect a factor loading [33]. All factors with eigenvalue ≥ 1.0 and factor loadings ≥ 0.40 were considered important. The internal consistency of the different subscales was analyzed using Cronbach's alpha, with $\alpha \geq 0.70$ indicating that a subscale was sufficiently reliable, an Item Total Correlation (ITC) ≥ 0.40 indicated that an item belonged to a certain subscale.

Furthermore, a Multiple Regression Analysis (MRA) to explain the relative importance of the variables was performed with the established factors and the demographic items as independent variables and 'Total quality assessment' as the dependent variables. The 'Total quality assessment' was computed by 'What rating on a scale of 1 to 10 would you give nurses for communication?', 'What rating on a scale of 1 to 10 would you give doctors for communication?' and 'What rating on a scale of 1 to 10 would you give for support and care in general?'.

Then, an analysis of variance (One Way ANOVA) was conducted to compare the total quality assessment among the four ICUs. Finally, the Quality Improvement Scores (QIS) were computed with the formula $([\text{mean importance item } y] \times [\% \text{'negative' experience item } y]) / 100$ to explore the usability of the new tool [34].

3. Results

3.1. Respondent characteristics

The CQI 'R-ICU' was sent to 282 relatives of ICU patients treated at Erasmus MC, Rotterdam. Due to logistic failure, 11 questionnaires (3.9%) were unusable for the analysis. With a loss of 60 respondents (22.1%), merely through a non-response rate of 19.9% ($n = 54$), the final sample included 211 questionnaires (a response rate of 77.9%) as shown in Fig. 2.

The female-male ratio was 66/34%. Partners of the patients accounted for 56% of the respondents and individuals in the age group of 45–64 years accounted for 49.7%. The mean average of the patient's length of stay in the ICU was 18.93 days, with 43.9% of all patients were still in the hospital and 21.5% were deceased at the time of the survey. Other characteristics are presented in Table 1.

3.2. Factor and reliability analysis

Of all the items only 'Did you receive information by digital means?' and 'Did the hospital offer you peer support?' showed a skewed distribution. These items were disregarded in the analyses due to non-applicability. Furthermore, it turned out that 16 items

Table 1

Characteristics of respondents Erasmus MC, Rotterdam.

	Respondents (%), N=211
Relation to patient	
Partner	56.0
Father/mother	12.4
Son/daughter	22.5
Brother/sister	5.3
Other	3.8
Woman	65.6
Age	Modus 55–64
18–24	3.3
25–34	7.7
35–44	17.2
45–54	23.9
55–64	25.8
65–74	17.7
75 and older	4.3
Health indication	
Excellent	18.7
Very good	23.4
Good	49.3
Reasonably well	8.1
Bad	0.5
Education	
Non/Primary school	3.4
GCSE	37.7
A-levels	30.4
College/university	27.0
Other	1.4
Ethnic background	
The Netherlands	89.9
Other	10.1
ICU Erasmus MC	
ICV-1	14.3
ICV-2	36.7
ICV-3	38.3
ICCU	10.2
IC-indication	
Planned	41.3
Not planned	58.7
Length of stay (mean in days, St. Dev.)	18.93 (26.64)
ICV-1	12.46 (range 1–99)
ICV-2	18.08 (range 1–99)
ICV-3	22.66 (range 1–167)
ICCU	8.75 (range 1–28)
Current situation of the patient	
Hospital	43.9
At home	30.2
Deceased	21.5
Other	4.4

had a non-response rate $>5\%$, with five being obligatory and another four rated as very important to the relatives according to the focus group interview; therefore these items were retained for the analysis. The other seven items with high non-response rates were excluded from further analysis.

None of the importance items were deleted. 'Peer support through the hospital' seemed to be the least important item from the perspective of the relatives; altogether 82.0% scored this item as 'not' or 'somewhat' important ($n = 169$). This was followed by 'Contact with clergy', 'Contact with psychologist' and 'Contact with social worker'; 64.3% ($n = 133$), 63.1% ($n = 130$) and 56.5% ($n = 117$) respectively. In contrast, as presented in Table 2, the most important to the relatives was 'Conflicting information'.

Factor analyses were conducted on 27 experience items (all using a 4 point Likert scale) to determine the underlying structure of the newly developed questionnaire. The PCA met all the requirements, with KMO being excellent (.84) and Bartlett's test of sphericity being significant ($N = 163$ and $p < .000$). The first analysis contained seven factors with an eigenvalue ≥ 1.0 , and 61.19% explained the total variance. The scree-plot presented a first drop after two factors and stabilized after four factors. These

Table 2
 Ten most important aspects of care to relatives (all items with median = 4).

Description of item	Mean (St. Dev)	Importance score	
		Important (%)	Very important (%)
Conflicting information	3.71 (0.52)	23.4	74.2
Health care providers take you seriously	3.69 (0.46)	30.8	69.2
Information doctors understandable	3.69 (0.54)	23.6	72.6
Information nurses understandable	3.66 (0.54)	29.2	68.4
Nurses listen carefully	3.62 (0.53)	34.1	63.9
Doctors listen carefully	3.59 (0.55)	35.6	61.5
Health care provider at first entrance	3.49 (0.71)	30.1	60.3
Enough time for you	3.46 (0.60)	43.5	51.2
Professional contact person in reach	3.46 (0.64)	44.4	52.2
Involved in decision making	3.45 (0.68)	36.2	55.1

Table 3
 Descriptive statistics of the four factors and the mean ‘Total quality assessment’.

	N	Mean (St. Dev)	Minimum–Maximum	Cronbach’s alpha	Skewness	Kurtosis
Communication	176	3.37 (0.49)	1.90–4.00	.85	–0.76	0.06
Involvement	184	2.39 (0.76)	1.11–4.00	.86	0.35	–0.81
Organization of care	192	2.03 (0.79)	1.00–4.00	.54	0.50	–0.71
Nuisance	200	3.64 (0.39)	1.50–4.00	.51	–1.74	5.15
Total quality assessment	198	7.36 (1.83)	1.00–10.0	.87	–1.02	1.51
Overall	163	2.91 (0.47)	1.78–3.89	.89	0.10	–0.57

Table 4
 Results MRA; Total quality assessment as dependent variable with four factors in step 1 and eight socio-demographic as dummy variables in step 2 (N = 154).

Variable	B	SE	β	t	p
Step 1					
(Constant)	7.45	.07		106.92	.00
Factor communication	1.07*	.10	.64	11.27	.00
Factor Involvement	.46*	.09	.27	4.92	.00
Factor Organization of care	–.03	.08	–.02	–.42	.67
Factor Nuisance	.12	.07	.07	1.61	.11
Step 2					
(Constant)	6.27	.82		7.63	.00
Factor Communication	.99*	.10	.59	10.14	.00
Factor Involvement	.51*	.09	.30	5.47	.00
Factor Organization of care	–.03	.08	–.02	–.44	.66
Factor Nuisance	.13	.08	.08	1.68	.10
Gender	.16	.15	.05	1.09	.30
Age	.39	.23	.07	1.57	.12
Ethnic background (Dutch to non-Dutch)	–.06	.25	–.11	–.25	.80
Education (low to high)	.55*	.15	.17	3.74	.00
Relationship with patient (partner to non-partner)	–.14	.15	–.04	.90	.37
Health of relative (good to bad)	–.32	.27	–.05	–1.18	.24
Current situation (home to not-home)	.08	.17	.02	.47	.64
Length of stay (less or more than one week)	–.06	.15	–.02	–.42	.68

* Significant.

factors were ‘Communication’, ‘Involvement’, ‘Organization of care’ and ‘Nuisance’. Table 3 shows that the factor ‘Nuisance’ was skewed to the left and had a high kurtosis value, reflecting that most of the respondents did not report any nuisance at all. As also shown in Table 3, the internal consistency of all items together amounts to .89 with a range between .51 and .87 for the separate subscales.

3.3. Total scores

The correlation between the ‘Total quality assessment’ and the factor ‘Communication’ was very strongly positive ($r = .82$, $p > .000$). In addition, the factor ‘Involvement’ was strongly positive ($r = .69$, $p > .000$), with the factor ‘Organization of care’ was moderately positive ($r = .33$, $p > .000$), and with the factor ‘Nuisance’ was weakly positive ($r = .30$, $p > .000$).

Hierarchic MRA, with the standardized Z-scores of the four factors as independent variables and ‘Total quality assessment’ as a

dependent variable in step one, presented a significant model ($F(4,155) = 102.69$, $p < .000$). The explained variance was 72.6% ($R^2 = .73$). The beta coefficients for the factors ‘Communication’ ($\beta = .64$) and ‘Involvement’ ($\beta = .28$) were significant and contributed the most to the ‘Total quality assessment’. The factors ‘Organization of care’ and ‘Nuisance’ were not significant. In step two, the socio-demographic dummy variables of gender, age, ethnic background, education, relationship to patient, health of relative, current situation and length of stay, were added as covariables (see Table 4). This model was also significant ($F(12,141) = 38.07$, $p < .000$), and the explained variance was barely changed ($R^2 \text{ change} = .03$ with $F_{\text{change}}(8,141) = 2.06$, $p < .05$) with only a significant contribution from level of education. However, the mean score for the ‘Total quality assessment’ for the level of education showed no significant difference ($M_{\text{high educated}} = 7.29$ and $M_{\text{low educated}} = 7.43$, $t(173.05) = -.51$ ns).

Subsequently, the total quality assessment was compared among the four ICUs of the Erasmus MC: ICV-1, ICV-2, ICV-3 and

Table 5
Mean 'Total quality assessment' and marks on communication and support divided per ICU.

ICU	Communication with nurses (mark 1–10) Mean (St. Dev)	Communication with doctors (mark 1–10) Mean (St. Dev)	General support (mark 1–10) Mean (St. Dev)	Total quality assessment Mean (St. Dev)
ICV-1 (<i>n</i> =28)	7.96 (1.80)	6.77 (3.13)	7.04 (2.39)	7.11 (2.31)
ICV-2 (<i>n</i> =72)	7.59 (1.67)	7.30 (2.02)	6.93 (1.92)	7.30 (1.65)
ICV-3 (<i>n</i> =76)	7.86 (1.66)	6.86 (2.62)	6.92 (2.27)	7.19 (1.95)
ICCU (<i>n</i> =20)	9.11 (0.90) ^a	8.33 (1.24)	7.85 (1.14)	8.46 (0.98) ^b
Total	7.90 (1.64)	7.17 (2.38)	7.06 (2.07)	7.58 (1.72)

ICCU, cardiological ICU; ICV-1, thoracic surgery; ICV-2 and ICV-3 are two mixed units with neurological, neurosurgical, transplantation surgery and medical patients.

^a The test results with an analysis of variance (ANOVA) showed a significant difference for ICCU compared to ICV-1, ICV-2 and ICV-3, $F(3,185)=4.20$, $p < .05$, $\eta^2 = .064$.

^b The test results with an analysis of variance (ANOVA) showed a significant difference for ICCU compared to ICV-2 and ICV-3, $F(3,179)=2.60$, $p < .05$, $\eta^2 = .042$.

ICCU (see Table 5). The cardiological ICU, ICCU, yielded the highest mean scores for the 'Total quality assessment' ($M_{ICCU} = 8.46$), whereas the thoracic surgery ICU, ICV-1, yielded the lowest mean scores for the 'Total quality assessment' ($M_{ICV-1} = 7.11$). Table 5 also reveals that the scores for communication were higher for nurses than doctors. The scores for 'Total quality assessment' were not different between men and women ($M_{women} = 7.38$ and $M_{man} = 7.31$, $t(194) = -.25$ ns).

The item analysis showed some remarkable results, such as 58.3% answering 'sometimes' or 'never' in response to 'Did health care providers pay attention to what you needed?'. The respondents seemed most satisfied with (no) nuisance of noise from visitors ($M = 3.82$) and (no) nuisance of noise from employees ($M = 3.75$). Both information given by doctors ($M = 3.69$) or nurses ($M = 3.66$) and careful listening by doctors ($M = 3.59$) or nurses ($M = 3.62$) also scored high. The respondents seemed to be least satisfied with the provision of information by digital means such as email or a website ($M = 1.09$), information on meals ($M = 1.69$) and offering to write in an ICU diary ($M = 1.85$). The latter two, together with participating in taking the care of the patient, also represented the highest Quality Improvement Scores.

4. Discussion and conclusion

4.1. Discussion

The aim of this study was to develop and provide a theoretical framework for a new instrument to measure the experiences of relatives with the quality of care in the ICU. This tool, the CQI 'R-ICU', has been elaborated by the HAN University of Applied Sciences using a standardized scientific approach and has resulted in a tailor-made questionnaire for the relatives of ICU patients. Two strengths of the CQI 'R-ICU' questionnaire are that it attempts to overcome the conceptual and methodological problems associated with satisfaction surveys and that the relatives were directly involved in the instrument's development. The questionnaire focuses on "reports" of the quality of care rather than on highly subjective ratings of satisfaction.

With a focus on the data from Erasmus MC, Rotterdam, the internal consistency of the questionnaire overall and of most subscales was satisfactory except for the 'Organization of care'. Reconsidering this four-item subscale appears necessary [35]. A highly internal consistency was found for both the 'Total quality assessment' and all the items in the questionnaire combined. Therefore, the CQI 'R-ICU' promises to be a reliable measurement instrument.

The correlation between the 'Total quality assessment' and the factors 'Communication' and 'Involvement' appeared to be (very) strongly positive. Inevitably, 'Communication' explained most of the 'Total quality assessment' and was hence the most important predictor of the quality of care given to the relatives, followed by 'Involvement'. The different items within these two factors all

belong to the process indicators, which was in accordance with the expectations [35]. At the same time, the relative importance of communication items in quality improvements is in line with the results of previous studies and seems applicable to various health care professionals [36]. The respondents judged the items of controversial information and being taken seriously as very important. These findings illustrate that the Theoretical Model in Communications conveyed in the questionnaire – both as instrumental needs, such as providing understandable information, and emotional needs, such as carefully listening – clearly emerged.

The established QIS provided insight into a ranking of improvement points, merely based on individual weighting of aspects of care combined with their experience. In accordance with the discrepancy model and the promising results of a new method to measure satisfaction [20], it has become clear that importance questions should be a permanent part of this questionnaire. The QIS takes into account the real weighting of the respondents, and strikingly showed information about meals as one of the highest requiring improvement.

The potential for a relationship between some demographic variables and how relatives experience their needs was previously mentioned [13,37]. Nevertheless, the present study demonstrated no significant influence of age or education on the respondents' total quality assessment of care. Thus, it is conceivable that a difference in neediness is not reflected in the perspective of relatives in their judgment of communication. This outcome is in line with the indicated theory stating that a difference between expectations and experiences determines satisfaction. Needs may control the quality aspects in some ways but are not predominantly decisive. Thus, it might be established that women are familiar with other needs that arise during the stressful ICU period, but that these other needs will not result in a significant deviance in their judgment of communication.

In accordance with the Expectation Violence Theory, a considerable part of how positive or negative an experience with a communicator is assessed to be will be based on physical attractiveness, task expertise and knowledge, similarity and other non-verbal items [38]. This bias means that the same behavior by different professionals might be interpreted in different ways. In small sample sizes, such as in current study, this effect could influence the mean total quality assessment.

4.1.1. Limitations

This study was performed in one hospital with four ICUs, resulting in a relatively small number of respondents. Therefore, the results are not generally applicable. A multicenter study, which has already been conducted, is necessary to confirm or disapprove the identified results. Another restriction must be made regarding the development process; which will continue until the discriminatory phase has finished. To address these issues, a subsequent study is already in progress in 21 regional and 2 academic hospitals in the Netherlands.

Additionally, some statistical decisions were made with respect to the used guideline despite valuable completeness to current practice and the real world of an ICU. For example, some items were formulated as screener questions with an answer category of 'if no, then go to question xx'. This set-up appeared very confusing for respondents and resulted in a high percentage of missing values, which were subsequently not analyzed. However, those items could have revealed some important information.

4.2. Conclusions

As noted in the discussion, it is clear that the CQI 'R-ICU' appeared to be a valid, reliable and usable instrument. Thus, further development and large-scale implementation are recommended. Professionals can learn from the experiences of relatives by using this instrument. Moreover, the measurement instrument will provide insight into the points requiring improvement with respect to the care for relatives. The relatives' quality judgment on communication and support by the health care professionals in ICUs has a value to the establishment and/or maintenance of good interventions in caring. It is rather unlikely that demographic variables have any influence on this judgment. The results indicate that the theoretical framework of the CQI 'R-ICU' has a sound basis that there is a good possibility of a sufficient discriminatory power. More research on this aspect is needed.

4.3. Practical Implications

The newly developed questionnaire will provide feedback to health care professionals and policy makers for the evaluation of quality improvement projects with regard to relatives in the ICU. The tool is expected to measure the effects of upcoming interventions in the policy on relatives in the ICU (e.g., open visiting policies, participation in patient care and adherence to doctor's rounds). The identified Quality Improvement Scores are especially useful indicators to strive for professional progression in the care given to relatives. This instrument identifies and sets priorities regarding specific aspects that need improvement in the quality of care given to relatives. For these reasons, the new tool is not a goal in itself but mainly a practical instrument in the care given to relatives.

Conflict of interest

The authors have no conflicts of interest.

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We confirm all personal identifiers have been removed or disguised so the persons described are not identifiable and cannot be identified through the provided details.

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