

## Competencies required for nursing telehealth activities: a Delphi-study

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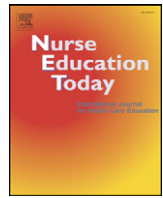
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## Competencies required for nursing telehealth activities: A Delphi-study<sup>☆</sup>



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### SUMMARY

**Background:** Telehealth is viewed as a major strategy to address the increasing demand for care and a shrinking care professional population. However, most nurses are not trained or are insufficiently trained to use these technologies effectively. Therefore, the potential of telehealth fails to reach full utilization. A better understanding of nursing telehealth entrustable professional activities (NT-EPAs) and the required competencies can contribute to the development of nursing telehealth education.

**Method:** In a four-round Delphi-study, a panel of experts discussed which NT-EPAs are relevant for nurses and which competencies nurses need to possess to execute these activities effectively. The 51 experts, including nurses, nursing faculty, clients and technicians all familiar with telehealth, were asked to select items from a list of 52 competencies based on the literature and on a previous study. Additionally, the panelists could add competencies based on their experience in practice. The threshold used for consensus was set at 80%.

**Results:** Consensus was achieved on the importance of fourteen NT-EPAs, requiring one or more of the following core competencies; coaching skills, the ability to combine clinical experience with telehealth, communication skills, clinical knowledge, ethical awareness, and a supportive attitude. Each NT-EPA requires a specific set of competencies (at least ten). In total, 52 competencies were identified as essential in telehealth.

**Discussion/Conclusion:** Many competencies for telehealth, including clinical knowledge and communication skills, are not novel competencies. They are fundamental to nursing care as a whole and therefore are also indispensable for telehealth. Additionally, the fourteen NT-EPAs appeared to require additional subject specific competencies, such as the ability to put patients at ease when they feel insecure about using technology. The NT-EPAs and related competencies presented in this study can be used by nursing schools that are considering including or expanding telehealth education in their curriculum.

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### Background

Using technology to provide healthcare remotely is seen as a major strategy to address the continuous increase in the demand for care. Due to the increasingly available communication technology, telehealth is attracting growing interest. Nurses can use telehealth technologies in the care of community-dwelling patients (Krijgsman et al., 2014), for example, by (a) replacing face-to-face visits with e-visits via the use of videoconferencing, (b) monitoring vital signs such as blood pressure, blood glucose levels or heart rate via devices for self-measurement, (c) monitoring movements in and around the home via activity monitors, or (d) responding to personal alarms by patients to let nurses or family members know when something goes wrong. Nurses can also

use technologies for teleconsultation, for example to provide wound assessment at a distance. However, these telehealth solutions are only effective if users (patients and nurses) know how to use technology adequately (Jang-Jaccard, Nepal, Alem, & Li, 2014).

Education and training can bring technology and healthcare together (Gifford, Niles, Rivkin, Koverola, & Polaha, 2012). Training nurses how to integrate information technology into existing care pathways will also facilitate its acceptance (Brewster, Mountain, Wessels, Kelly, & Hawley, 2014). For many years, the importance of telehealth education and training has been recognized in science (e.g., Booth, 2006; Brewster et al., 2014; Giordano et al., 2011; Kort and van Hoof, 2012; Lamb and Shea, 2006; Maag, 2006; Sharma and Clarke, 2014; Simpson, 1998; van Houwelingen et al., 2015), politics (e.g., European Commission, 2012) and education (Simpson, 1998; e.g., Steering Group Bachelor of Nursing 2020, 2015). In addition, we have seen in an earlier study that the willingness of nurses to use telehealth will increase when they are more experienced with telehealth applications (van Houwelingen et al., 2015).

On a global level, the importance of telehealth competencies for nurses is emphasized in the different nursing standards: e.g., The Tuning Framework in Europe (Tuning Project, 2011), the Australian Qualifications Framework (2013), the American Nurses Association (2010), and also by the World Health Organization (2009). These standards however, limit themselves to emphasizing the importance of telehealth competencies, and lack in giving examples of concrete nursing telehealth practices. The current study aims to discuss this nursing telehealth practice in depth, by exploring the knowledge, skills and attitudes that nurses need for the execution of professional telehealth activities in an attempt to facilitate the development of telehealth education and the acceptance of telehealth. In this study, we define competencies as the blend of knowledge, attitudes and skills. Some studies (Barakat et al., 2013; De Gagne et al., 2012; Gifford et al., 2012) have started to provide insight into what competencies and training nurses might need for the provision of telehealth and described a first overview of the most important basic telehealth competencies. Besides these studies, there are valuable reports available describing telehealth competencies in more detail (e.g., American Academy of Ambulatory Care Nursing, 2011; Australian Nursing Federation, 2013). Thus far no scientific studies have identified the specific telehealth activities nurses can perform to support community-dwelling patients and which specific set of competencies is required for each of the telehealth activities. Identifying these nursing telehealth activities and related competencies, is the aim of the current study.

A new approach to the frame of competencies in healthcare domains is the use of 'entrustable professional activities' (EPAs) (Mulder, ten Cate, Daalder, & Berkvens, 2010;; ten Cate, 2005; ten Cate, 2014). EPAs are defined as "tasks or responsibilities to be entrusted to the unsupervised execution by a trainee once he or she has attained sufficient specific competence" (ten Cate, 2013, p. 157). There is an important difference between EPAs and competencies: EPAs are tasks that can be distributed among health care team members at the beginning of a shift. Competencies are the required capacities that a team member should possess before he or she can be entrusted to perform the EPA independently. The concept of entrustable professional activities (EPAs) was designed to link competencies to clinical practice for curriculum development and teaching assessment (ten Cate and Scheele, 2007). One of the first applications of the concept was with physician assistants in training (Mulder et al., 2010). In our study the concept is used to explore all the competencies that nurses need to possess before they can be trusted to perform specific nursing telehealth EPAs.

The research questions posed in the current study were as follows: (1) Which nursing telehealth entrustable professional activities (NT-EPAs) can nurses perform to support community-dwelling patients?; and (2) What knowledge, attitudes and skills do nurses need to acquire before they can be entrusted with the telehealth activities derived from question 1? The findings might also provide insight into the question whether nurses need new, subject specific competencies (competencies

that were not relevant before the emergence of telehealth technologies), or that a range of common competencies (competencies of importance for nursing practice in general) is sufficient to be able to execute the nursing telehealth activities independently.

## Method

This study had two phases: (1) the development of a survey with possible relevant nursing telehealth EPAs (NT-EPAs) and competencies and (2) a Delphi-study with experts in which the survey was used as an instrument to reach consensus on the most essential telehealth activities and competencies. The two phases are illustrated in Fig. 1 and are explained below.

### *Development for the Proposal of Nursing Telehealth EPAs and Knowledge, Attitudes and Skills*

The proposal of NT-EPAs and possible related knowledge, attitudes and skills that was presented in the survey was based on the following sources:

- Analysis of the Dutch nursing profile and 'body of knowledge and skills'
- Literature search
- Previous research
- Interviews
- Observations

### *Analysis of the Dutch Nursing Profile and 'Body of Knowledge and Skills'*

The proposed 14 NT-EPAs were developed based on an analysis of the following sources: (a) the Dutch nursing profile (Schuurmans, Lambregts, Projectgroep V&V 2020, and Grotendorst, 2012; Steering Group Bachelor of Nursing 2020, 2015), (b) the Dutch nursing professional roles as described by Pool (2007), (c) the 'body of knowledge and skills' (Steering Group Bachelor of Nursing 2020, 2015), (d) the final attainment levels, in existence since 1996 (Commissie Kwalificatiestructuur, 1996) and (e) a study on the future of Dutch district nurses (Keurhorst et al., 2011). The main question of the analysis of the content of these sources was which 'traditional' nursing activities can also be provided via telehealth. The proposal of NT-EPAs was composed with all authors in close collaboration with a nurse with more than eight years of experience in daily practice in telehealth, randomly selected via the network of the authors.

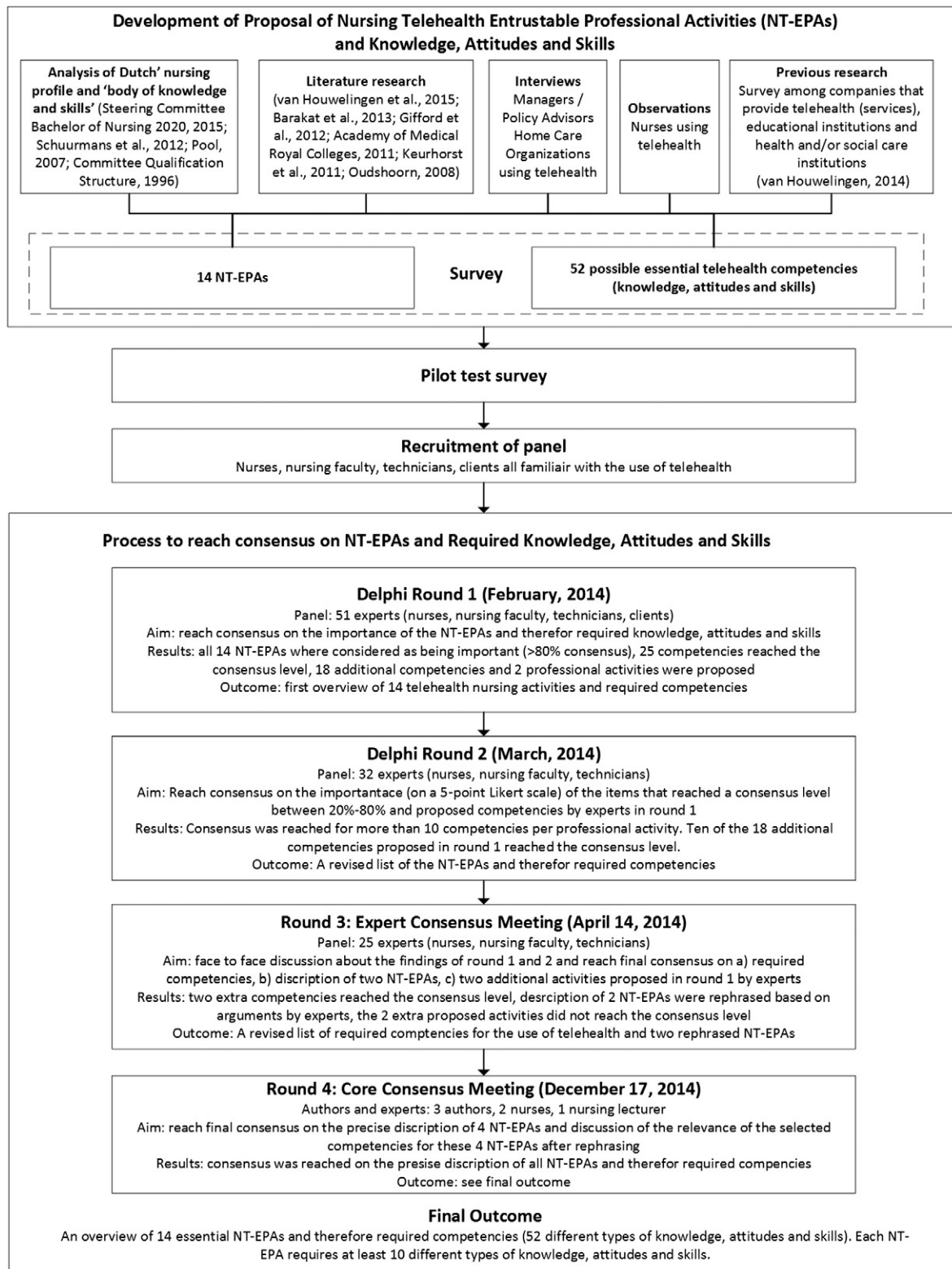
### *Literature Search and Previous Research*

The list of competencies, consisting of 52 types of knowledge, attitudes and skills for telehealth, was partly based on literature sources and was retrieved and selected via correspondence with specialists from our network (Academy of Medical Royal Colleges, 2011; Barakat et al., 2013; Oudshoorn, 2008; Schuurmans et al., 2012; Scottish Centre for Telehealth and Telecare Development Programme, 2011; van Houwelingen et al., 2015).

In addition, input from previous research was used (van Houwelingen, 2014; van Houwelingen et al., 2015). In this study, 361 representatives of companies that provide telehealth services, educational institutions and health and social care organizations in the Netherlands, Germany, Spain and the United Kingdom described which competencies they consider essential for nurses to provide telehealth.

### *Observations and Interviews*

Between October and December 2013, observations and structured interviews were conducted in two healthcare organizations where nurses have been working with telehealth for more than eight years.



**Fig. 1.** Study design of the development of essential nursing telehealth entrustable professional activities (NT-EPAs) and the required knowledge, attitudes and skills. Each step of the method is discussed in detail in the method section of this paper.

To gain insight into relevant telehealth activities and competencies, four telehealth-experienced nurses were observed based on the 'think-aloud method' Van Someren et al., 1994, in which the nurses were asked to think aloud while performing their telehealth activities. In

addition to the observations, two team managers in these two healthcare organizations were asked what competencies they expect recruited nurses have when they apply for a function in which telehealth activities play an important role.

### Compiling of Information

The memos written during the observations and interviews and the answers by representatives from previous research were coded and grouped into recurring themes (using MAXQDA software for qualitative data analysis, 1989–2015, VERBI Software – Consult – Sozialforschung GmbH, Berlin, Germany). The recurring themes and the findings from the literature review served as the basis for the list of 52 competencies that was proposed in the survey.

### Structure and Pilot Testing of the Competencies List

To structure the list of 52 competencies (see Table 3), the competencies were categorized into fifteen knowledge competencies, nine attitude competencies and 28 skills competencies placed into five subcategories: general, technological, clinical, communication and implementation skills. To explore the readability and feasibility of the survey, the survey was pilot tested by four volunteering undergraduate nursing students who made notes and remarks and checked the completion time of the survey. The survey was restructured into a final version based on their feedback.

### Recruitment of the Expert Panel Members

The recruitment of experts commenced in December 2013 via telephone. Eight nursing schools that provide bachelor's degree level education, two hospitals, eleven home care organizations and seven providers of technology were contacted. The organizations were selected based on the authors' network and individuals' earlier interest in the topic.

Snowball sampling was used to approach employees with a special interest in telehealth, and the employees were asked to propose other potential experts. Additional information was given by an e-mail information letter explaining the aim of the study, the relevance for practice and the dates of the consecutive research rounds. After general interest to participate was received from potential experts, the participants were informed about the study by telephone and screened to determine whether they met the inclusion criterion of at least six months of telehealth experience.

Patients were recruited by their nurses with the subsequent provision of an information letter. Thereafter, an eligibility telephone call was made to check if patients had at least six months of experience and whether they were able to read Dutch. If participants were not able to complete the survey online, a paper version was posted.

### Ethical Approval

Because this study did not involve participants being required to perform actions or imposing certain behaviors upon them, the Dutch Medical Research Act (WMO) did not apply to this study. Subsequently, all necessary precautions were taken to protect the anonymity and confidentiality of our participants; in the patient information letter, participants were informed about their voluntary participation and informed that they were free to decline at any time. Furthermore, the participants were informed that their responses were processed anonymously and only used for research purposes. No identifying patient information was collected.

### Process to Reach Consensus on Nursing Telehealth EPAs and Required Knowledge, Attitudes and Skills

The first Delphi round started with a survey consisting of the open question "Which competences are needed for the provision of telehealth?", and a proposed list of competencies and nursing telehealth EPAs derived from previous research, literature, observations and interviews (discussed below). The combination of an open question and proposed list of competencies was chosen for two reasons: (1) for the

respondent it can be challenging to propose new competencies, and (2) for the aim of this study, it is important to have the opinion of an expert panel on findings of previous research and literature.

### Delphi Round 1

The first Delphi round started with an online survey (using [www.surveymonkey.com](http://www.surveymonkey.com)) presenting the fourteen NT-EPAs and the list of 52 types of knowledge, attitudes and skills and aimed for each panel member to select the items for each NT-EPA. To prevent missing essential competencies, the experts could propose additional knowledge, attitudes and skills.

The expert panel was asked to indicate – on a 5-point Likert scale – the relevance of each NT-EPA for the nursing profession. Subsequently, the panel members were asked to select what knowledge, attitudes and skills of the list they thought to be a prerequisite for nurses to perform the NT-EPA independently. To encourage the experts of the panel in selecting the competencies critically, a maximum of half of the 52 competencies were needed to be selected per NT-EPA.

### Delphi Round 2

Items from the first round that were selected by >80% of the expert panel were considered to be relevant competencies. These were not presented in round 2. Items with <20% consensus were excluded from round 2. Consequently, only competencies with an agreement level of 20%–80% in the first round were presented to the participants in round two. For each competency, the precise agreement level retrieved in round 1 was shown to the participant. Furthermore, new items proposed by respondents in round 1 were presented. This method was applied for each NT-EPA and the related knowledge, attitudes and skills.

### Round 3: Expert Consensus Meeting

In round three, the experts came physically together in a three-hour meeting aimed at discussing the findings from previous rounds and at achieving final consensus on the telehealth activities and related competencies. This meeting was chaired by one of the authors (OtC) (see Fig. 2, Appendix A). Participants gave permission for the meeting to be audio-recorded.

At the start of this meeting, each expert received a hand-out with all NT-EPAs and related competencies. All competencies deemed necessary for an NT-EPA with an agreement level of >80% were displayed in green, and the remaining items were depicted in red. Each activity was discussed with a focus on the red competencies. The experts were given the opportunity to bring in arguments for the importance of competencies that did not already reach the consensus level of 80%. After a short discussion, opinions were collected using an electronic voting device (Xtol Messenger: <http://www.xtol.co.uk/handsets.html>). Experts could respond 'yes' or 'no' to the question "Do you consider this knowledge, attitude or skill as being required in order to be able to provide this nursing telehealth activity adequately?".

### Round 4: Core Consensus Meeting

On four of the NT-EPAs, open discussions concerning the precise phrasing remained at the end of the third round. Subsequently, an extra expert consultation meeting was organized to reach a final consensus on precise definitions for these nursing telehealth EPAs. One lecturer, and two nurses of the expert panel of the previous rounds volunteered to participate in this final meeting, together with three of the authors. Transcriptions of the audio-recordings from round three were used as input for the discussion. After the revision of the nursing telehealth activities, the related competencies were discussed to verify if the competencies were still relevant, leading to

choices to accept or withdraw the rephrasing of the four NT-EPAs that were discussed.

### Statistical Analysis

The level of consensus within the expert panel was explored using frequencies of items: did more than 80% of the expert panel select an NT-EPA as an essential required competency? All data analyses were performed using SPSS (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp).

### Qualitative Analysis of the Expert Meeting

Aiming at identifying groups of items with a similar meaning, transcriptions of the audio-recordings and notes given by experts in round three were transformed into themes. Themes were transformed using MAXQDA via a process of axial coding by two of the authors (CvH and AM) independently.

## Results

### Demographics of the Expert Panel

In total, 51 experts from six nursing schools that provide bachelor's degree level education, one hospital, eight home care organizations and six providers of technology consented to participate and took part in Delphi round 1. Most were nurses (62.7%); the remaining participants were nursing faculty, technicians or clients. One of the client experts indicated that the survey was too complicated and left the study in round 1. In rounds 2 and 3, there was a decline in response to 32 and 25, respectively. Thus, over 50% of the expert panel dropped

**Table 1**  
Demographic characteristics of the expert panel

Characteristics	Expert panel Round 1 (n = 51)	Expert panel Round 2 (n = 32)	Expert panel Round 3 (n = 25)
Expertise, % (n)			
Nursing faculty	23.5 (12)	21.8 (7)	36 (9)
Nurse	62.7 (32)	62.5 (20)	52 (13)
Technician	9.8 (5)	9.4 (3)	12 (3)
Client	3.9 (2)	6.3 (2)	0
Gender, % (n)			
Male	31.4 (16)		
Female	68.6 (35)		
Age, % (n)			
23–32	27.5 (14)		
33–42	13.7 (7)		
43–52	21.6 (11)		
53–62	33.3 (17)		
63–79	3.9 (2)		
Telehealth experience, % (n)			
Personal alarms	58.8 (30)		
Videoconferencing	84.3 (43)		
Activity monitors	19.6 (10)		
Telemedicine	33.3 (17)		
Telemonitoring	29.4 (15)		
Telehealth experience in years, % (n)			
1 year	19.6 (10)		
1–4 years	49.0 (25)		
4–10 years	21.6 (11)		
>10 years	9.8 (5)		
Educational level, % (n)			
Lowest (primary education)	2.0 (1)		
Low (lower secondary education)	2.0 (1)		
Average (general or vocational upper secondary education)	13.7 (7)		
Above average (post-secondary non-tertiary education)	86.2 (44)		

\* These demographic data were not asked in the third round.

**Table 2**  
Nursing telehealth entrustable professional activities (NT-EPAs).

NT-EPA – Title	
1:	Supporting patients in the use of technology <sup>a</sup>
2:	Training patients in the use of technology as a way to strengthen their social network
3:	Providing health promotion remotely <sup>b</sup>
4:	Triaging incoming calls and alarms <sup>c</sup>
5:	Analyzing and interpreting incoming data derived from (automatic) devices for self-measurement <sup>a</sup>
6:	Monitoring body functions and lifestyle <sup>1b</sup>
7:	Providing psychosocial support <sup>1b</sup>
8:	Encouraging patients to undertake health promotion activities <sup>1c</sup>
9:	Instructing patients and family care givers in self-care <sup>1b</sup>
10:	Assessing patient capacity to use telehealth <sup>b</sup>
11:	Evaluating and adjusting the patient care plan <sup>1b</sup>
12:	Coordination of care with the use of telehealth technology <sup>b</sup>
13:	Independent double-check of high-risk medication <sup>1b</sup>
14:	Guidance and peer consultation <sup>1b</sup>

Note: complete definitions of the NT-EPAs are listed in Appendix B.

<sup>1</sup> Via the use of videoconferencing.

<sup>a</sup> Consensus level on the relevance of the NT-EPA = 80–89%.

<sup>b</sup> Consensus level on the relevance of the NT-EPA = 90–99%.

<sup>c</sup> Consensus level on the relevance of the NT-EPA = 100%.

out in the third round, the expert consensus meeting. Table 1 lists the demographic characteristics of the complete expert panel.

### Professional Nursing Telehealth Entrustable Professional Activities (NT-EPAs)

Fourteen NT-EPAs were identified and considered to be relevant for nursing practice with consensus levels varying from 82% to 100% (see Table 2).

During the second Delphi round, two additional possible NT-EPAs were proposed by the experts: (1) “peer group supervision with regard to the use of telehealth” and (2) “the telehealth care professional being available twenty-four seven, working with a permanent team in order to support the client in getting to know the health care professionals remotely”. After a discussion in round three, the expert panel concluded that these responsibilities were relevant but represented facilitating requirements and not NT-EPAs in their own right. As a result, no additional NT-EPAs were added, leaving 14 activities in which nurses can use telehealth to provide healthcare to community-dwelling patients remotely.

### Competencies Required to Execute the NT-EPAs

For each of the nursing telehealth activities, a specific set of necessary competencies was selected by the expert panel. A complete overview of the 14 NT-EPAs and related required competencies is listed in Table 3 and will be discussed below.

### Required Knowledge for the Provision Telehealth

The expert panel acquired consensus on 13 different types of knowledge that are required for the provision of telehealth, represented in Table 3. All nursing telehealth activities – except for NT-EPA 7 and NT-EPA 8 – require multiple knowledge sources, ranging from two to four types. Clinical knowledge and procedural knowledge (what to do in case of an emergency) were the most frequently selected knowledge items (see Table 3).

### Required Attitudes for the Provision Telehealth

The expert panel reached consensus on 12 different attitudes that are required for the provision of telehealth, illustrated in Table 3. ‘An attitude to support self-management/empowerment’ and ‘the use of

**Table 3**  
Required knowledge, attitudes and skills for the each of the NT-EPAs.

Required competencies <sup>1</sup>	Nursing telehealth entrustable professional activities <sup>2</sup>														Total NT-EPAs
	1. Support patients	2. Train patients	3. Health promotion	4. Triageing	5. Data-analysis	6. Monitoring	7. Psychosocial support	8. Encouraging	9. Instructing	10. Assessing	11. Evaluating	12. Coordinating	13. Double check	14. Peer consultation	
<i>Knowledge</i>															
Clinical knowledge	-	-	+	+	+	+	-	+	+	-	+	-	+	+	9
Knowledge of the procedure: what to do in case of an emergency*	+	-	-	+	+	+	-	-	-	-	-	-	+	-	5
Knowledge of policies, procedures and protocols of the organization concerning the deployment of telehealth technologies*	+	-	-	-	-	-	-	-	-	+	-	+	+	+	5
Knowledge of the (clinical) limitations of telehealth*	-	-	-	+	+	-	-	-	+	+	-	-	-	-	4
Knowledge of how telehealth can be deployed in existing pathways*	-	+	+	-	-	-	-	-	-	+	-	+	-	-	4
Knowledge of how technology can be used in sharing information with colleagues*	-	-	-	-	-	-	-	-	-	-	-	+	+	+	3
Knowledge of the laws and regulations concerning the protection and exchange of medical data, e.g., data protection, informed consent and confidentiality*	-	-	-	-	-	-	-	-	-	-	-	+	+	+	3
Knowledge of the potential benefits of telehealth*	-	+	-	-	-	-	-	-	-	+	-	-	-	-	2
Knowledge of how to collect health-related data for patient monitoring*	-	-	-	-	-	+	-	-	-	-	-	-	-	-	1
Insight into which sources patients like to use to find information about their disease	-	-	+	-	-	-	-	-	-	-	-	-	-	-	1
Insight into the reliability of health information on the web	-	-	+	-	-	-	-	-	-	-	-	-	-	-	1
Knowledge of relevant protocols <sup>3*</sup>	-	-	-	+	-	-	-	-	-	-	-	-	-	-	1
Knowledge about what to do if the technology does not work <sup>3*</sup>	+	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Attitudes</i>															
Has an attitude aimed to support self-management/empowerment, encourages patients to play an active role in their treatment	+	+	+	-	-	+	+	+	+	+	+	-	-	-	9
Uses an ethically correct attitude during videoconferencing (honesty, confidentiality, personal and professional integrity)*	-	-	+	+	-	-	+	-	+	-	+	+	+	+	8
Is patient	+	+	-	+	+	-	+	-	+	-	-	-	-	-	6
Can convey empathy through videoconferencing by facial expression and verbal communication*	+	-	+	+	-	-	+	-	+	-	-	-	-	-	5
Is able to promote privacy and confidentiality in videoconferencing*	-	+	+	-	-	-	+	-	-	-	-	-	-	+	4
Encourages the use of electronic	-	-	-	-	+	+	-	-	-	-	-	-	-	-	2

(continued on next page)

Table 3 (continued)

Required competencies <sup>1</sup>	Nursing telehealth entrustable professional activities <sup>2</sup>														Total NT-EPAs
	1. Support patients	2. Train patients	3. Health promotion	4. Triage	5. Data-analysis	6. Monitoring	7. Psychosocial support	8. Encouraging	9. Instructing	10. Assessing	11. Evaluating	12. Coordinating	13. Double check	14. Peer consultation	
measurement devices for the collection of detailed patient information*															
Promotes the importance of a unified way of analyzing and sharing clinical information to improve the quality of data and the quality of care	–	–	–	–	–	–	–	–	–	–	–	+	–	–	1
Has confidence that telehealth technology is not difficult to use*	–	–	–	–	–	–	–	–	–	+	–	–	–	–	1
Is open-minded to innovations in ICT (taking into account the importance of protecting confidentiality)*	–	–	–	–	–	–	–	–	–	+	–	–	–	–	1
Motivational attitude <sup>3</sup>	–	+	–	–	–	–	–	–	–	–	–	–	–	–	1
Remains calm, friendly and analytic towards the patient when troubleshooting <sup>3</sup>	+	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Is able to enhance the confidence of the patient in the deployed technology <sup>3*</sup>	+	–	–	–	–	–	–	–	–	–	–	–	–	–	1
<i>General skills</i>															
Analytical skills: is able to think creatively to solve problems	+	–	–	+	+	+	–	+	+	–	+	+	+	+	10
Coaching skills	+	+	+	–	–	–	+	+	+	+	–	–	–	+	8
Is able to prioritize and switch quickly between different patients and different requests for help	–	–	–	+	–	–	–	–	–	–	–	+	+	–	3
Protects the privacy of self and the patient in the use of telehealth technologies (compliance to ethical, legal and regulatory considerations)*	–	–	–	–	–	–	+	–	–	–	–	–	+	–	2
<i>Technological skills</i>															
Is able to train the patient to use the equipment*	+	+	–	–	–	–	–	+	+	–	–	–	–	–	4
Basic ICT skills, such as the use of the Internet and a personal computer*	–	+	+	–	–	–	–	–	–	–	–	–	–	+	3
Is able to check equipment for functionality*	+	–	–	–	+	+	–	–	–	–	–	–	–	–	3
Technological skills in the field of new technology*	–	+	–	–	–	–	–	–	–	–	–	–	–	+	2
Is able to use electronic health records <sup>3*</sup>	–	–	–	–	–	–	–	–	–	–	+	–	–	–	1
<i>Clinical skills</i>															
Is able to combine clinical experience effectively with telehealth technology in decision-making*	–	–	–	+	+	+	–	+	–	–	–	+	+	+	7
Observation skills: interprets non-verbal and verbal expressions in the right way when videoconferencing	+	–	+	+	–	+	+	+	+	–	–	–	–	–	7
Is able to use health-related data effectively	–	–	–	–	+	–	–	–	–	–	+	+	+	+	5



in patient care; (a) presents patient data clearly to colleagues																
Is able to use health-related data effectively in patient care; (b) is able to measure, compare, group and interpret data	–	–	–	+	+	+	–	–	–	–	–	–	+	–	–	4
Is able to compose a risk prevention plan to support patients' safe independent living	–	–	–	–	–	–	–	–	+	–	–	+	–	–	–	2
Triage and clinical reasoning skills <sup>3</sup>	–	–	–	+	–	–	–	–	–	–	–	–	–	–	–	1
<i>Communication skills</i>																
Communication skills: is able to listen and ask focused questions to the patient, paraphrasing and summarizing at reluctant responses	+	+	+	+	+	+	+	+	+	+	+	+	+	–	+	13
Is focused in communication and able to reveal patients' problem through specific questions	+	–	–	+	+	+	–	–	–	–	–	+	+	+	+	8
Empathy: is able to recognize (at a distance) the needs of the patient and care situation*	–	–	+	+	–	+	+	+	+	–	+	–	–	–	–	7
Is able to communicate clearly in videoconferencing and knows what to do to enhance contact (e.g., use of voice, light, background)*	–	–	+	–	–	+	+	–	–	+	–	–	–	–	+	5
Is able to put patients at ease when they feel insecure about using technology*	+	+	–	–	–	–	–	–	–	+	+	–	–	–	–	4
Is able to create a confidential environment and a pleasant atmosphere in video conferencing*	–	–	–	–	–	–	–	+	–	–	–	–	–	–	–	1
Is able to communicate across different disciplines <sup>3</sup>	–	–	–	–	–	–	–	–	–	–	–	–	+	–	–	1
Motivational techniques <sup>3</sup>	–	–	–	–	–	–	–	–	+	–	–	–	–	–	–	1
<i>Implementation skills</i>																
Is able to assess whether telehealth technology is convenient for the patient by the use of established criteria (for example, cognitive ability, technological skills)*	+	–	+	–	–	–	–	–	–	–	+	–	–	–	–	3
Is able to assess the needs and preferences of the patient with respect to telehealth*	–	+	–	–	–	–	–	–	+	–	+	–	–	–	–	3
Is able to communicate effectively the benefits of telehealth technologies*	–	+	–	–	–	–	–	–	–	–	+	–	–	–	–	2
Is able to provide advice about reliable health information on the internet; sites, medical care portals and mobile applications*	–	–	+	–	–	–	–	–	–	–	–	–	–	–	–	1
Total required competencies:	17	14	16	16	12	14	12	12	14	13	10	14	12	15		

\* These 32 competencies are specifically required for the provision of telehealth, and would not have been relevant without the emergence of telehealth. The remaining 22 competencies are also important for several other traditional nursing activities.

<sup>1</sup> Competencies sorted by frequency within the category.

<sup>2</sup> See Table 2 for a complete description of the 14 NT-EPAs.

<sup>3</sup> These nine competencies were not part of the initial proposed list of 52 competencies in round one but were afterwards proposed by one of the experts in rounds 2 or 3 and reached the 80% agreement level. All other competencies listed above were part of the proposed list and also reached the threshold of 80% for at least one of the NT-EPAs. Of the 52 competencies that were proposed in the survey in round one, the following nine competencies did not reach the 80% consensus level: (1) knowledge about the costs related to telehealth, (2) technological knowledge: is aware of the newest telehealth technologies, (3) knows that the patient is free to choose to not use telehealth, (4) knowledge about the risks of exchanging footage, (5) is able to discuss technological issues with the patient, (6) is able to implement new telehealth technologies in practice, (7) is able to assess patients' capacity to use telehealth based on standardized criteria (e.g., cognitive ability, technological skills, motivation), (8) ensures that the personal dignity of the patient is not compromised during videoconferencing, and (9) is able to identify patients via a protocol.

an ethically correct attitude during videoconferencing' were selected most frequently, nine and eight times, respectively. Another frequently selected attitude was 'patience'.

In addition to the selected attitudes, 'ethical awareness' arose from the qualitative analysis of the audio-recordings of the expert meeting. Nurses should pay attention to privacy in remote contact and to limitations in collecting patient data. During the expert meeting in round three, one of the experts emphasized the importance of an ethical awareness as follows: "The future nurse should be aware of the legal and ethical aspects of the use of those devices and the safety of open networks. Where are these data stored? Be aware of what I'm saying and write down with new technology".

#### *Skills for the Provision Telehealth*

The expert panel reached consensus on 27 different skills that are required for the provision of telehealth, presented in Table 3. Communication skills were selected for the provision of all fourteen activities, except for NT-EPA 13. Furthermore, coaching skills, analytical skills, and being able to combine clinical experience effectively with telehealth technology in decision-making were frequently selected; all three skills were selected for eight of the fourteen activities.

During the expert consensus meeting, the experts discussed the importance of 'being able to communicate clearly in videoconferencing and knows what to do to enhance contact (e.g., use of voice, light, background)'. In round two, 63% agreed on the relevance of this skill for NT-EPA 6 'monitoring body functions and lifestyle via videoconferencing'. In round three, one of the experts argued that to monitor body functions, a nurse must be able to assess a patients' skin color, and distinguish whether an observed change in color indicates that the patient is sick or whether the change in skin color is caused by the light of the video screen. After hearing this argument, 86% of the expert panel agreed on this skill, which subsequently was included in the list of competencies related to NT-EPA 6.

In addition to the selected skills as presented in Table 3, a few themes arose from the qualitative analysis of the audio records of round three. For instance, 'lifelong learning' was brought up as a result of a discussion regarding the rapid development of new technologies. Nurses should have the competence to integrate current technologies in their care pathways. One of the experts mentioned the risk of being too focused on specific technologies: "The contemporary telehealth technique will be thrown away in two years' time. When it comes to new technologies in general, you should be aware of new developments".

#### **Discussion**

Communication skills, coaching skills, the ability to combine clinical experience with telehealth, clinical knowledge, ethical awareness, and a supportive attitude were seen as the most important competencies for nurses that provide telehealth. These findings are consistent with findings from previous studies (e.g., *Academy of Medical Royal Colleges, 2011; Barakat et al., 2013*), in which comparable telehealth competencies were reported. In addition, the results of the current study emphasize the benefits of avoiding general statements about telehealth competencies. In the four rounds of the Delphi-study, the experts revealed that each of the fourteen nursing telehealth activities requires a specific and different set of competencies.

In discussing the 52 competencies found in this study, a distinction can be made between fundamental, more common competencies and 'new' or 'subject specific' competencies. Competencies such as clinical knowledge, communication skills or patience have always been fundamental, for nursing in general. Due to their wide importance, these competencies became generic and were also expected to be important for the provision of telehealth.

In addition to the 20 common competencies, this study discovered a set of 32 distinctive and new competencies; competencies that became

relevant as a result of the emergence of telehealth. Based on the number of times they were selected, especially the competencies that were required for just a few activities, 'is able to communicate clearly in videoconferencing', 'knows what to do to enhance contact, e.g., use of voice, light, background', and 'knowledge about what to do if the technology does not work' were the most distinctive of the common competencies.

Regarding the list of competencies, one could argue that some competencies, such as the ethics-related ones, are indispensable. However, one might be surprised that not all of these ethics-related competencies are selected for all the NT-EPAs that involve videoconferencing. In the case of NT-EPA 9 for example ('instructing patients and family care givers in self-care via the use of videoconferencing'), only one ethics-related competency was selected ('uses an ethically correct attitude during videoconferencing (honesty, confidentiality, personal and professional integrity)'). One explanation might be that the experts have thought that the content of other ethics-related competencies (e.g., 'protects the privacy of self and the patient in the use of telehealth technologies') is already integrated in the competency that was selected, and therefore became less demanding.

During the expert meeting in round three, experts provided arguments to select additional competencies. Not all of these competencies reached the 80% agreement level. For example, one expert argued that clinical knowledge should be required for the provision of NT-EPA 7 'psychosocial support via videoconferencing'. The expert emphasized, "Imagine you have to deal with a psychiatric patient, then you need background information of the patient in order to decide what kind of psychosocial support you are going to provide". As 59% of the expert panel agreed and a threshold of 80% was used for consensus, this knowledge was not included in the final list of competencies that were considered to be essential for the provision of NT-EPA 7.

The selected nursing competencies in the current study were based on the opinion of an expert panel. In twelve cases, nurses achieved consensus on the importance of a specific knowledge, attitude or skill item, whereas faculty disagreed significantly (using a Mann-Whitney U test and  $P = <0.05$ ). For example, nurses achieved consensus (>85%) on the importance of the ability to assess the needs and preferences of the patient with respect to (telehealth) technology for three of the activities in NT-EPA 1, 7 and 11, whereas not even 35% of the faculty considered this skill to be important for these three nursing activities.

In the current study, we used the consensus levels of the total panel, including both nurses and nursing faculty. The examination of significant differences however, reveals that there are different opinions between subgroups with respect to the importance of telehealth competencies. The current study was not designed to reveal the reasons for these differences in opinion so we can only speculate. One possible explanation for this finding is that faculty filled out the survey more critically. Another possible explanation is that nursing faculty underestimate the importance of these competencies, perhaps caused by a lack of practical experience with telehealth.

#### *Implications for Training in Practice and Education*

The fourteen activities and related competencies that arose from this study can be used for training and assessment purposes. The description of the activities provides insight into how telehealth can be integrated in routine care. Before nurses can be trusted to perform one of the activities, they should demonstrate that they possess the required knowledge, attitudes and skills. The description of the fourteen NT-EPAs can also help design the curricula of nursing training by linking their education to practice.

There are several opportunities to relate our NT-EPAs to the international nursing frameworks mentioned in the introduction. For example, the NT-EPAs and required competencies can be added to the 'subject specific competences' section of the Tuning Framework (Tuning Project, 2011), or linked to the seven competency roles of the CanMEDS framework in the Netherlands (Steering Group Bachelor of Nursing 2020,

2015), since each NT-EPA will require different roles. The NT-EPAs can also be linked to the standards described in the American Scope and Standards of Practice (American Academy of Ambulatory Care Nursing, 2011). For example, NT-EPA 7 'Providing psychosocial support' can be linked to AAACN Standard 11 'Communication', NT-EPA 12 'Coordination of care with the use of telehealth technology' fit with Standard 5.1 'Coordination of Care', and NT-EPA 14 'Guidance and peer consultation' fit with Standard 5.3 'Consultation'. Linking the results of this study to a specific framework might be helpful in an attempt to translate the NT-EPAs to the curricula of a specific country.

#### *Limitations and Future Research*

In the original design, we aimed to increase the weight of the response of the nurses compared to the response of the nursing faculty, since we value their experience in practice with telehealth. However, as a result of drop-outs in the second and third round, the ratio of faculty and nurses that were represented in the expert panel, shifted from twelve faculty on 32 nurses, to nine faculty on thirteen nurses. Without this change in the group, perhaps more competencies would have been selected in round 3, following the thought that nurses voted less critically. Nevertheless, nurses were still in the majority. The fact that the nurses apparently did not manage to convince nursing faculty with arguments has to be taken into account when interpreting the results of our study.

Sequentially in this study, an opinion-based approach was used to collect data. The fact that this study is based on the opinion of Dutch experts only, could have had consequences for the generalizability of

our results. However, in order to confine this limitation, the consensus discussion started with a list of knowledge, attitudes and skills based on findings of previous research and international literature.

The relative novelty of the topic of telehealth competencies and a lack of understanding of necessary competencies was the reason to first build a framework of telehealth competencies that subsequently can provide a base for future validation research. Further validation of the nursing telehealth EPAs and related competencies is recommended to investigate if the nursing competencies also enhance the quality of telehealth provided by nurses in practice.

#### **Conclusion**

This study yielded 14 NT-EPAs and 52 required types of knowledge, skills and attitudes (KSAs) that nurses should possess when executing telehealth activities. Thirty-two KSAs are 'new' competencies, specifically required for the provision of telehealth. Nurses can use technology in various ways to provide health care remotely, ranging from the provision of psychosocial support via videoconferencing to an independent double-check in the case of high-risk medication. All of these nursing telehealth EPAs appear to require a specific set of knowledge, attitudes and skills. This situation emphasizes the need to describe competencies in relation to specific telehealth activities, rather than a general overview of telehealth competencies. Home care organizations or nursing schools can use the NT-EPAs and related competencies presented in this study as a starting point for the development of successful training and education.

## Appendix A. Roadmap Round Three: Expert Consensus Meeting

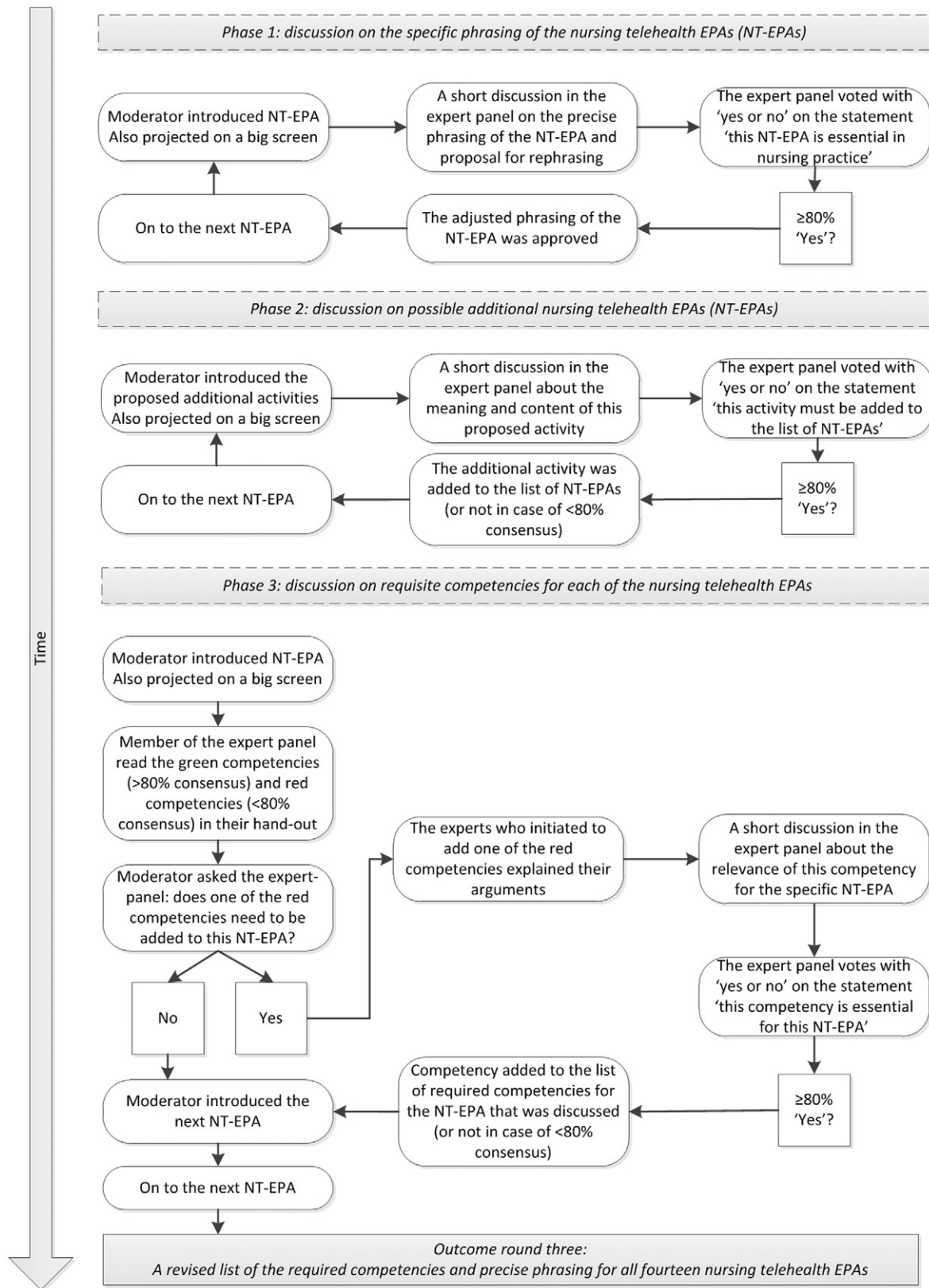


Fig. 2. Roadmap expert consensus meeting from Delphi round three, consisting of three phases of discussion: 1) the precise phrasing of the NT-EPAs, 2) the possible additional NT-EPAs and 3) the required competencies.

## Appendix B. Nursing Telehealth Entrustable Professional Activities (NT-EPAs)

**Table 4**

Nursing telehealth entrustable professional activities (complete definitions).

NT-EPA 1: Supporting patients in the use of technology
Definition: The nurse is the first port of call for community-dwelling patients in case they experience trouble in the use of technology. Nurses should support patients in finding a solution.
NT-EPA 2: Training patients in the use of technology as a way to strengthen their social network
Definition: Nurses are responsible for supporting patients in maintaining and strengthening their social network. Nurses should attempt to keep patients away from social isolation. Several technologies can be used to strengthen patients' social network. Social media websites, e-mail, or a smartphone can be used to keep in contact with family or relatives. Nurses should provide patients information about the possibility of these media.
NT-EPA 3: Providing health promotion remotely
Definition: The provision of health promotion is an important nursing responsibility. Besides providing health promotion face-to-face, health promotion can be offered remotely with the use of technology. As a result, nurses provide – in addition to face-to-face health promotion – health promotion with the use of videoconferencing, e-mail and internet. Depending on the situation, nurses decide which medium fits best. As a part of health promotion, nurses refer patients to trustworthy health websites.
NT-EPA 4: Triaging incoming calls and alarms
Definition: In case of incoming alarms via screens, video, telephone or incoming data, nurses assess the situation and problems of the patients remotely. Nurses use a two-way audio transmission or videoconferencing to collect information. In the case of a two-way transmission, no visual information is available. Nurses assess the gravity of the situation remotely and arrange a settlement in line with the protocol.
NT-EPA 5: Analyzing and interpreting incoming data derived from (automatic) devices for self-measurement
Definition: Diagnosing and monitoring vital functions are core tasks of nurses. Today, in healthcare practice, several technologies are being used to automatically check and transport (body) functions of the patient, e.g.: heart rate monitors, motion detectors to monitor patients' activity, or medication dispensing services that sound an alarm when medication has been forgotten. Furthermore, patients can use devices for self-measurement, e.g., measuring their blood pressure at home. Nurses analyze and interpret the incoming data from these devices. Nurses assess whether the incoming data are alarming and determine what action is required.
NT-EPA 6: Monitoring body functions and lifestyle <sup>1</sup>
Definition: Diagnosing and monitoring body functions and lifestyle are also possible remotely. Nurses monitor the health conditions, lifestyle and the circadian rhythm of patients by questions and observations through videoconferencing. When nurses observe signs of health hazards, they determine what action is required.
NT-EPA 7: Providing psychosocial support <sup>1</sup>
Definition: Nurses need to be alert to possible psychosocial problems of patients. The goal of psychosocial support is to treat patients humanely and support them to take their full place in society. Psychosocial support can be "unscheduled", when it is part of the daily somatic care, or "scheduled", when the psychosocial care is planned separately. Both types are – in addition to face-to-face meetings – provided by nurses remotely through videoconferencing.
NT-EPA 8: Encouraging patients to undertake health promotion activities <sup>1</sup>
Definition: Nurses have a responsibility to empower patients, referred to as 'empowerment'. By stimulating patients to undertake health promotion activities, nurses empower patients. This empowerment is also provided remotely through videoconferencing. Nurses stimulate patients to do breathing exercises, take medication (promote medication adherence), and attend a day program. In addition, nurses stimulate patients to control their health and well-being as much as possible on their own, referred to as self-management. Nurses advise patients what medical applications, (automatic) devices for self-measurement, and health care portals (online platform for exchanging health and care information) they can use to have an active role in controlling their own health and well-being.
NT-EPA 9: Instructing patients and family care givers in self-care <sup>1</sup>
Definition: In the context of empowerment, nurses stimulate patients to take care of their own disease, referred to as self-care. To maintain safety, nurses inform and instruct patients and support family caregivers. This instruction can be provided remotely through videoconferencing. Although other self-care tasks exist, nurses instruct patients and their families the following self-care tasks at minimum: measuring blood glucose levels/blood pressure, administer insulin/intramuscular injection, ostomy and fistula management, wound care and catheter care.
NT-EPA 10: Assessing patient capacity to use telehealth
Definition: Nurses have a responsibility to recruit patients for telehealth. Thus, nurses assess patient capacity to use telehealth. Nurses assess patients' physical and cognitive abilities and motivation to use telehealth, e.g., during a visit at the patients' home. During the patient assessment for telehealth, nurses discuss how telehealth can support the patient in ageing in place through (a) more control, (b) greater autonomy and (c) more privacy and can (d) support them in getting in contact with people outdoors.
NT-EPA 11: Evaluating and adjusting the patient care plan <sup>1</sup>
Definition: Nurses actively involve patients and family caregivers to their patient care plan. Therefore, nurses evaluate the patient care plan in consultation with the patient. When a patient has access to videoconferencing, nurses evaluate the patient care plan remotely using this technology. When patients use telehealth services, 'the use of telehealth' is part of the evaluation because the use of telehealth is a part of their patient care plan. Furthermore, nurses organize video meetings and chair these meetings. The patient, family caregivers and all involved healthcare providers are invited to join these video meetings with the aim of increasing their involvement in the patient care plan.
NT-EPA 12: Coordination of care with the use of telehealth technology
Definition: Nurses have a responsibility in coordinating care with the aim of delivering care as a continuous and integrated process. In addition to consulting face-to-face, nurses coordinate care via electronic medical records, e-mail and videoconferencing.
NT-EPA 13: Independent double-check of high-risk medication <sup>1</sup>
Definition: An independent double check by another staff member is required for the administration of high-risk medication. The independent double-check process does not require physical presence and can be performed remotely via videoconferencing. Nurses provide and receive independent double-checks through videoconferencing, at least in the administration of insulin and intravenous medication.
NT-EPA 14: Guidance and peer consultation <sup>1</sup>
Definition: Nurses have the task of supervising (new) colleagues and other caregivers in the performance of established tasks and activities. Furthermore, when in doubt or in the absence of expertise, nurses ask and provide peer consultation via videoconferencing.

<sup>1</sup> Via the use of videoconferencing.

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