ORIGINAL ARTICLE

The transitional risk and incident questionnaire was valid and reliable for measuring transitional patient safety from the patients' perspective

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Abstract

Objective: This study describes the development and validation of the Transitional Risk and Incident Questionnaire (TRIQ), which measures transitional patient safety from the patients' perspective.

Methods: The TRIQ was developed based on literature review, tested in the target group using a think-aloud procedure, and validated by a cross-sectional study among patients receiving health care at the interface between general practice and hospital care in two regions in the Netherlands. Exploratory factor analysis was performed, and internal consistency was assessed. The relationships between the occurrence of transitional safety incidents (TSIs) as measured by the TRIQ and relational continuity and those between TSI occurrence and overall rating of transitions were assessed.

Results: In total, 451 questionnaires were completed for analysis. The exploratory factor analysis provided a four-factor solution: (1) personal relation with general practitioner, (2) personal relation with hospital physician, (3) information exchange, and (4) treatment consistency. Internal consistency was good (composite reliability, 0.75-0.95). An experienced TSI was related to a poorer relational continuity both with the general practitioner and hospital and with a lower overall rating of all transitions.

Conclusions: The TRIQ is a valid and reliable questionnaire measuring transitional patient safety from the patients' perspective. © 2018 Elsevier Inc. All rights reserved.

Keywords: Patient safety; Patient; Survey; Transitional care; Discharge; Referral

1. Introduction

Patient safety incidents are common in health care at all levels, and safeguarding the patient from any unintended or unexpected incident is a major challenge for health-care professionals. To prevent safety incidents in patients who are treated concurrently by multiple physicians or in multiple settings, communication and handover of information between the professionals is vital [1]. As the patient is the only constant factor, he or she is the only one who could assess the entire patient journey and give feedback on the quality and safety of received care. Therefore, the patients' perception is essential in looking at transitional patient safety [2,3].

As patients report different safety issues than health-care professionals, excluding patients will lead to a biased view on transitional patient safety [4,5]. Because most interventions to improve patient safety are initiated from a professionals' perspective, they may not be fully tailored to the patients' needs, and as a result, they may only suboptimally affect patient outcomes [6].

Therefore, we need a patient-reported outcome measure (PROM) to accurately identify transitional patient safety issues and measure the effect of transitional safety interventions [7−9]. PROMs are available that measure related constructs to transitional safety such as continuity of care (a broader concept including continuity within a single organization) [10−13], one way transitions such as admission or discharge [14,15], or safety in one specific patient group such as cancer patients [16]. Yet, a PROM measuring the generic concept of patient safety in health-care transitions is not available.

What is new?

Key findings
- The 'Transitional Risk and Incident Questionnaire' (TRIQ) is a valid and reliable questionnaire measuring transitional patient safety from the patients' perspective.

- The TRIQ consists of four dimensions: (1) personal relation with general practitioner, (2) personal relation with hospital physician, (3) information exchange, and (4) treatment consistency.

What this adds to what was known?
- Patients with higher comorbidity levels had an increased risk of experiencing transitional safety incidents (TSIs).

- In theory, patients have the complete picture of the patient journey, but patients are not always able to adequately identify TSIs.

What is the implication and what should change now?
- Using the TRIQ incorporating the patients perspective in identifying TSIs, providing input for quality improvement, and monitoring the effect of safety improving interventions.

The aim of this study was to describe the development and validation of the Transitional Risk and Incident Questionnaire (TRIQ) developed for measuring transitional patient safety from the patients' perspective.

2. Methods

2.1. Setting

This study is conducted in the context of the Transitional Incident Prevention Programme, a complex intervention study in the Netherlands aiming to improve transitional patient safety [17].

2.2. Questionnaire development and content validity

We defined transitional safety as any unintended or unexpected incident which could have or did lead to harm for one or more patients at transitions between care settings. As a first step in development of the TRIQ, we performed a literature study on frameworks related to transitional patient safety and PROMs assessing related concepts, that is, continuity of care, coordination of care, integrated care, self-care, patient satisfaction, discharge, and referral. We based our

questionnaire on the conceptual framework for continuity of care by Reid et al. because its concepts are relevant for transitional safety as well [18]. Reid's framework identifies three different types of continuity of care: (1) relational continuity, (2) informational continuity, and (3) management continuity. Relational continuity encompasses the ongoing relationship between patient and health-care provider over time, informational continuity means that information on earlier events is available for present care delivery, and management continuity ensures that care received from different providers is linked in a coherent way [18]. Yet, the framework consists of continuity both within and between health-care settings. The aim of our questionnaire was to explicitly focus on continuity between distinct health-care settings and the outcome in terms of patient safety thereof, that is, the prevention of harm and occurrence of incidents between health-care settings (transitional patient safety). Therefore, we took Reid's framework as a basis for our questions. We considered informational and management continuity as vital for safe care transitions [18], but in case of our questionnaire, this occurs only when directed at safety in care transitions between health-care settings instead of within one health-care setting. We did not consider Reid's domain of relational continuity an aspect of transitional patient safety in itself. Yet, we included it in our questionnaire as we consider lack of relational continuity as a risk factor for transitional safety incidents (TSIs) [18]. Aller et al. developed a questionnaire measuring continuity of care across care levels, named the Cuestionario Continuidad Asistencial Entre Niveles de Atención (CCAENA) questionnaire based on Reid's framework, assessing care continuity across levels from the patients' perspective [10]. Although the concept of the CCAENA was closely related to our need for a questionnaire measuring transitional patient safety, we concluded that it did not fit our purpose. The CCAENA proved too extensive and was not suitable to the Dutch setting. Therefore, we developed a new questionnaire that among others includes parts of Aller's questionnaire which we adapted to the concept of transitional patient safety measuring harm and occurrence of incidents and applied it to the Dutch health-care system.

In the next step, we used an iterative method to construct items and presented them to patient safety experts, healthcare professionals, and a patient panel. In the final development step, we performed a think-aloud process in which patients were interviewed and asked to think aloud when reading and answering the questions [19]. Interviews were audiotaped, and the interviewer registered reactions indicating difficulties in instructions and item wording or meaning. Patients were asked to comment on the length and completeness of the questionnaire. The initial questionnaire was adjusted twice during this process.

2.3. Content of the TRIQ questionnaire

The final version consisted of 24 items. Eight items assessed relational continuity on a four-point scale from

"always" to "never" or "very much" to "very little". Sixteen items of the TRIQ measured informational or management discontinuity in health-care transitions, as experienced by the patients. These sixteen items regarded all transitions between hospital and general practitioners (GPs), that is, referral, hospital discharge, and joint care programs. All answers were reported on a four-point scale including "Yes", "Partially", "No", or "I don't know". If answers suggested discontinuity, patients were asked to explain their answer in a free-text field. The questionnaire is available online in appendix A (original Dutch version used for the validation) or in appendix B (English, translated version). We considered all patient-reported problems as a possible TSI. We identified the definite TSIs by assessing all patient-reported problems from the patient elaboration in the free text field. We considered the response category "I don't know" as no indication of a TSI. Finally, we included three items rating satisfaction with the experienced transition on a five-point scale ranging from "very bad" to "very good" with a "not applicable" option. Items A7, C4, and C6 are preceded by a selection question, so these items were not presented if the items did not apply. When not applicable, the item was set to 'no indication of a TSI'. The introduction to the questionnaire explains that the questionnaire is assessing all transitions between the GP and the department which has requested to fill in the questionnaire in the past 6 months.

2.4. Validation process

Between November 2014 and January 2015, patients who were treated both in primary and secondary care were requested to fill in the TRIQ, either online at home or on laptops at the hospital's outpatient clinic. Participants were selected from the departments of gastroenterology, cardiology, and internal medicine of the St. Antonius Hospital (a specialized urban hospital with 848 beds in Nieuwegein), Diakonessenhuis (an urban hospital with 480 beds in Utrecht), University Medical Center Utrecht (a university hospital with 1,042 beds in Utrecht), and Röpcke-Zweers Hospital (a rural hospital with 197 beds in Hardenberg). Patients were asked to participate at the moment they left the outpatient clinic after a visit. On request, patients could be assisted by medical students, who were trained to guide patients through the questionnaire without influencing their answers. Unfortunately, for organizational reasons, we were not able to exactly determine the number of patients that were invited to participate. Therefore, we were not able to calculate an exact response rate. We analyzed only those questionnaires in which patients had at least answered the first TSI-identifying question C1 (appendix A and B).

2.5. Statistical analysis

We assessed item completion and response percentages per item.

2.5.1. Exploratory factor analysis

We performed an exploratory factor analysis (EFA) with Geomin (oblique) rotation to investigate which factor structure would fit the data using MPLUS 6.1, as this program allows EFA of binary and ordered categorical variables [20]. Items not fitting into a larger factor were not excluded from the questionnaire because of the formative nature of the questionnaire [21]. We performed Bartlett's test of sphericity; when significant ($P < 0.001$), this would indicate that the data were appropriate for factor analysis. Mplus only gives the following fit indices for an EFA with ordered categorical variables, not the usual eigen values: (1) Root Mean Squared Error of Approximation (RMSEA), (2) Comparative Fit Index (CFI), (3) Tucker Lewis Index (TLI), and (4) Standardized Root Mean Square Residual (SRMR). Based on these, the optimal factor structure is chosen. An RMSEA ≤ 0.06, CFI/TLI ≥ 0.95, and SRMR ≤ 0.08 indicate satisfactory model fit [21]. Based on Stevens et al., we decided to report only factor loadings above 0.26, which required at least 400 respondents [22].

2.5.2. Reliability and construct validity

Internal consistency of the factors was measured using Guttman's lower bound (GLB λ2) and composite reliability because these measures are more suitable for dichotomous response data than Cronbach's alpha [23,24]. A GLB and composite reliability above 0.7 indicate acceptable internal consistency. Intercorrelations between factors were calculated. Construct validity is defined as the degree to which a test indeed measures what it claims to be measuring [25]. To assess construct validity, we computed the relationship between an experienced TSI as identified by the TRIQ with relational continuity and with a rating of satisfaction with the transition (discharge, referral, or concurrent care). We hypothesized that respondents who experienced a TSI would rate both their relational continuity with either the GP or hospital physician and their satisfaction with the transition lower than that of patients who did not experience a TSI. Also, we expected that patients with comorbidity or polypharmacy or a lower level of education would experience more incidents. Descriptive statistics were used to summarize the characteristics of the respondents, namely age, gender, level of education, ethnicity, comorbidity, polypharmacy, and the type of transitions that patients had experienced in the last 6 months. We used Mann-Whitney U, Chi-square, and Chi-square-for-trend to calculate the relationship between incidents and patient characteristics and between incidents and relational continuity and overall ratings of transitional patient safety. All statistical analyses were conducted using MPlus (for the EFA) (version 6.12) and SPSS (version 23).

2.6. Ethics

This study was exempted from ethical assessment by the medical ethic review committee of the University Medical Center Utrecht, Utrecht, the Netherlands (METC number, 13/142).

3. Results

3.1. Participants

In total, 458 questionnaires were returned, of which seven were excluded because all incident identifying questions were missing. Response rate was 33.6% in the Utrecht and Nieuwegein area. This resulted in 451 questionnaires eligible for analysis. Seven respondents stopped filling in the questionnaire halfway, leading to missing data halfway (from question D1 to baseline characteristics, $N = 444$; appendix A and B).

The mean respondents' age was 64 years, and gender was equally distributed (51% female) (Table 1). Seventy percent of patients had comorbidity, and 44% of patients used at least five medicines (polypharmacy). After reclassification, 533 transitional incidents were reported by 234 of 451 patients (53%).

Most patients visited one to three different GPs and one to five different hospital physicians in the past year. The majority of patients had a high or very high level of confidence in their treating physicians in both general practice and hospital (Table 2).

3.2. TRIQ item analysis

Table 3 shows the distribution of answers to the incident-identifying questions. More than 60% of the

Table 1. Baseline characteristics of included patients $N = 444$

Characteristics	Overall	No TSI, $N = 210$	TSI, $N = 234$
Female sex	226 (50.9%)	105 (50.0%)	121 (51.7%)
Age (median, range)	64 (19-99)	65 (20-89)	63 (19-99)
Polypharmacy (% yes)[a]	196 (44.1%)	79 (36.4%)	117 (50.0%)
Comorbidities[a]			
0	132 (29.7%)	73 (33.6%)	59 (25.2%)
1-2	264 (59.5%)	124 (57.1%)	140 (59.8%)
3-5	51 (11.5%)	18 (8.3%)	33 (14.2%)
≥6	3 (0.7%)	1 (0.5%)	2 (0.9%)
Education			
Primary education	185 (41.7%)	91 (43.3%)	94 (40.2%)
Secondary education	112 (25.2%)	52 (24.8%)	60 (25.6%)
Higher education	147 (33.1%)	67 (31.9%)	80 (34.2%)
Ethnicity			
Dutch	394 (88.7%)	189 (90.0%)	205 (87.6%)
Not Dutch	50 (11.3%)	21 (10.0%)	29 (12.4%)
Transition past 6 months			
Discharged from hospital[a]	85 (19.1%)	30 (13.8%)	55 (23.5%)
Referred to hospital	178 (40.1%)	74 (34.1%)	104 (44.4%)
Outpatient treatment	380 (85.6%)	181 (83.4%)	199 (85.0%)

TSI, transitional safety incident.
[a] Significant difference at $P < 0.05$.

patients were not able to report on accurate communication between GP and specialist (D6). Likewise, over 40% of respondents could not judge the GP specialist collaboration (D5), the awareness of their GP of specialists' management (C6 and C8) or vice versa, or the receipt of test results from hospital (C9). Most TSIs were identified by the researchers from the free text fields of questions C9 (reporting of GP test results to the hospital physician), A7 (GP being informed about hospital discharge), and C4 (awareness of the GP of the specialist diagnosis). Unfortunately, not enough information was given in the free text field to assess the clinical impact of the TSIs.

3.3. Results from the EFA

Bartlett's test of sphericity was significant ($P < 0.0001$), so a factor analysis could be performed. The EFA reached acceptable fit indices in a four-factor solution with an RMSEA of 0.047, a CFI/TLI of 0.959, and an SRMR of 0.090. The resulting four factors were as follows: (1) personal relation with GP (four items), (2) personal relation with hospital physician (four items), (3) information exchange (seven items), and (4) treatment consistency (eight items) (Table 4).

Five items loaded on two factors: (1) B8, "Does your hospital physician understand what you tell him/her?"; (2) C4, "Was your GP aware of the diagnosis newly established in hospital?"; (3) D5, "Do your GP and hospital physician work well together?"; (4) D6, "Do your GP and hospital physicians communicate with each other?"; and (5) D7, "Do you have confidence in the collaboration between your GP and hospital physician?".

3.4. Reliability and construct validity

The internal consistency for individual factors was acceptable to good (composite reliability, 0.75-0.95; GLB λ2, 0.52-0.63) (Table 4). Correlation between dimensions ranged from 0.19 to 0.31.

Patients with comorbidity and polypharmacy experienced more TSIs (Table 2). We did not find a relationship between other patient characteristics such as educational level and TSIs.

As expected, experiencing at least one TSI identified by the TRIQ questionnaire was significantly related to a lower relational continuity in both general practice and hospital, except for item B1 "seeing the same GP at every visit". In addition, an experienced TSI was related to a poorer overall rating of all transitions individually (Table 2).

4. Discussion

4.1. Main findings

We developed and validated the TRIQ for measurement of patients' perspective on transitional patient safety. The TRIQ consisted of 4 domains: (1) personal relation with

Table 2. Distribution of answers in relational continuity, overall agreement and the relationship with transitional safety incidents % (*N*)

Items	Overall	No TSI	TSI	P[a]
Do you see the same GP at every visit?				
Always	221 (49.1%)	111 (50.9%)	110 (47.4%)	0.299
Usually	195 (43.3%)	91 (41.7%)	104 (44.8%)	
Sometimes	24 (5.3%)	11 (5.0%)	13 (5.6%)	
Never	10 (2.2%)	5 (2.3%)	5 (2.2%)	
Do you see the same hospital physician at every visit?				
Always	285 (63.3%)	154 (70.6%)	131 (56.5%)	**0.001**
Usually	121 (26.9%)	50 (22.9%)	71 (30.6%)	
Sometimes	25 (5.6%)	9 (4.1%)	16 (6.9%)	
Never	19 (4.2%)	5 (2.3%)	14 (6.0%)	
How many different GPs have you seen in the past year?				
1	237 (52.7%)	127 (58.3%)	110 (47.4%)	**0.037**
2-3	198 (44.0%)	86 (39.4%)	112 (48.3%)	
>3	15 (3.3%)	5 (2.3%)	10 (4.3%)	
How many different hospital physicians have you seen in the past year?				
1	225 (50.0%)	126 (57.8%)	99 (42.7%)	**0.002**
2-5	215 (47.8%)	90 (41.3%)	125 (53.9%)	
5-10	9 (2.0%)	1 (0.5%)	8 (3.4%)	
>10	1 (0.2%)	1 (0.5%)	0 (0.0%)	
Do you have confidence in your GP's professional ability?				
Very high	30.2% (136)	31.7% (69)	28.9% (67)	0.070
High	60.0% (270)	62.4% (136)	57.8% (134)	
Low	8.0% (36)	4.6% (10)	18.6% (26)	
Very low	1.8% (8)	1.4% (3)	2.2% (5)	
Do you have confidence in your hospital physician's professional ability?				
Very high	170 (37.8%)	99 (45.4%)	71 (30.6%)	<**0.001**
High	268 (59.6%)	119 (54.6%)	149 (64.2%)	
Low	12 (2.7%)	0 (0.0%)	12 (5.2%)	
Very low	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Does your GP understand what you tell him/her?				
Always	269 (59.8%)	145 (66.5%)	124 (53.4%)	**0.002**
Usually	153 (34.0%)	66 (30.3%)	87 (37.5%)	
Sometimes	26 (5.8%)	6 (2.8%)	20 (8.6%)	
Never	2 (0.4%)	1 (0.4%)	1 (0.4%)	
Does your hospital physician understand what you tell him/her?				
Always	284 (63.1%)	150 (68.8%)	134 (57.8%)	<**0.001**
Usually	152 (33.8%)	67 (30.7%)	85 (36.6%)	
Sometimes	14 (3.1%)	1 (0.5%)	13 (5.6%)	
Never	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Overall rating of your referral, *N* = 314				
Very good	73 (23.2%)	39 (25.7%)	34 (21.0%)	0.701
Good	210 (66.9%)	109 (71.7%)	101 (62.3%)	
Moderate	21 (6.7%)	3 (2.0%)	18 (11.1%)	
Poor	8 (2.5%)	1 (0.7%)	7 (4.3%)	
Very poor	2 (0.6%)	0 (0.0%)	2 (1.2%)	
Overall rating of your discharge, *N* = 187				
Very good	28 (15.0%)	13 (17.6%)	15 (13.3%)	**0.001**

(Continued)

Table 2. Continued

Items	Overall	No TSI	TSI	P[a]
Good	123 (65.8%)	55 (74.3%)	68 (60.2%)	
Moderate	24 (12.8%)	4 (5.4%)	20 (17.7%)	
Poor	8 (4.3%)	2 (2.7%)	6 (5.3%)	
Very poor	4 (2.1%)	0 (0.0%)	4 (3.5%)	
Overall rating of your concurrent care at the GP and hospital outpatient clinic, *N* = 297				
Very good	41 (13.8%)	21 (15.9%)	20 (12.1%)	**0.006**
Good	223 (75.1%)	110 (83.3%)	113 (68.5%)	
Moderate	24 (8.1%)	1 (0.8%)	23 (13.3%)	
Poor	7 (2.4%)	0 (0.0%)	7 (4.2%)	
Very poor	2 (0.7%)	0 (0.0%)	2 (1.2%)	

Bolded value represents the significant difference at *P* < 0.05.

GP, general practitioner; TSI, transitional safety incident.

[a] Chi-square trend.

GP, (2) personal relation with the hospital physician, (3) information exchange, and (4) treatment consistency. Our results demonstrated the TRIQ to be a valid and reliable instrument, with internal consistency scores of 0.75 or higher. Adequate content and face validity was achieved by building on the concept of continuity of care (Reid et al.) and by including both patients and professionals in the development [18]. The overall ratings of transitional care and the TRIQ domains were related, confirming the construct validity. In addition, at higher comorbidity levels, patients had an increased risk of experiencing TSIs according to the TRIQ. We think that the TRIQ is a valid and efficient diagnostic tool to adequately identify safety risks and transitional care incidents along the patient journey between the care levels of general practice and hospital.

4.2. Comparison to literature

Related questionnaires exist, but they either measure broader concepts such as continuity of care [10—13], focus mainly on continuity within health-care setting [26,27], or limit themselves to one transition (mainly discharge) [14,15] or to one patient group [16]. The TRIQ was developed to measure patient safety from the patients' perspective when patients move between settings. Transitional patient safety especially focuses on preventing medical errors during or after these health-care transitions.

To our knowledge, the TRIQ is the first generic measurement tool to measure transitional patient safety and identify TSIs from a patients' perspective, providing essential information for directions of quality improvement initiatives. The questionnaire was developed together with patients, and readability testing showed that the questionnaire was easily accessible to all patients.

4.3. Interpretation

Although, in theory, the patient should have the complete picture of the patient journey, it can be disputed whether patients are always able to adequately identify correct from incorrect health care. Especially unnecessary redundant testing (D1) needed reassessment of the responses, as patients reported tests as being redundant which, from a medical perspective, were correctly repeated within a short time period, such as blood tests for inflammation markers or electrocardiograms. Indeed, patients do not always have the specific medical knowledge to distinguish correct from incorrect repetition of tests. In addition, TSIs may not always be directly recognized by patients for the incident may occur behind the scenes [28]. However, patients can identify the aftermath, such as lack of communication [29]. An example is that a patient notices that he receives the wrong medication or that the GP is unaware of a hospital admission or new diagnosis, which is caused by a missing discharge letter. As a patient never actually sees a discharge letter or knows whether one has been sent or not, not all missing correspondence will be noticed. Therefore, we could only assess the experienced TSIs that have occurred by translating the patients' experiences in the free text fields of the TRIQ. Unfortunately, the patients did or could not describe the severity of these safety incidents despite our attempts to measure harm with our questionnaire.

When assessing internal consistency, we used the Guttman's lower bound and composite reliability, which differed considerably. The composite reliability best reflected the dichotomous nature of our questionnaire items and the decent individual factor loadings found in our EFA, leading to our conclusion that internal consistency was acceptable to good. However, for optimal transparency, we also chose to present the Guttman's lower bound. Despite the reporting of fit indices, this study did not perform a confirmatory factor analysis (which requires testing a predefined structure) but an EFA, albeit with other statistics than usual. This is because MPlus only reports fit indices when doing an EFA with ordered categorical variables.

Despite the fact that 53% of our patients had experienced a minor TSI, the level of confidence in their

Table 3. Distributions of answers in incident identifying questions, *N* (%)

Question		N	N missing	Yes	Partially	No	I don't know	TSI (after reclassification)
B9	Do you know who your primary responsible physician is for your current disease or health complaint?	451	0	400 (88.7%)		51 (11.3%)		44 (9.8%)
C1	Was your hospital physician aware of your previous medical history?	451	0	266 (59.0%)	47 (10.4%)	37 (8.2%)	101 (22.4%)	64 (14.2%)
C2	Was your GP aware of the decisions made and instructions given at the hospital?	451	0	236 (52.3%)	47 (10.4%)	44 (9.8%)	124 (27.5%)	73 (16.3%)
C4	Was your GP aware of your diagnosis newly established in hospital?	91	0	43 (47.3%)	10 (11.0%)	12 (13.2%)	26 (28.6%)	8 (1.8%)
C6	Was your GP aware of changes in your treatment plan made in hospital?	97	0	34 (35.1%)	8 (8.2%)	13 (13.4%)	42 (43.3%)	14 (3.1%)
C8	Did your GP receive the results of all hospital tests?	451	0	204 (45.2%)		40 (8.9%)	207 (45.9%)	31 (6.9%)
C9	Did your hospital physician receive the results of all test performed by your GP?	451	0	181 (40.1%)		62 (13.7%)	208 (46.1%)	18 (4.0%)
A7	Was your GP informed about your hospital discharge?	85	0	45 (52.9%)	25 (29.4%)	15 (17.6%)		12 (2.7%)
D1	Was a test done twice by both your GP and hospital physician in a short time?	444	7	264 (59.3%)		147 (33.0%)	34 (7.6%)	6 (1.4%)
D2	Did your GP and hospital physician give different information?[a]	444	7	415 (93.3%)	14 (3.1%)	16 (3.6%)		17 (3.8%)
D3	Do your GP and hospital physician give different advice?[a]	444	7	418 (93.9%)	14 (3.1%)	13 (2.9%)		15 (3.4%)
D4	Did your GP and hospital physician disagree on your treatment plan?[a]	444	7	290 (65.2%)	8 (1.8%)	18 (4.0%)	129 (29.0%)	17 (3.8%)
D5	Have your GP and hospital physician worked well together?	444	7	192 (43.1%)	27 (6.1%)	20 (4.5%)	206 (46.3%)	25 (5.6%)
D6	Have your GP and hospital physicians communicated with each other?	444	7	114 (25.6%)	30 (6.7%)	24 (5.4%)	277 (62.2%)	28 (6.3%)
D7	Are you confident about the collaboration between your GP and hospital physician?	444	7	71 (16.0%)[b]	302 (67.9%)[b]	63 (14.2%)[b]	9 (2.0%)[b]	
D8	Do you know who to contact in case something is wrong?	444	7	399 (89.7%)		46 (10.3%)		46 (10.4%)

GP, general practitioner; TSI, transitional safety incident.

[a] Negatively stated questions.

[b] Response options: Very high/high/low/very low.

health-care providers remained high. Only in the hospital, the experience of a TSI was related to a lower confidence. Possibly, the long-standing personal doctor-patient relationship in general practice accounts for more sustainable appreciation and trust [30].

4.4. Limitations

Our study has some limitations. First, the confirmation of a TSI was based on the subjective information provided by the patient in the free text. Unfortunately, the descriptions sometimes were not precise enough to assign a firm judgment or might have been only an outing of patient (dis)satisfaction with care instead of an actual TSI. This may have led to either an underestimation or overestimation of the actual TSIs.

Second, the response rate of 33.6% for individual questionnaires is low; however, it is not unusual. The low response could be because of the length of the questionnaire (approximately 15-20 minutes) or the dispersion through email in part of the population. This might have led to a certain selection of patients, such as unsatisfied or younger patients more used to computers. However, the respondent characteristics are similar to the normal patient population, with a median age of 64 years. Therefore, we do not expect a large bias in our results also regarding that a factor analysis does not assess the actual values of the answers but mainly the pattern of response.

Third, due to a logistical error, the number of eligible patients in the Hardenberg region was not registered, so for this area, we could not calculate the response rate.

Table 4. Factor loadings and internal consistency of the TRIQ

Item	Description	F1	F2	F3	F4	GLB λ2	CR
Personal relation with general practitioner						0.63	0.78
B1	Do you see the same GP at every visit?	0.59					
B2	How many different GPs have you seen in the past year?	0.62					
B3	Do you have confidence in your GP's professional ability?	0.76					
B4	Does your GP understand what you tell him/her?	0.74					
Personal relation with hospital physician						0.60	0.76
B5	Do you see the same hospital physician at every visit?		0.78				
B6	How many different hospital physicians have you seen in the past year?		0.47				
B7	Do you have confidence in your hospital physician's professional ability?		0.69				
B8	Does your hospital physician understand what you tell him/her?	0.40	0.48				
B9	Do you know who your directly responsible physician is for your current disease or health complaint?		0.69				
Information exchange						0.57	0.83
C1	Was your hospital physician aware of your previous medical history?			0.31			
C2	Was your GP aware of the decisions made and instructions given to you at the hospital (i.e., prescription changes, information on self-care management, future appointments in hospital)			0.88			
C4	Was your GP aware of your diagnosis newly established in hospital?		0.47	0.54			
C6	Was your GP aware of changes in your treatment plan made in hospital?			0.64			
C8	Did your GP receive the results of all hospital tests?			0.88			
C9	Did the hospital physician receive the results of all tests performed by your GP?			0.56			
A7	Was your GP informed about your hospital discharge?			0.55			
Treatment consistency						0.52	0.95
D1	Was a test done twice by both your GP and hospital physician in a short time period?				0.61		
D2n	Did your GP and hospital physician give different information?				0.94		
D3n	Did your GP and hospital physician give different advice?				0.98		
D4	Did your GP and hospital physician disagree on your treatment plan?				0.97		
D5	Have your GP and hospital physician worked well together?			0.73	0.86		
D6	Have your GP and hospital physician communicated with each other?			0.50	0.83		
D7	Are you confident about the collaboration between your GP and hospital physician?	0.52		0.45	0.66		
D8	Do you know who to contact in case something is wrong?				0.78		

CR, composite reliability; GP, general practitioner; GLB, Guttman's lower bound; Hos, hospital; n, negatively stated questions; TRIQ, transitional risk and incident questionnaire.

However, as all eligible patients were approached for participation, we do not expect any influence on the results.

Fourth, the TRIQ was a digital questionnaire and therefore less accessible to elderly patients. We tried to solve this with the help of a medical student, but this may have led to more socially acceptable answers in this patient group. However, we trained the students to assist without steering the answers. In addition, not providing this assistance would probably have led to the underestimation and missing of specific types of TSIs associated with these high-risk patients.

Finally, the TRIQ is developed for the primary-secondary care interface in the Netherlands. For use in other countries, the TRIQ should ideally first be adapted and validated to fit a different context. In addition, to be able to reliably assess effect of improvement plans, further testing of reliability (test-retest), measurement error, and responsiveness is needed.

5. Conclusion

The TRIQ is a valid and reliable questionnaire for measuring transitional patient safety from the patients' perspective, which can be helpful in identifying safety incidents and monitor the effect of safety-improving interventions.

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Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jclinepi.2018.08.002.

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