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# Development of an Interactive Communication Model with Integrated Teach-Back

– using a web-based IT solution to create synergy between research and practice.

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## Abstract

This paper describes the development of an easily applicable web-based IT solution that enhances interactive communication (the interactive communication model) and ensures comprehension in nursing practice. The model seeks to identify knowledge and skills allowing tailored communication and seeks to ensure comprehension and recall between nurses and patients. Results from testing the model shows that it has the potential to enhance self-care in citizens receiving community nursing and creates a basis for a more holistic nursing approach.

## Keywords

Health literacy, web-based, IT, user-involvement, communication.

## 1 INTRODUCTION

Modern healthcare systems are developing in a way that compel patients and citizens to become more active in the management of their own disease(s), health, and life situation. This development changes the role of modern patients and the skills needed to navigate the healthcare system. There is increasing pressure on healthcare resources due to demographic changes with more elderly people and thus, an increase in the prevalence of chronic diseases [1]. A strategy for handling the increasing pressure on healthcare resources is to reduce the length of stay in hospitals and promote more healthcare in patients' and citizens' own homes. This strategy calls upon more (self) rehabilitation actions, where the goal is to strengthen self-management and self-care among citizens and patients. This requires a general adherence to treatment (during the self-management of chronic disease(s)) and an ability to be an active part in shared decision making with healthcare professionals, thus requiring that citizens and patients increase their understanding and application of health information [2–4]. Overall, the development in modern healthcare systems set some requirements to citizens' and patients' level of self-management and patient empowerment. Health literacy (HL) can be considered a prerequisite for these concepts and plays an important role in strengthening them [5]. HL is defined by the World Health Organization as *'the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health'*[6]. As seen in the definition, HL is a complex and broad concept that comprises multiple personal skills and different levels (access, understand and use), which make it difficult to

access [7].

A Danish study shows that 10-20% of the Danish population experience difficulties with the ability to interact with healthcare professionals and the ability to understand health-related information well enough to act on it (two important dimensions of HL) [8]. This suggest that they do not have the necessary HL skills to handle their health sufficiently, which produces a higher risk of adverse health effects for example improper use of healthcare services and medications, poor self-management, and poor health outcomes [9]. This is problematic when considering the development in healthcare systems that emphasis a higher level of self-management and self-care. Based on this, clear communication and ensuring recall and comprehension becomes more essential in patient-provider interactions. It is particularly important in relation to patients with chronic disease(s) because self-management educational efforts and counselling are key elements in handling everyday life with chronic disease(s) and strengthening self-care. Clear communication and ensuring comprehension become even more important if patients with chronic disease experience challenges in accessing, understanding, and applying health-related information necessary to efficiently manage their health and make informed health decisions [10]. Patient-provider communication has been proposed as a potential pathway through which HL might influence health outcomes, especially in individuals with chronic disease(s). Hence, tailoring communication to the individual level of HL, might have a positive influence on health outcomes [11,12]. Nurses play an essential role in providing education and counselling to patients with a chronic disease through communication – it is considered a core competency in nursing practice [13]. However, nurses rarely use

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communication that focus on recall and comprehension in their interaction with patients [14]. On this basis, this pilot study focuses on the development of a web-based interactive communication model (ICM) that both seeks to identify knowledge and skills (HL) allowing tailored communication and seeks to ensure comprehension and recall between nurses and patients.

## 2 METHODS

This study includes two phases: the development of the ICM and a pilot study of the model in community nursing.

### 2.1 Development of the interactive communication model

The IT-based ICM is designed based on data from 335 community nurses in Aalborg Municipality. The 335 community nurses participated in workshops (14 workshops) centred on user-involvement. The community nurses discussed and made a comprehensive answer to several questions about existing practices and challenges in (self) rehabilitation. The discussion was carried out in groups of 4-6 community nurses. The knowledge and experience gathered from practice formed the basis for the development of the ICM, which was subsequently qualified via recognized methods, to make citizens more self-reliant (regardless of HL level), identified via systematic literature search. In this way, synergy has been created between theory and practice, and a best-practice approach was mapped for the development and application of strategies that strengthen self-care and the degree of self-help in citizens with chronic disease(s). The workshops were facilitated by one researcher (LKEH, first author of the present paper) who's a registered nurse (RN). LKEH have a solid experience of work in healthcare. The content of the ICM was created based on the material from the workshops combined with the best-practice approach identified through the systematic literature search. The ICM is implemented as a web-based IT solution to enable a straight-forward integration with the software on the nurses' working tablet. The IT solution contained all the steps and information needed to use the ICM in everyday nursing practice and it is easy to make accessible on the start page of their working tablet.

### 2.2 Pilot study

Following an observational approach, the focus was on observing nurses' actions in an everyday community nursing context and the aim was to observe responses and challenges related to the use of the ICM as part of community nursing practice. One district of community nursing was selected as setting for the pilot study. The district comprises six community nurses, who were included in the study. The community nurses were introduced to the ICM prior to observation. Participant observations and informal interviews were used as general data collection methods.

The observations were conducted by LKEH. The presence of the researcher could, however, affect the observations and this must be considered. To minimize the effect of the researcher, she adapted to the clinical environment by wearing the same uniform as the community nurses and no nameplate. In this manner, there was access to the healthcare environment while at the same time showing not

to be seen as healthcare personnel handling citizens with care needs. Thus, the researcher could participate without being directly involved or being a distraction.

Participant observations were carried out for five weeks and guided by the aim of the pilot study. During the observations the researcher took thorough notes guided by an observational guide. Informal interviews were primarily conducted in the community nursing cars when driving between visits among citizens with care needs, but also sometimes in the coffee room. These informal interviews were mainly conducted to add further information to the observations and to create a more comprehensive understanding of what had been observed. Notes from both the observations and the informal interviews were transcribed after each observation. Six community nurses completed a brief survey (8 questions) about their use of the ICM at the end of the pilot study. The survey was constructed based on literature and focuses on evaluation of using the ICM in community nursing; for instance, they were asked to evaluate if the model enhances their awareness on knowledge and competences among their citizens on a Likert scale (see *Appendix A*). SurveyXact was used to distribute and administer the surveys.

#### 2.2.1 Ethical considerations

Permission to carry out the pilot study was given by the head nurse in the selected district. Oral consent was obtained from the six community nurses in the district in accordance with the Declaration of Helsinki [15] after they were informed of the purpose, method and publication of the pilot study, that participation was voluntary, and they could withdraw at any time. No ethical approval was required for this type of pilot study. Citizens present in the observations were informed of the purpose of the pilot study and that the researcher was bound by professional secrecy in her role as health care professional.

## 2.3 Analysis

### 2.3.1 The interactive communication model (ICM)

Data from the 14 workshops (335 participating community nurses) were analysed using thematic analysis [16]. Thematic analysis is a basic qualitative analytical approach that seeks to identify themes or patterns in the gathered material (in this case material gathered from the 14 workshops). The analysis was characterized by an inductive data-driven approach, which resulted in themes that are closely linked to data. The coding of data can take place without relation to a specific framework or a specific analytical (pre) understanding.

The material from the 14 workshops were read and coded openly conducting descriptive coding [17]. The material was read several times and meaning units related to challenges with conducting community nursing aiming to strengthen self-care among citizens receiving community nursing were detected. These meaning units were then assigned a code describing their content. Meaning units and data text were scrutinized. On this basis, relevant categories and themes and categories were identified throughout the data material. The analysis comprised continuous discussions between authors and a lecturer in thematic analysis to reach consensus. The original data was re-examined in case of discrepancies.

### 2.3.2 The pilot study

The transcribed notes from observations and informal interviews were also analysed using thematic analysis [16]. The material was read several times and meaning units related to using the ICM were identified. These meaning units were then assigned a code describing their content. Meaning units and data text were scrutinised thoroughly. On this basis, relevant categories and themes, related to challenges with using the ICM to strengthen self-care in community nursing, were identified throughout the data material.

Data from the brief surveys were analysed using basic statistics [18]. Data from the observational study, and the informal interviews, was combined with data from the surveys, hence, data triangulation was carried out.

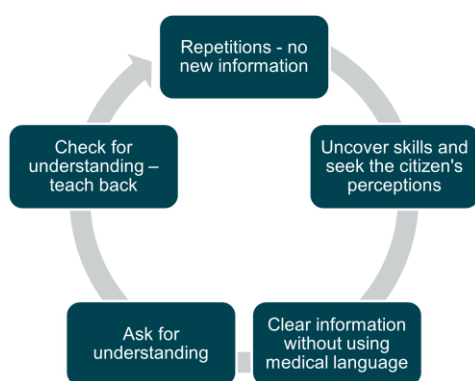
## 3 RESULTS

This presentation of results will comprise three sections: the content of the ICM, results from the pilot study and results from the survey.

### 3.1 The interactive communication model

#### 3.1.1 Content in the ICM

The material from the 14 workshops, in conjunction with relevant research literature, has formed the basis for the development of the ICM with integrated teach-back. The ICM is inspired by Schillinger et al. [19] and comprises the following components:



**Figure 1.** Illustration of the interactive communication model (ICM) inspired by Schillinger et al. [19].

*Step 1 - Repetitions:* The model is initiated with a repetition of key points (very few sentences) from the last visit / learning session. The community nurse simply repeats key points and provide no new information at this stage. By the first visit, the community nurse cannot perform repetitions, but instead the citizen is presented to the plan for enhancing their knowledge and self-care.

*Step 2 - Uncover skills and seek the citizen's perceptions:* This allows the community nurse and citizen to reach a common understanding. Moreover, it helps the community nurse assess how to tailor information and instructions for the individual citizen.

*Step 3 - Clear information without using medical language:* The community nurse provides information, instructions, and guidance at a very easy-to-understand level without using medical language. The information, instructions, and

guidance are provided based on predefined material made available to the community nurse from the start page of her /his working tablet. The information, instructions and guidance are supplemented by the delivery of easy-to-understand material to the citizen.

*Step 4 - Ask for understanding:* The community nurse asks the citizen directly if they have understood the given information and what has been discussed.

*Step 5 - Check for understanding - teach back:* The community nurse uses the teach-back technique to ensure that the citizen understands the information/instructions and what has been discussed. The community nurse asks the citizen to retell (in their own words) the information and instructions provided. This stage may also involve the citizen having to demonstrate the performance of a 'task', for example, the community nurse asks the citizen, with chronic obstructive pulmonary disease, to demonstrate their inhalation technique. This an indirect method to check for understanding.

#### 3.1.2 Development of the web-based IT solution

The ICM must be easily accessible and an efficient tool for community nurses, therefore it is made available as a web-based IT solution. The tool is entitled '*personalised support for self-care*' and can be accessed from the start page of the community nurses' working tablet.



**Figure 2.** Screenshot of the start page of the web-based IT solution 'Personalised support for self-care'.

The content of the IT solution is selected based on the most prominent diseases and reasons for receiving community nursing in Northern Jutland. People receiving community nursing are often very vulnerable with multiple health-related challenges and comorbidities – setting high requirements to their level of HL. The idea is that the ICM (made available in the web-based IT solution) supports community nurses in accommodating citizens' broad range of information and communication preferences. Instead of assuming what people know, the model uncovers what they know, thus, it is a more objective approach to accessing knowledge and skills.



**Figure 3.** Screenshot of the pull-down menu with items representing the most prominent diseases and reasons for receiving community nursing: ‘The interactive communication model’, ‘COPD’, ‘Diabetes and insulin’, ‘Diabetes and diabetic ulcers’, ‘Venous ulcers’, ‘Arterial ulcers’, ‘Compression’, ‘Heart failure’, and ‘Medicine dispensing’.

The IT solution comprises a general description of the ICM and how to perform each individual communicative step in the model (the first item in the pull-down menu – see figure 3). The description is supported with a graphical illustration of the different steps in the model. The instructions on how to use and implement the different communicative steps in the model and incorporate it in practice creates the

foundation for emphasising use of interactive communication in community nursing.

Further, the IT solution demonstrates how to use the ICM in relation to the most prominent diseases such as COPD, diabetes, cardiovascular diseases etc. It is demonstrated how the nurse should perform the individual steps related to the specific disease - all the way down to how questions should be formulated and asked to uncover citizens' knowledge and level of skills (*step 2 - ask for understanding*) and how information is provided in a concise easy-to-understand manner without medical language (*step 3 – clear information without using medical language*). Hence, the nurses do not have to decide for themselves what characterises easy-to-understand language as it is provided by the web-based system. The information and instructions formulated in the system has been developed in the following manner: information about the specific diseases is inspired by an acknowledged national patient centred webpage (sundhed.dk) and pedagogical tools with a focus on increasing and ensuring understanding with the recipient [20,21]. The material in the system is kept on a readability of 6-7<sup>th</sup> grade level and, thus, the community nurse provides information and guidance on this level when using the ICM. The material was read thoroughly by independent reviewers to ensure concise and easy-to-understand language not exceeding 6-7<sup>th</sup> grade level. It should be noted that the system also provides different links and video material (easy-to-understand that can be used by the community nurses in *step 3 – clear information without medical language*) relevant for the specific diseases.

Even though, the information and instructions in the system serves as a guide to learn the ICM technique, the goal is that the community nurses adapt the communication technique into their everyday practice. Hence, the system is intended to facilitate the use of a very easy-to-understand language, as well as to check the understanding of information by the recipient.

The web-based IT solution was informally tested and evaluated by two nurses prior to the pilot study.

### 3.2 Results from the pilot study

#### 3.2.1 Proper introduction and training prior to use

The use of the web-based ICM model requires adequate training and support. It requires understanding and experience with the different steps in the model and an understanding of the purpose in each step. When the community nurses started using the model (in the beginning of the pilot study), they were a little unsure of how they could integrate it into their communication without it being ‘staged’ or ‘forced’. As a result, it took some time for the community nurses to get comfortable with using the ICM. However, with enough practice and use, the community nurses managed to integrate it over time and, thus, making their communication more interactive. On this basis, the ICM can serve as a development and training of community nurses' interactive communication skills.

The community nurses were briefly introduced to the use of the ICM prior to the pilot study. When the community nurses adapt the ICM, it can be performed in approximately five minutes – and subsequently have an overall time reducing potential. The time reducing potential of the ICM



is supported by the results from the survey – see paragraph 3.3 below.

### 3.2.2 A more uniform communication practice

A prominent result of the pilot study is that the web-based ICM ensures clear communication without use of medical jargon and make tailored communication easily accessible. It emphasises a focus on reducing the use of medical words and how difficult it can be to use very simple language when explaining health-related information. The community nurses became more aware of their own communication technique and use of words. Concrete formulations/explanations with regards to the most widespread diseases and community nursing services is available in the system and therefore the community nurses do not subjectively have to decide what is easy to understand health-related information. It became clear in the pilot study that the ICM contributes to a more uniform approach to communication among community nurses. It was also observed that some of the community nurses preferred to use the system (with the ICM) as preparation prior to visits with citizens needing community nursing and others used it as a guide during the visits.

### 3.2.3 Assessment of understanding and allowing a more holistic approach

The ICM allows identification of understanding and skills among citizens receiving community nursing. An important step in the ICM is the check for understanding via the teach-back technique – results from the pilot study shows that the community nurses often thought that their citizens had more knowledge of their disease and situation than they had. The community nurses expressed that the ICM allowed a more accurate identification of their citizens' understanding and skills.

Further, the community nurses expressed that the ICM allowed for a more holistic nursing approach as it made it easier to identify the individual challenges among their citizens and tailor communication accordingly. They felt that the ICM allowed them to access 'the whole situation' and not just was allocated for the nursing visit. These results are in accordance with the results from the survey – see paragraph 3.3 below.

## 3.3 Results from the survey

The following will present a short summary of the results from the brief survey at the end of the pilot study. Six community nurses were asked to rank their answers on a Likert scale: *not at all, a little, some, greatly and completely* (see appendix A).

1. 83 % of the community nurses think that the ICM greatly or completely increases citizens' knowledge of their own disease(s) and life situation, while the remaining 17% ranked it to some extent.
2. 67 % of the community nurses think that the ICM greatly or completely increases citizens' self-care, while the remaining 33 % think its increases self-care to some extent.
3. All community nurses (100%) think that the ICM completely or greatly enhances their experience of more holistic nursing.

4. All community nurses (100%) think that the ICM completely or greatly help them find out what and how much a citizen knows about their own disease(s) and life situation.
5. 50 % of the community nurses think that the ICM completely or greatly increases their focus on not using medical terms, while 33 % think it increases their focus to some extent. The remaining 17 % think it does not increase their focus on this at all.
6. All community nurses (100%) think that the ICM completely or greatly increases their focus on 'checking' citizens' understanding of the information and guidance they provide as nurses.
7. 66% of the community nurses think that the web-based system is useful, while 17 % find it useful to some extent. 17 % does not find it useful at all.
8. 33 % of the community nurses think that the ICM greatly reduces their time consumption with citizens, while 33 % think it reduces time consumption a little. 33 % does not think the ICM reduces time consumption at all.

## 4 DISCUSSION

The aim of this pilot study was to develop an easily applicable communication model that enhances interactive communication and ensures comprehension in nursing practice. This has been accomplished by the development of the ICM and making it available as a web-based IT solution. A strength of this pilot study is that the ICM has been developed based on a high degree of user-involvement – the end users (in this case the community nurses) were involved in the development, which create a sense of ownership. The ICM proved able to identify level of knowledge and skills among citizens receiving community nursing and thus, allowing community nurses to target their communication accordingly. It is known from the literature that nurses often overestimate the level of HL (e.g., level of knowledge and skills) [22,23]. Results from the pilot study suggest that the ICM provides a more objective approach to assessing the level of knowledge and skills allowing a more accurate estimation. The more accurate assessment of knowledge and skills (and thereby indication of HL level), further, promotes targeted communication in the citizen-nurse interaction and might enhance self-care among citizens receiving community nursing. The community nurses, further, expressed an experience of providing more holistic nursing, which is rather interesting considering the increasing scarce health resources that put restraints on the time available to perform nursing tasks. Based on this, it is reasonable to assume that the ICM can support efficient and holistic nursing at the same time. In this regard, it should, however, be mentioned that the use of the ICM requires sufficient training and practice prior to use to achieve this. From the pilot study it could be seen that the introduction should have been more in depth, preferably with focus on training the use of ICM for example the community nurses could have trained the use on each other. More in depth training of using the ICM can probably reduce the time for integrating it in practice among nurses and quicker make the nurses more comfortable using it. E.g., enough training and practice are needed to promote the time reducing potential of the ICM.

It became clear in the pilot study that the ICM is a communication technique that nurses can adapt into their everyday practice with adequate training and support. However, it takes time to incorporate the ICM (communication technique) into existing nursing practice, so an initial extra time consumption must be expected in this regard. The literature shows that nurses can be dubious of using universal precautions and simple language because they are concerned it will offend or patronise highly literate citizens and patients [24]. Even though, the ICM emphasis simple language without medical terms, it seeks to uncover skills (in step 2) that allows tailored information to the individual citizen or patient and primarily aims to meet them at their individual level.

The ICM is made available as a web-based IT solution that can easily be accessed from community nurses' working tablet, which promoted the use. It was observed in the pilot study that some of the community nurses preferred to use the system (with the ICM) as preparation prior to visits with citizens needing community nursing and others used it as a guide during the visits. In this regard, it should be noted that there is a possibility of the system 'stealing' the attention, and therefore, efforts should be made to ensure that nurses become so well versed in the ICM model that this is not the case. The ICM seemingly contributes to a development and expansion of communication techniques among community nurses. One could argue that nurses are already sufficiently trained in communication skills and educated to use communication efficiently in their practice, but on the contrary literature shows that basic communication techniques are rarely used [13,14]. Additionally, the nursing profession is undergoing a change due to the development in modern healthcare; the conducting part of nursing is increasingly reduced, while the communicative/guiding part is emphasised to support the self-care line of thought in modern healthcare systems and thus, make citizens and patients more active [25]. This changes the requirement to communication skills and techniques in nursing care, as it becomes one of the most valuable factors in supporting self-care in modern healthcare systems. If nurses overestimate HL (knowledge and skills) and assume their citizens and patients have more knowledge and skills than they actually have, then it becomes difficult for nurses to target the communication according to individual informative and communicative preferences (which is rather important to support self-care in people) [22,23]. The ICM can be considered an objective supplement to nurses' subjective estimation of knowledge and skills in citizens and patients, as it uncovers this by simple communication techniques. At the same time, the ICM also ensures recall and comprehension when providing information and guidance. When the community nurses were introduced to the ICM prior to the pilot study, they expressed concerns with regards to time consumption. The results, however, shows that this is not the case if they receive enough training and adapt the ICM into their everyday working practice (e.g., that they develop and expand their interactive communication techniques).

The web-based IT solution was informally evaluated prior to use but useability test or heuristic evaluation were not performed. However, the community nurses found it intuitive and easy to assess the material in the system

during the pilot study. The challenges were as mentioned, to learn the communication techniques and adapt them into their nursing practice. The web-based IT system serves as an important platform to learn and adapt the communication techniques that the ICM comprises.

A limitation to this pilot study is that observations were carried out by one researcher. The observations were carried out continuously for five weeks and allowed the researcher to adapt to the environment and build trust. Another limitation is that the survey results are based on six respondents; it was conducted at the end of the pilot study and contributed to the primary data material gathered through observation and informal interviews.

Hopefully, the results from this pilot study can create the foundation for testing the web-based ICM in a larger scale.

## 5 REFERENCES

- [1] World Health Organization. The global burden of chronic diseases [Internet]. 2016 [cited 2016 Mar 29]. Available from: [http://www.who.int/nutrition/topics/2\\_background/en/](http://www.who.int/nutrition/topics/2_background/en/)
- [2] Jordan JE, Osborne RH. Chronic disease self-management education programs: challenges ahead. *Med J Aust.* 2007 Jan 15;186(2):84-7. doi: 10.5694/j.1326-5377.2007.tb00807.x. PMID: 17223770.
- [3] Coleman K, Austin BT, Brach C, Wagner EH. Evidence on the Chronic Care Model in the new millennium. *Health Affairs.* 2009 Jan;28(1):75–85.
- [4] Joosten EAG, DeFuentes-Merillas L, de Weert GH, Sensky T, van der Staak CPF, de Jong CAJ. Systematic review of the effects of shared decision-making on patient satisfaction, treatment adherence and health status. *Psychotherapy and Psychosomatics.* 2008 May;77(4):219–26.
- [5] Canadian Public Health Association. Low health Literacy and Chronic Disease prevention and Control- Perspectives from The Health And Public Health Sectors. 2006;(July):16. Available from: [www.cpha.ca/uploads/portals/h-l/kl\\_summary\\_e.pdf](http://www.cpha.ca/uploads/portals/h-l/kl_summary_e.pdf)
- [6] Nutbeam D. Health promotion glossary. *Health Promot.* 1998;1(1):113–27.
- [7] Duell P, Wright D, Renzaho AMN, Bhattacharya D. Optimal health literacy measurement for the clinical setting: A systematic review. Vol. 98, *Patient Education and Counseling.* Elsevier Ireland Ltd; 2015. p. 1295–307.
- [8] Bo A, Friis K, Osborne RH, Maindal HT. National indicators of health literacy: ability to understand health information and to engage actively with healthcare providers - a population-based survey among Danish adults. *BMC Public Health.* 2014 Oct 22;14:1095. doi: 10.1186/1471-2458-14-1095. PMID: 25339154; PMCID: PMC4286937.
- [9] Berkman ND, Sheridan SL, Donahue KE, Halpern DJ, Viera A, Crotty K, Holland A, Brasure M, Lohr KN, Harden E, Tant E, Wallace I, Viswanathan M. Health literacy interventions and outcomes: an updated systematic review. *Evid Rep Technol Assess (Full Rep).* 2011 Mar;(199):1-941. PMID: 23126607; PMCID: PMC4781058.

- [10] Berkman ND, Davis TC, McCormack L. Health literacy: What is it? Vol. 15, *Journal of Health Communication*. 2010. p. 9–19.
- [11] Hironaka LK, Paasche-Orlow MK. The implications of health literacy on patient-provider communication. *Arch Dis Child*. 2008 May;93(5):428-32. doi: 10.1136/adc.2007.131516. Epub 2007 Oct 4. PMID: 17916588.
- [12] Al Sayah F, Williams B. An Integrated Model of Health Literacy Using Diabetes as an Exemplar. *Canadian Journal of Diabetes*. 2012 Feb;36(1):27–31.
- [13] Kourkouta L, Papathanasiou I. Communication in Nursing Practice. *Materia Socio Medica*. 2014;26(1):65.
- [14] al Sayah F, Williams B, Pederson JL, Majumdar SR, Johnson JA. Health literacy and nurses' communication with type 2 diabetes patients in primary care settings. *Nursing Research*. 2014 Dec 10;63(6):408–17.
- [15] Medical Association W. WMA DECLARATION OF HELSINKI – ETHICAL PRINCIPLES FOR MEDICAL RESEARCH INVOLVING HUMAN SUBJECTS 2020.
- [16] Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*. 2006;3(2):77–101.
- [17] Saldana J. *The coding manual for qualitative researchers*. SAGE Publications ; 2015.
- [18] Everitt B. *The Cambridge Dictionary of Statistics*. 2nd ed. Cambridge: Cambridge University Press; 2002.
- [19] Schillinger D, Piette J, Grumbach K, Wang F, Wilson C, Daher C, Leong-Grotz K, Castro C, Bindman AB. Closing the loop: physician communication with diabetic patients who have low health literacy. *Arch Intern Med*. 2003 Jan 13;163(1):83-90. doi: 10.1001/archinte.163.1.83. PMID: 12523921.
- [20] Yen PH, Fnp-Bc D, Leasure AR, Yen P. Use and Effectiveness of the Teach-Back Method in Patient Education and Health Outcomes.
- [21] Talevski J, Shee AW, Rasmussen B, Kemp G, Beauchamp A. Teach-back: A systematic review of implementation and impacts. Vol. 15, *PLoS ONE*. Public Library of Science; 2020.
- [22] MacAbasco-O'Connell A, Fry-Bowers EK. Knowledge and perceptions of health literacy among nursing professionals. In: *Journal of Health Communication*. 2011. p. 295–307.
- [23] Dickens C, Lambert BL, Cromwell T, Piano MR. Nurse overestimation of patients' health literacy. *Journal of Health Communication*. 2013 Dec 4;18(SUPPL. 1):62–9.
- [24] Brooks C, Ballinger C, Nutbeam D, Mander C, Adams J. Nursing and allied health professionals' views about using health literacy screening tools and a universal precautions approach to communication with older adults: a qualitative study. *Disability and Rehabilitation*. 2020 Jun 18;42(13):1819–25.
- [25] Kwame A, Petrucka PM. A literature-based study of patient-centered care and communication in nurse-patient interactions: barriers, facilitators, and the way forward. Vol. 20, *BMC Nursing*. BioMed Central Ltd; 2021.



**Appendix A: Results from brief survey about community nurses use of the interactive communication model**

	Not at all	A little	Some	Greatly	Completely
1. To what extent do you think the interactive communication model increases citizens' knowledge of their own disease(s) and life situation?	0%	0%	17%	50 %	33 %
2. To what extent do you think the interactive communication model increases citizens' self-care?	0%	0%	33%	50%	17 %
3. To what extent do you think the interactive communication model enhances your experience of a more holistic nursing?	0%	0%	0%	50%	50%
4. To what extent do you think the interactive communication model helps you find out what and how much a citizen knows about their own disease(s) and life situation?	0%	0%	0%	33%	67%
5. To what extent do you think the interactive communication model increases your focus on NOT using medical terms in communication with citizens?	17%	0%	33%	33%	17%
6. To what extent do you think the interactive communication model increases your focus on 'checking' citizens' understanding of the information / guidance you provide as a nurse?	0%	0%	0%	83%	17%
7. To what extent do you think the web-based IT solution is useful?	17%	0%	17%	33%	33%
8. To what extent do you think the interactive communication model reduces your time consumption with citizens?	33%	33%	0%	33%	0%