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## The effect of Electronic Health Records on the medical professional identity of physicians: a systematic literature review

Albert Boonstra\*, Janita Vos, Lars Rosenberg

*University of Groningen, Faculty of Economics and Business, Nettelbosje 2, 9747 AE Groningen, The Netherlands*

### Abstract

Electronic Health Records (EHR) have become standard practice and have altered the way physicians work and communicate with their patients. This changing work environment may subsequently influence the perceived professional identity of physicians. In this study, we aim to understand the impact of EHR use on the medical professional identity of physicians. We conducted a systematic literature review which resulted in the analysis of 34 papers that met inclusion quality criteria. The literature suggests that EHRs make the interaction between patients and physicians more formal and standardized. In addition, physicians experience a decrease in their autonomy which negatively influences their experienced professional identity. Based on these findings, we recommend examining how EHRs can allow physicians to focus more on medical work and communication with their patients and be less distracted by EHR requirements so that their medical professional identity can be restored or enhanced.

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\* Corresponding author.

E-mail address: [albert.boonstra@rug.nl](mailto:albert.boonstra@rug.nl)

## 1. Introduction

Electronic Health Records (EHRs) are computerized medical information systems that collect, store and display patient's health and clinical information electronically. They enable instant availability of this information to all relevant providers of healthcare and so should assist in providing coherent and consistent care [2]. Access to patient data may potentially contribute to improved clinical quality, patient safety, and efficiency. Because of these compelling promises, patient information flows of almost every hospital draws on a comprehensive EHR. The seamless integration enabled by EHRs promises to elevate healthcare to a new level and opening up new possibilities for patients, physicians, and researchers [1, 2]. However, many of the predictions and expectations about the benefits of EHRs have not yet been fully realized due to various challenges [1, 3]. One of these challenges is that EHRs require extensive administrative tasks by physicians during consultations, which can harm the communication quality between physicians and patients. Interaction with patients is a major attribute of a physician's medical professional identity, defined as the way physicians see and describe themselves in relation to their work and that of others [4, 10, 36]. Physicians enjoy professional autonomy and authority because of their medical knowledge and their status as healers [32]. However, this can change if they cannot fully exercise their medical expertise during their interactions with patients due to obligations of EHR-related protocols and documentation tasks.

This possible influence of the use of EHRs on the interaction between physicians and patients and subsequently the medical professional identity of physicians is the motivation of this systematic literature review, in which we address the following research question: *What are findings from the literature regarding the effects of EHR-systems on the interactions between patients and physicians and subsequently on the medical professional identity of physicians?*

The answer to this question has both theoretical and practical significance. Theoretically, the change of the medical professional identity of physicians could have an impact on the healthcare quality due to possible causes and consequences for both physicians and patients. Practically, the development of future EHR systems and their implementation process could benefit from this systematic review due to the insights into the causes of altering physician-patient interactions and the possible change of physicians' professional identity.

In the next section, we describe how we selected and analyzed the literature on the effects of EHR systems on physicians' professional identity. Then we present the results, which we organized around four distinct themes which emerged inductively from the analysis. Finally, we discuss the theoretical and practical implications of these effects and propose suggestions for future research.

## 2. Method

### 2.1 Identifying and assessing the literature

Three steps were followed to identify appropriate literature, see Figure 1. First, literature was identified on the basis of keywords and synonyms supplemented by alternative search strategies and by selecting relevant databases. Second, the remaining literature was screened for relevance for addressing the research question and whether it met the formulated eligibility criteria. Third, the final set of articles were fully read and assessed based on eligibility criteria and relevancy.

To create search strategies, the main keywords were selected based on the primary subjects of interest. These were Electronic Health Record, Professional identity, Interaction, Patient, Physician, Change, Healthcare. The databases selected were PubMed and the National Library of Medicine. When both the keywords, synonyms, and databases were selected, the search strategies on the basis of keywords and synonyms were formulated. To ensure the relevance of the retrieved content, three inclusion criteria were applied at this stage of the identification process. First, the research had to be reported in English, and the full text had to be available online. Second, only literature since January 1<sup>st</sup> of 2010 was included in the selection process because of the swift development of technology in healthcare and the relatively short time span since EHR systems were implemented. Third, studies had to be published in peer-review journals to guarantee a sufficient degree of quality.

We then assessed the relevance of the literature by determining whether the title and summary can contribute to answering the research question. This resulted in the identification of 101 potentially relevant studies. The identified literature was screened using the search strategy described above to meet the inclusion criteria. We scanned the full

text of the remaining studies to gain a better understanding of the relevance of the study for answering the research question. In order to minimize the risk of excluding essential insights, we conducted two alternative literature search strategies. The first was backward search, which involves analyzing the reference lists of the identified literature to identify studies with the same topic. The second was forward-searching which is searching for papers that cite already selected literature.

These strategies resulted in the identification of 24 additional studies to the 101 articles already identified. Subsequently, 26 duplicates were excluded. The screening process as described for the first 101 articles as well as the articles found with the alternative search strategies resulted in a reduction of 55 studies. The remaining 44 studies were read in full text to further assess the relevance of the studies using the same criteria as in the screening process.

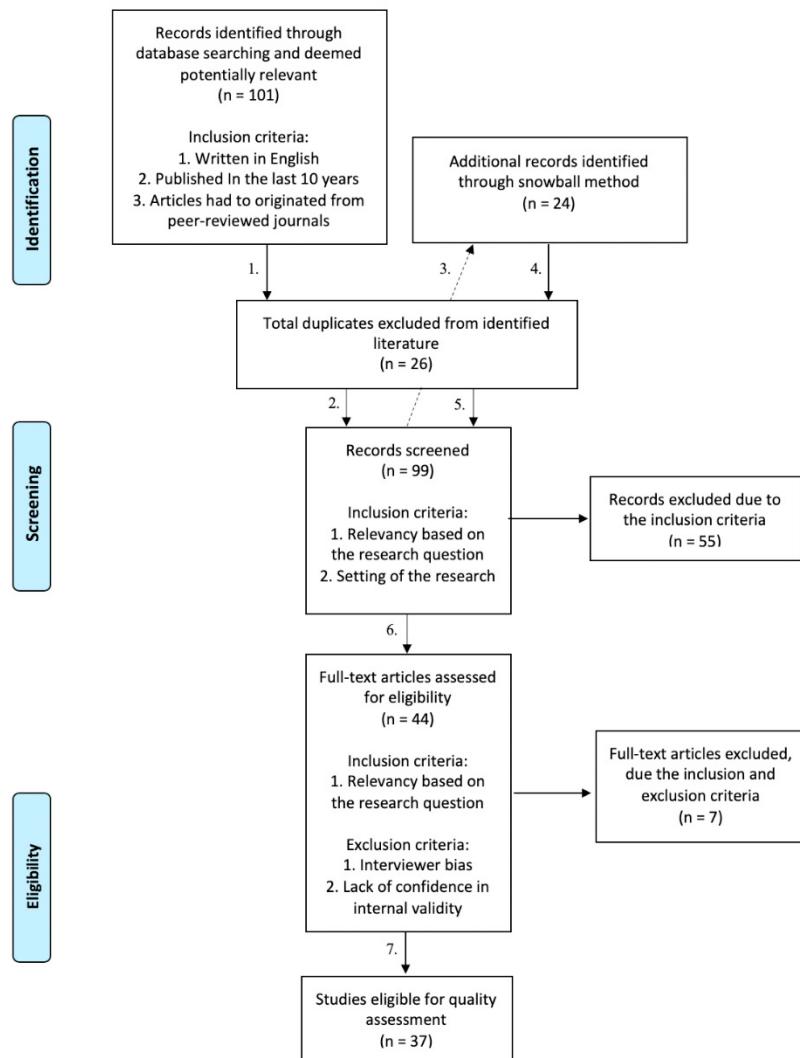


Fig. 1. Flow diagram of the identification and selection of the literature

After the studies were read full-text and considered, as described above, the quality of the retrieved articles was evaluated by using the Standard Quality Assessment Criteria (STQA) [5]. This evaluation resulted in the exclusion of three articles. The following 34 studies survived this selection procedure and were further analyzed to address the main research question, see Table 1.

Table 1. Selected publications

Authors	Reference number	Year of publication
Abramson, E. L., Patel, V., Malhotra, S., Pföh, E. R., Osorio, S. N., Cheriff, A., . . . Kaushal, R.	6	2012
Alkureishi, M. A., Lee, W. W., Lyons, M., Press, V. G., Imam, S., Nkansah-Amankra, A., . . . Arora, V. M.	7	2016
Asan, O., Young, H. N., Chewning, B., & Montague, E	8	2015
Ben-Assuli, O.	9	2015
Beth, A., & Rodriguez, D.	10	2012
Boonstra, A., & Broekhuis, M.	11	2010
Booth, A., Lecouturier, A., & Chur-Hansen, A	12	2013
Campos-Castillo, C., & Anthony, D. L	13	2015
Carayon, P., Wetterneck, T. B., Alyousef, B., Brown, R. L., Cartmill, R. S., McGuire, K., . . . Walker, J. M	14	2015
Crampton, N. H., Reis, S., & Shachak, A.	15	2016
Cresswell, K. M., Worth, A., & Sheikh, A.	16	2012
Håland, E.	17	2012
Hunt, L. M., Bell, H. S., Baker, A. M., & Howard, H. A.	18	2017
Joukes, E., Abu-Hanna, A., Cornet, R., & de Keizer, N., F.	19	2018
Lathrop, D.	20	2017
Lau, F., Price, M., Boyd, J., Partridge, C., Bell, H., & Raworth, R.	21	2012
Makoul, G., Curry, R. H., & Tang, P. C.	22	2001
Manias, E., Bucknall, T., Wickramasinghe, N., Gray, K., Schaffer, J., & Rosenfeld, E	23	2020
Marckini, D. N., Samuel, B. P., Parker, J. L., & Cook, S. C	24	2019
Mishra, A. N., Anderson, C., Angst, C. M., & Agarwal, R.	25	2012
Moerenhout, T., Fischer, G. S., & Devisch, I.	26	2019
Montague, E., & Asan, O.	27	2014
Muhammed, I., & Wickramasinghe, N.	28	2017
Nguyen, L., Bellucci, E., & Nguyen, L. T	29	2014
Noteboom, C., & Qureshi, S.	30	2014
Orton, P., Orton, C., & Gray, D. P.	31	2012
Pearce, C., Arnold, M., Phillips, C., Trumble, S., & Dwan, K.	32	2011
Rathert, C., Mittler, J. N., Banerjee, S., & McDaniel, J	33	2017
Reich, A. (2012).	34	2012
Reich, L. J. (2011).	35	2011
Rosenthal, D. I., & Vergheze, A	36	2016
Shield, R. R., Goldman, R. E., Anthony, D. A., Wang, N., Doyle, R. J., & Borkan, J.	37	2010
Stewart, R. F., Kroth, P. J., Schuyler, M., & Bailey, R.	38	2010
Venkatesh, V., Zhang, X., & Sykes, T. A.	39	2011

## 2.2 Data analysis

To answer the research question, the two main topics for further analysis were: (1) the change in the way physicians communicate with their patients through the use of EHR systems, and (2) the potential change in physicians' perceived medical professional identity as a result of this other way of communication.

To capture the change of interactions between patients and physicians due to EHR-systems, it was necessary to specify which aspects of the interactions could change. Based on prior work [40], there were three factors determining the interactions between patient and physicians: the exchange of information, the relationship between the physician and patient, and how treatment-related decisions are made. Therefore, the *first* data item was the exchange of information. Information is specified as a resource brought to the verbal interactions by both parties [40]. As a result, this data item has been used to compare different papers on their information on topics such as EHR-related standardization of questions. The *second* data item was the interpersonal relationship between patient and physician,

which is specified as two people aiming to establish or sustain an effective working relationship with mutual trust [40]. Consequentially, this data item was used to compare the degree of engagement between the two parties. The third data item was how treatment-related decisions are made. Treatment-related decisions are defined as any decision made regarding the care and treatment of patients [40]. Information such as the degree of involvement of the EHR system in the decision-making was captured.

The second topic of interest was the potential change in physicians' professional identity as a result of EHR use. Therefore, the following three data items related to professional identity were included. (1) How physicians' experienced their work before, (2) what changed as a result of the EHR system, and (3) how they experience their work now.

### 3. Results

This paper examines the findings from the literature regarding (1) the effect of EHR systems on the interactions between patients and physicians and (2) on the medical professional identity of physicians. The main findings from the literature review are organized around the four themes. The first three themes relate to the first part of the research question and the fourth theme to the second part.

*Theme 1. Information exchange between patients and physicians becomes more standardized when EHRs are used [9, 17, 18, 25, 26, 30, 34].*

According to several papers, the way physicians and patients interact has changed due to an increase of EHR-related standardization of the information exchanged [10, 18, 30]. This means that physicians have to ask standard questions during each consultation that sometimes may have little to do with the treatment of the particular patient [10, 18]. The literature indicates that the reason for this is the need for data that could be used not only for immediate medical decisions but also, for instance, for the benefit of other medical departments, for research, or for reimbursement purposes

*Theme 2. The relationship between patients and physicians becomes more formal when EHRs are used [8, 9, 12, 13, 16, 17, 18, 20, 22, 24, 25, 27, 28, 30, 36, 37, 38].*

Several papers point to a change in the physician-patient relationship due to a lack of opportunity to show empathy and respect during consultations [10, 18, 30]. For example, several papers report that, on average, physicians spend around 42% of the time staring at the EHR screen during a consultation rather than looking at the patients, thus reducing the possibility to engage with patients [8, 10]. Consequentially, some papers describe that this lack of engagement leads to a more formal and impersonal relationship between patients and physicians due to the increase in both standardized questions and the time to look at the screen physicians [16, 18]. In addition, in some papers, it is concluded that physicians spend so much time on administrative tasks that it reduces the possible time with patients, therefore negatively impacting their relationship [18, 30]. This would explain the increase of burnout symptoms among physicians due to the rise in hours worked [31]. Still, two papers report increased time spent with patients as both patients and physicians share more information [31, 37].

*Theme 3. EHR becomes an actor in medical decision-making [1, 4, 5, 13, 20, 21, 23, 25, 27, 32, 34].*

Several papers characterize the use of an EHR system as a new actor in medical decision-making because such a system actively guides consultation and decision-making processes and assists in making treatment plans [10]. Physicians use the EHR system as a tool to support and elaborate the treatment plans by showing relevant data from the EHR system as evidence [39]. However, some studies suggest that the EHR-system lacks the necessary quality to help contribute to an accurate diagnosis, which may result in diagnostic errors [10, 30]. Consequently, the EHR system contributes to the decision-making process and affects the medical authority of physicians from the patient perspective [25].

*Theme 4. Physicians spend more time on administrative tasks when using EHR systems and feel frustrated by their loss of autonomy [6, 9, 10, 14, 16, 17, 18, 20, 22, 24, 25, 26, 28, 30, 32, 34, 36, 37].*

In the literature, physicians are characterized as medical professionals who, due to their knowledge mastery, social status, and status as healers, have great authority and autonomy [32]. However, EHRs may undermine this established

position. Many papers indicate that EHRs imply an increase in administrative tasks to be performed by physicians. This is necessary to use the system effectively. For example, Marckini and colleagues [24] indicate that physicians need two hours for EHR-related administrative tasks for each hour of contact with patients. That is why Rosenthal and Verghese [36] argue that physicians now spend around 40% of their working hours behind a computer screen. In addition, several studies indicate that the degree of the physician's autonomy and authority has decreased [16, 17]. The reason for this change was the use of EHR embedded procedures to meet the financial and organizational requirements of the healthcare organization [26]. Therefore, physicians do not have the same opportunities to use their medical expertise as in the pre-EHR era. They have to follow protocols and prescriptions embedded in the EHR system before, during, and after consultations [18]. As a result, physicians are more likely to feel dissonance between the job they aspired for and the one they currently have because of concerns and frustrations due to the EHR [24, 31]. Some papers, although significantly fewer, state that the physicians are satisfied with the EHR system because they feel it benefits both their work and their patient care [22, 25, 28, 38]. For example, Mishra et al. [25] state that physicians are less dependent on nurses and administrative staff to use relevant information during consultations, giving them extra time for patient care. A survey among physicians and patients concluded that most physicians felt no threat to their autonomy, and 76% agreed that the EHR improved healthcare [28].

#### 4. Discussion

This systematic literature review demonstrates that the interaction between physicians and patients has been affected due to the use of EHR systems [10]. While EHR systems can be used as a comprehensive medical database that supports physician-patient interactions, there are significant problems. Previously, physicians used their medical expertise to diagnose their patients while actively listening and showing empathy for their patient's condition [10]. However, most of the reviewed literature suggests that EHR use results in more formal and procedural interactions between physicians and patients [16]. The standardization of questions causes this, including protocols and documentation tasks prescribed by the EHR system [24, 26]. This requires a focus of the physician on the EHR system at the expense to attention for the patient, which for instance, leads to abrupt breaks and subject changes during the consultation [15]. Many physicians experience fewer opportunities to interact with their patients due to an increased administrative burden due to the EHR system [24]. Nevertheless, physicians still wish to spend enough time interacting with their patients, often resulting in longer working hours [24].

A physician's medical professional identity is influenced by changing interactions with patients [24]. Previously, physicians were characterized as professionals who enjoy autonomy and exercise authority because of their medical expertise and status as healers [32]. However, the standardization of the exchanged information and the importance of EHR systems for clinical decision-making erodes this autonomy. Physicians can no longer exclusively rely on their own medical expertise to diagnose and treat patients [16, 26, 36]. Organizational pressures to use EHR systems also influence their interaction with patients, e.g. their documentation tasks, and tend to affect the physician's authority [34] negatively. However, there is also evidence that using EHR systems for treatment-related decisions can improve the credibility and thus the authority of physicians [7, 39].

These effects on the medical professional identity of physicians resulted in a dissonance between the job physicians aspired and the work they currently do include frustration with the use of EHR systems [1, 20]. Rosenthal and Verghese [36] argue: *"It's clear that physicians are increasingly dissatisfied with their work, resentful of the time required to transcribe and translate information for the computer and the fact that, in that sense the work never stops"*. Therefore, the literature provides worrying evidence that physicians believe that EHR systems have impaired their professional identity.

EHRs do offer many benefits, such as centralized patient information, cost-effectiveness, and evidence-based medicine. The negative impact of EHR systems on the medical professional identity of physicians will probably not lead to the abandonment of these systems. The current research focuses primarily on the consequences of the use of EHR systems, such as an increase in the administrative workload and a decrease in the autonomy of physicians. Given the search criteria of this systematic literature review, it was to be expected that solutions for these problems would have emerged from the literature. Only screen sharing with patients was mentioned. Evidently, there is a need for research directed to find solutions for the negative consequences of using EHR systems by physicians. Organizational and technological solutions should go hand in hand to mitigate the identified problems. Examples of organizational

solutions are scribes, support from medical administrators, or redesigned working processes. Speech recognition, intuitive user interfaces, and artificial intelligence are possible technological-related solutions to mitigate these problems.

## 5. Conclusion

This systematic literature review was conducted to examine the influence of EHR systems on the medical professional identity of physicians. The main findings suggest that the interaction between physicians and patients has become more formal and bureaucratic. As a result, the medical professional identity of physicians has weakened due to a decrease in autonomy which harms their perception of being a medical expert. We recommend paying attention to organizational and technological measures that allow physicians to focus more on medical work and communication with patients and less on administrative tasks. Such a change should give back what physicians have lost in terms of professional identity and result in an EHR use that respects rather than harms professional identity and enhances the quality of care.

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