Implementing National Electronic Health Records in Nursing Homes in Tyrol: A Nursing Management Perspective

Michael SCHALLER[a,1,2], Verena DORNAUER[a,1], Werner O. HACKL[a], Georg LECHLEITNER[b], Marko ÜBEREGGER[b] and Elske AMMENWERTH[a]
[a] *Institute of Medical Informatics, UMIT – Private University for Health Sciences, Medical Informatics and Technology, Hall in Tirol, Austria*
[b] *Department of Information Technology, Tirol Kliniken GmbH, Innsbruck, Austria*

Abstract. Background: Health information technologies as electronic health records (EHR) have the potential to improve the quality and efficiency of health care. Implementing national EHR in nursing homes in Tyrol is a required task within the next years. Objectives: To explore and analyze the current situation of information exchange in nursing homes in Tyrol as well as expected potentials and challenges of an ELGA implementation from a nursing management perspective. Methods: Semi-structured interviews with nine nursing managers of nursing homes in Tyrol were conducted and analyzed using qualitative content analysis. Results: The explorative interviews offered a glance at the actual information exchange with other institutions and at the perception of nursing managers regarding potentials (e.g. decreasing organizational effort) and challenges (e.g. incompleteness of available patient information) of the nationally mandated implementation of ELGA in the nursing homes in Tyrol. Conclusion: The interviews with the nine nursing managers of nursing homes in Tyrol revealed some hopes (e.g. the reduction of double documentation) that ELGA will probably not be able to fulfill.

Keywords. electronic health records, nursing homes, qualitative research

1. Introduction

Health information and communication technologies (ICT) have the potential to improve the performance, safety, quality, efficiency and delivery of health care on different levels [1–4]. However, implementation of health ICT may fail if they are not accepted and used by health care workers, even if these implementation programs are nationally mandated [5]. Both social and technical factors need to be taken into account for a successful implementation course [6].

One example of such nationally mandated health ICT are electronic health record (EHR) systems. EHR systems enable health care providers and other eligible users to collect, share and get access to relevant patient information wherever and whenever it is needed [2,7].

---

[1] Contributed equally to this work

[2] Corresponding Author: Michael Schaller, Private University for Health Sciences, Medical Informatics and Technology (UMIT), Eduard-Wallnöfer-Zentrum 1, A-6060 Hall in Tirol, Austria, E-Mail: michael.schaller@umit.at

In Austria, the provision of a nationally mandated EHR system [8] (ELGA; "ELektronische GesundheitsAkte") began in 2015. ELGA as a national eHealth infrastructure helps to share and to communicate patient data within the Austrian health care system [9]. At the moment, ELGA comprises laboratory and radiology data, hospital discharge and transition documents, and data on medication[3] [10]. The citizens can access ELGA via a patient portal[4]. For the patients, ELGA is designed as Opt-out-System, i.e. the participation in ELGA can be objected at any time [8]. Several studies regarding ELGA were already conducted, e.g. whether ELGA could support the continuity of care [11] or how to integrate already existing information systems with the ELGA system [12,13].

The technical and operational readiness of Austria for the provision of national health information from the ELGA system is rather high in an international comparison [1]. Citizens of Austria seem to have a generally positive attitude towards eHealth solutions [7] and a nationwide implementation of an EHR system [14]. However, citizens also show concerns and a lack of information regarding ELGA [14]; additionally, there were a contentious discourse and negative emotions among physicians in private practice associated with the implementation of ELGA [15].

One task of this nationwide implementation process is the integration of nursing homes into the ELGA system. This is planned to be realized in 2022 [10]. Within these nursing homes, several advantages of EHR are expected such as increased accuracy of documentation. However, nursing homes in other countries seem reluctant with regard to EHR implementation [16]. Alexander and Madsen confirmed this point and described additionally the potential benefits of health information technology to long term care facilities, e.g. error reduction, clinical efficiencies, and improved patient outcomes [17]. Hamann and Bezboruah focused on the implementation process of health information technology, especially electronic medical records, within nursing homes and described several negative outcomes, e.g. double documentation and problems in the training of the staff. In conclusion they recommended the involvement and information of the main stakeholders, e.g. the implementation administrators and the staff, in the implementation process [18].

At least, we could not identify any study that investigates in more detail the potential of ELGA in nursing homes in Austria. As ELGA especially promises to improve information exchange with other health care facilities, we focused on the aspect of information exchange with other health care institutions.

Thus, the objective of this study was to explore and analyze the current situation of information exchange in nursing homes in Tyrol as well as expected potentials and expected challenges of an ELGA implementation from the point of view of the nursing managers.

2. Methods

We conducted explorative interviews with the nursing management of nine nursing homes in Tyrol that volunteered to participate. Overall, there are about 90 nursing homes in Tyrol[5]. The semi-structured interviews focused on the following thematic blocks:

[3] https://www.elga.gv.at/faq/wissenswertes-zu-elga/
[4] https://www.gesundheit.gv.at/elga/inhalt
[5] https://portal.tirol.gv.at/TigedatWeb/public/einrichtungen.xhtml?type=heime&source=xxxx

- Description of the information exchange with external institutions
- Challenges and problems of the information exchange with external institutions
- Attitudes of nursing management towards ELGA
- Expected potentials and challenges of ELGA for nursing homes

Two medical informatics researchers, one with a medical, one with a nursing science background, conducted face-to-face interviews in the nursing homes. One researcher led the interview, the other directly transcribed the answers. Directly afterwards, the transcript was elaborated in a contentual-structuring manner. After that, both individually conducted a systematic, computer-assisted aggregation of the results. These were subsequently compared and consolidated.

The material was then analyzed by a qualitative content analysis method according to Kuckartz [19] and using MAXQDA20 (verbi GmbH) as software tool.

3. Results

We conducted nine interviews with the nursing management of nine nursing homes in Tyrol. The extent of the collected material comprises about ten hours of interview duration as well as 60 pages of aggregated information.

3.1. Short description of the organization

The number of residents in the nine nursing homes was between 44 and 236 (mean: 91). All nursing homes used a mix of electronic documentation systems and paper-based tools; four facilities used the nursing documentation system CareCenter (carecenter Software GmbH), two TransDok (Motile Users Software GmbH), two Vivendi® (x-tention Informationstechnologie GmbH) and one Nursing Care Solution (NCaSol; Care Solutions GmbH). None of the facilities was already using the ELGA system to exchange information with other health care facilities.

3.2. Description of information exchange with other institutions

The interviewees reported a huge variety of external organizations and persons with which and whom an information exchange takes place (see Table 1). Overall, the nine nursing homes exchanged information with at least 18 types of other health care institutions. Please note that the question was an open question, the interviewees did not get a pre-defined list of possible communication partners (multiple answers were possible). A missing ”x” in the table thus only indicates that an information exchange was not actively mentioned but may take place.

3.3. Challenges and problems of information exchange

The interviewees reported several problems and challenges regarding information exchange with other institutions. One reported problem was the ‘**lack of information**’; the reasons for this can be manifold:

Table 1. Aggregation of the open question "With which other institutions do you exchange patient-related information?" The open answers were then aggregated to this information exchange matrix. 'X' denotes information exchange of the nursing homes (1, 2, 3…, 9) with an external institution (left column).

Information exchange with:	**Number of nursing home**								
(answers to open question)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
General practitioners	X	X	X	X	X	X	X	X	X
Hospitals	X	X	X	X	X	X	X	X	X
Pharmacy	X	X	X	X	X	X	X	X	X
Therapists	X	X	X	X	X	X	X	X	X
Medical specialists	X			X		X	X	X	X
Rehabilitation institutions		X		X	X			X	
Social and health judicial districts	X		X	X	X				
Agencies (e.g. health insurance)		X		X				X	X
Resident representation	X				X		X	X	
Ambulance		X	X					X	
Municipality/mayor			X					X	
Nutrition specialists		X							
Psychosocial services		X							
Hospice- and palliative-team for outpatients								X	
Case- and care-managers								X	
Memory clinic ("Gedächtnisambulanz")						X			
External psychologists									X
Short-term and transitional care								X	

- loss of paper-based documents during patient transfer to institutions: six persons out of nine mentioned this as a problem; e.g. during the transition of a patient to a hospital
- low quality of paper-based documents that are received from other institutions, e.g. unreadable handwritten letters received from a hospital
- missing paper-based documents, e.g. some documents are not sent to the nursing homes or only delayed or on-demand
- flawed information, e.g. increased error propensity especially with regard to media disruptions
- limited access to information that is available in other institutions, e.g. information on patients treated in the hospitals is not available to the nursing homes because of data security concerns

Another problem reported by the interviewees was the '**complexity of the prescription process and the medication management**' between nursing home, general practitioner and pharmacies. A general process could not be identified; almost all the participants faced this complexity in an individual manner. Exemplarily we describe one reported process in a shortened textual form:

- staff prepares medication for residents once a week → general practitioner (GP) prescribes via nursing documentation system → nurse prints medication list → if medication is needed, these are highlighted on the list →list is sent via fax to the GP → GP writes prescription and sent it to the pharmacy or GP takes prescription with him/her to the ward round, the secretary of the nursing home brings it to the pharmacy → the pharmacy delivers medication

But most of the interviewees reported that the GP does not directly prescribe in the nursing documentation system. Then nursing homes use the fax and telephone to get the signature of the GP. One person called it a "hunt for signature" (6, Pos. 92-93), especially if the GP did not use the possibility of the digital signature within the nursing documentation system.

3.4. Attitudes of nursing managers towards ELGA

We aggregated the attitudes out of the open responses of the interviewees. Five out of nine nursing managers reported a rather positive or positive attitude towards ELGA. Two of them explicitly would opt for a fast implementation of ELGA.

Four interviewees seemed to be rather neutral towards the implementation of ELGA.

3.5. Expected potentials and challenges of ELGA for nursing homes

The nursing managers reported a variety of improvements that they anticipate with the implementation of ELGA. At least three interviewees mentioned the following potentials of ELGA:

- Decreasing organizational effort for information exchange with other institutions, e.g. fewer telephone calls to get information from a hospital, reduction of paper-based documentation or decreasing double documentation
- Completeness and actuality of available of patient-related information, e.g. reduction of loss of documents within a transition phase of the resident to and from another institution
- Improved information flow and exchange, e.g. faster availability of patient-related information
- Improved information access, e.g. patient data is available at one place, the documentation quality rises

Further potentials mentioned by up to two nursing managers comprised a decrease in medication interactions and less complex information exchange processes.

Figure 1 summarizes the expected potentials of ELGA in some more detail. The main categories that were reported by at least three persons are highlighted.

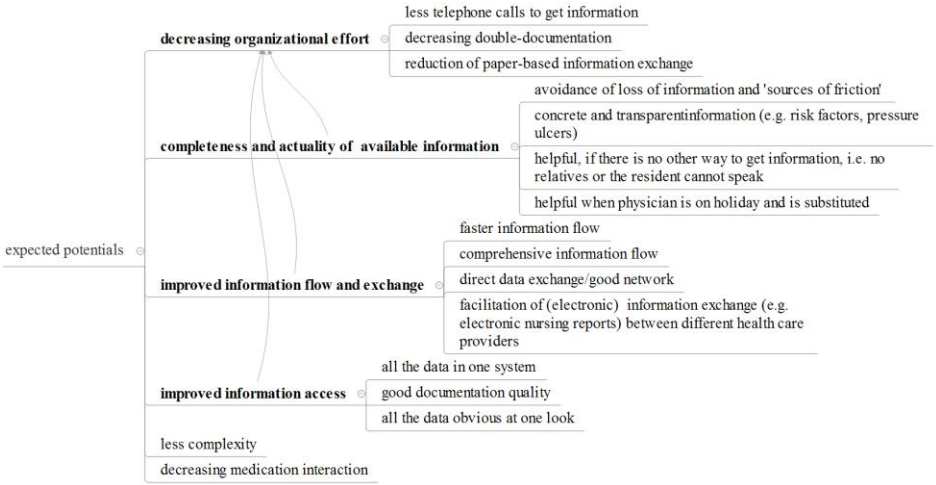

Figure 1. Expected potentials of ELGA as mentioned by nine nursing managers in free answers (excerpt from the content analysis). The arrows symbolize the reported association of the categories ‘completeness and actuality of available information’, ‘improved information flow and exchange’ and ‘improved information access’ which may lead to ‘decreasing organizational effort’.

The nursing managers were also asked about the challenges of ELGA they foresee for their institution. At least three interviewees mentioned the following challenges of ELGA:

- Increasing organizational effort, e.g. gaps in the information flow with ELGA require additional paper-based communication
- Incompleteness of available patient information, e.g. because of the possibility of full or situated opt-out of patients
- Data privacy, e.g. residents have to agree that health care providers get access to their data
- Clarification of responsibilities, e.g. who pays for the connection to ELGA or who decides for a resident with dementia which information can be shared within the ELGA system
- Incompatibility of ELGA with the nursing documentation system in the nursing home

Further ELGA challenges mentioned by up to two nursing managers comprised a higher complexity when more information systems have to be integrated, an increase in double documentation, problems with the medication workflow and limited access for nursing homes to the data within ELGA.

Figure 2 shows the aforementioned categories with some more details. The main categories, which were reported by at least three persons are highlighted.

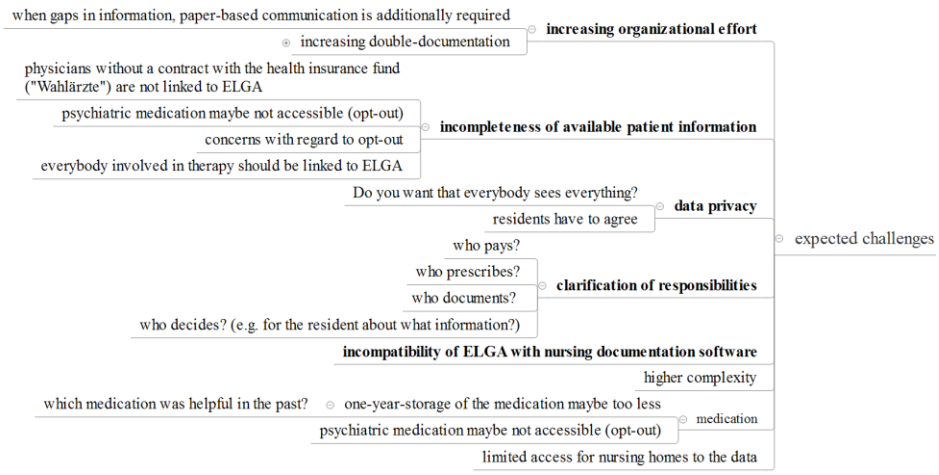

Figure 2. Expected challenges of ELGA as mentioned by nine nursing managers in free answers (excerpt from the content analysis).

4. Discussion

The nine explorative interviews with managers of nursing homes in Tyrol offered a glance at the actual information exchange with other institutions and at the perception of

nursing managers regarding potentials and challenges of the nationally mandated implementation of ELGA in Tyrol in the nursing homes.

The information exchange matrix revealed a huge variety of information exchange with other health care institutions that was mostly conducted in a paper-based way and thus lead to challenges such as the loss or delay of documents as well as the big effort to get the missing information. Kripalani et al. identified similar problems in information exchange between hospital and primary care physicians after discharge [20]. Additionally, interviewees reported very complex management of the prescription and medication process between nursing home, general practitioners and pharmacies. According to the "Addendum zum Organisationshandbuch: Pflege" [6] a conceptual solution leading to a reduction of media cracks in this complex process is not available yet [21].

The attitude of the nursing managers towards ELGA was between neutral to very positive. This result tends to confirm the conclusion of former studies with regard to citizens [14] but stands in contrast to the negative feelings of physicians [15].

The interviews with the nine nursing managers of nursing homes in Tyrol revealed some hopes that ELGA will probably not be able to fulfill if we look at ELGA's present state and planning. For example, the hope that all relevant patient information will be available in ELGA and thus "in one place" or the hope that ELGA will reduce double documentation seems not realistic [18]. In addition, nursing homes exchange information with at least 18 other types of health care institutions (Table 1); most of these institutions are currently not part of the ELGA integration. Thus, looking at the national ELGA planning, ELGA may mainly be able to support information exchange between nursing homes and hospitals, other nursing homes, general practitioners, some medical specialists, and (via the patient portal) with the patients [8].

These hopes may lead to problems within the concrete implementation processes if there is a lack of both information about the software and prioritization of the collection of information and learning about health information technologies [18].

Some limitations of this study have to be pointed out. The explorative character of this investigation and the rather small number of the participants do not allow easy generalizability of results. We cannot rule out that the nursing managers that volunteered to participate had a more positive attitude towards ELGA. One limitation of the data collection was that the interviews were not electronically recorded; a performance bias can here not been excluded.

The next steps of this project are in-depth process analyses in nursing homes to model in detail the information exchange processes between nursing homes and external institutions.

Acknowledgements

We would like to acknowledge all participants for their time and the interesting insights. We thank Mag. Anton Schator (ELGA GmbH) for sharing his knowledge on ELGA.

[6] a handbook for the information of nursing facilities with regard to relevant aspects and use cases for the integration of ELGA provided by ELGA GmbH

References

[1] J. Oderkirk, Readiness of electronic health record systems to contribute to national health information and research, *OECD Heal. Work. Pap.* **99** (2017). doi:10.1787/9e296bf3-en.

[2] F. Magrabi, M. Ong, and E. Coiera, Health IT for Patient Safety and Improving the Safety of Health IT, *Stud Heal. Technol Inf.* **222** (2016) 25–36. doi:10.3233/978-1-61499-635-4-25.

[3] European Commission, eHealth Action Plan 2012-2020 - Innovative healthcare for the 21st century, 2012. https://ec.europa.eu/digital-single-market/en/news/ehealth-action-plan-2012-2020-innovative-healthcare-21st-century.

[4] C.S. Kruse, and A. Beane, Health information technology continues to show positive effect on medical outcomes: Systematic review, *J. Med. Internet Res.* **20** (2018) e41. doi:10.2196/jmir.8793.

[5] T. Greenhalgh, D. Swinglehurst, and R. Stones, Rethinking resistance to 'big IT': a sociological study of why and when healthcare staff do not use nationally mandated information and communication technologies, *Heal. Serv. Deliv. Res.* **2** (2014) 1–86. doi:10.3310/hsdr02390.

[6] A.D. Black, J. Car, C. Pagliari, C. Anandan, K. Cresswell, T. Bokun, B. McKinstry, R. Procter, A. Majeed, and A. Sheikh, The impact of ehealth on the quality and safety of health care: A systematic overview, *PLoS Med.* **8** (2011) e1000387. doi:10.1371/journal.pmed.1000387.

[7] C. Rinner, W. Grossmann, S.K. Sauter, M. Wolzt, and W. Gall, Effects of Shared Electronic Health Record Systems on Drug-Drug Interaction and Duplication Warning Detection, *Biomed Res. Int.* **2015** (2015). doi:10.1155/2015/380497.

[8] Republik Österreich, Elektronische Gesundheitsakte-Gesetz - ELGA-G, 2012. https://www.ris.bka.gv.at/Dokumente/RegV/REGV_COO_2026_100_2_654513/REGV_COO_2026_100_2_654513.pdf.

[9] S. Herbek, H.A. Eisl, M. Hurch, A. Schator, S. Sabutsch, G. Rauchegger, A. Kollmann, T. Philippi, P. Dragon, E. Seitz, and S. Repas, The electronic health record in Austria: A strong network between health care and patients, *Eur. Surg. - Acta Chir. Austriaca*. **44** (2012) 155–163. doi:10.1007/s10353-012-0092-9.

[10] Tiroler Landesregierung, Strukturplan Pflege 2012 - 2022. Evaluierungsbericht 2017, 2019. https://www.tirol.gv.at/fileadmin/themen/gesellschaft-soziales/soziales/Publikationen/Evaluierungsbericht_zum_Strukturplan_Pflege_2012_-_2022.pdf.

[11] C. Rinner, S.K. Sauter, G. Endel, G. Heinze, S. Thurner, P. Klimek, and G. Duftschmid, Improving the informational continuity of care in diabetes mellitus treatment with a nationwide Shared EHR system: Estimates from Austrian claims data, *Int. J. Med. Inform.* **92** (2016) 44–53.

[12] M. Bonstingl, Integrating the hospital information system (HIS) into the Austrian electronic health record ('ELGA') using the example of the health care facility "breitenstein," *Stud. Health Technol. Inform.* **198** (2014) 203–210. doi:10.3233/978-1-61499-397-1-203.

[13] J. Haider, K. Hölzl, H. Toth, and G. Duftschmid, Generation of ELGA-compatible radiology reports from the vienna hospital association's EHR system, *Stud. Health Technol. Inform.* **198** (2014) 226–231. doi:10.3233/978-1-61499-397-1-226.

[14] A. Hoerbst, C.D. Kohl, P. Knaup, and E. Ammenwerth, Attitudes and behaviors related to the introduction of electronic health records among Austrian and German citizens, *Int. J. Med. Inform.* **79** (2010) 81–89. doi:10.1016/j.ijmedinf.2009.11.002.

[15] W. Hackl, A. Hoerbst, and E. Ammenwerth, "Why the hell do we need electronic health records?": EHR acceptance among physicians in private practice in Austria: A qualitative study, *Methods Inf. Med.* **50** (2011) 53–61. doi:10.3414/ME10-02-0020.

[16] E.L. Abramson, S. McGinnis, J. Moore, and R. Kaushal, A statewide assessment of electronic health record adoption and health information exchange among nursing homes, *Health Serv. Res.* **49** (2014) 361–372. doi:10.1111/1475-6773.12137.

[17] G.L. Alexander, and R. Madsen, A National Report of Nursing Home Quality and Information Technology: Two-Year Trends, *J. Nurs. Care Qual.* **33** (2018) 200–207.

[18] D.J. Hamann, and K.C. Bezboruah, Outcomes of health information technology utilization in nursing homes: Do implementation processes matter?, *Health Informatics J.* (2020). doi:10.1177/1460458219899556.

[19] U. Kuckartz, Qualitative Inhaltsanalyse. Methoden, Praxis, Computerunterstützung, Beltz Juventa, Weinheim, 2012.

[20] S. Kripalani, F. LeFevre, C.O. Phillips, M. V. Williams, P. Basaviah, and D.W. Baker, Deficits in communication and information transfer between hospital-based and primary care physicians: Implications for patient safety and continuity of care, *J. Am. Med. Assoc.* **297** (2007) 831–841.

[21] ELGA Gmbh, Addendum zum Organisationshandbuch: Pflege, 2019. OID: 1.2.40.0.34.3.1.2.1.33.