

Data Content and Exchange in General Practice: a Review

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ABSTRACT

Background: efficient communication of data is inevitable requirement for general practice. Any issue in data content and its exchange among GP and other related entities hinders continuity of patient care. **Methods:** literature search for this review was conducted on three electronic databases including Medline, Scopus and Science Direct. **Results:** through reviewing papers, we extracted information on the GP data content, use cases of GP information exchange, its participants, tools and methods, incentives and barriers. **Conclusion:** considering importance of data content and exchange for GP systems, it seems that more research is needed to be conducted toward providing a comprehensive framework for data content and exchange in GP systems.

Key words: primary care, data flow, data content, data model, general practice, data exchange, general practitioner, information flow, information content, information exchange, family doctor, family care.

1. INTRODUCTION

General practice is as an important component and the gatekeeper of health system. Referral for specialists and hospital are organized by GPs. Communication is vital to accomplish important tasks of general practice, and it is impossible without information and its exchange. Communication is very critical for general practice if its roles is to be realized (1). Continuity of care and its quality across health care continuum depends on the exchange of required information between primary care particularly general practice and other levels of health system (2). Efficient communication of data is inevitable requirement in general practice if the continuity of care is to be achieved (3). Information is pivotal for the quality of patient care (4) and core of care continuity resides in information continuity (5). Any issue in data content and its exchange among GP and other related centers such as other GP offices and hospitals (6) can hinder continuity of patient care (3). Consequently the quality of care and patient safety might be compromised (7, 8).

Aim of this paper is to determine content and exchange of information in General Practice by reviewing the literature.

2. METHODS

We conducted a literature search on three electronic databases including Medline, Scopus and Science Direct. The search was performed using a combination of the following terms: primary care, data flow, data content, data model, general practice, data exchange, general practi-

tioner, information flow, information content, information exchange, family doctor, family care. Figure 1 present a process of selecting papers for the review in detail. No limitation was set for the design of studies. To be included in the review, language of paper must be English.

3. RESULTS

3.1. BASIC CHARACTERISTICS OF STUDIES

The papers included in the present review were published between 1980 and 2013. Most of the papers were published in the US (with 11 articles) (9-19). Other papers originated from England (3, 20, 21), Australia (22-24), Germany (25, 26), Finland (27), Switzerland (28) and Slovenia (29). Content of health information in GP systems have been discussed in 17 studies (3, 10, 12-19, 22-24, 26-29) and exchange of the health information has been the focus of studies in 21 cases (3, 9-23, 25-29).

Most of the studies had addressed participants of the information exchange (3, 10, 12-18, 25-29), as well as its methods and tools (3, 10, 13, 14, 16, 17, 19, 22, 25, 26, 28, 29). However there were a few papers discussing barriers to the information exchange (11, 12, 15-17, 20), its benefits (11, 12, 16, 25) and motivators (11, 12, 17).

3.2. GP's DATA CONTENT

As shown in Table 1, data content mentioned for GPs in the studies can be categorized in three major classes including demographic data, administrative data, and clinical data. Patient's name (22), patient's date of birth (22), gender (22), post code (22), and telephone (22) are details

of demographic data identified from the studies (10, 19, 22-24, 29). Referrals (14, 16, 18, 23, 24, 27-29) and discharge summary (3, 15, 17, 27) from hospital are among administrative category of data reported in the studies. In the clinical class, there are data on patient's medical history (15, 19, 22, 24, 27, 29), problem list (14, 19, 22, 24, 27, 29), clinical status (22, 29), diagnosis (3, 26-28), test results (3, 13-19, 26, 27) and diagnostic or therapeutic procedures (14, 26-29).

3.3. GP'S DATA EXCHANGE

As it can be seen in Table 1, different studies have explored various aspects of health information exchange including its use cases, participants, tools and methods, motives and barriers. These aspects are described in detail as follows.

3.3.1. USE CASES

Use cases of GP information exchange identified from the included studies can be classified in three categories including clinical use cases, research use cases and financial and administrative ones. Clinical use cases highlighted in the studies include: viewing hospital correspondence by GP and other practice staff (3, 28); reading the correspondence by GP and doing actions based on the recommendation in it; informing the patient about their medication changes based on the secondary care recommendation; informing GP by hospital during patient's hospitalization in case of any unexpected clinical procedures (3, 28); ordering laboratory and radiographic tests, tracking and receiving their results by GP (16, 17); e-prescribing (13, 16, 17, 21); getting access to patient child's or parent's medical records by GP (16); signing up for preventive health services reminders by patients (16); getting access to test results by GP (16, 17); improving referral processes (11, 16, 21, 28); and communicating clinical information among health care professionals and settings (23). Only one research use case was found for the information exchange; it was for informing patients about participating in medical research opportunities (16).

Main use cases of data from administrative and financial perspective include: Receiving the hospital correspondence by the front line staff in GP office and stamping the date after opening it (3, 28); scanning information received from hospital by administrative staff into the practice's computer system (3, 16); amending or upgrading patient records by inputting and updating relevant information (3); documenting insurance claims and keeping track of expenses (16), deductibles and co-pays (16); filling out documents by patient before and after a visit (16); finding a physician who accepts patients' insurance (16); scheduling the appointments (9, 16, 21); creating reports by administrative staff in GP offices (17); providing primary care services within a sustainable business model (11); invoicing for general medical services, and practice accounts; recalling patients, issuing prescriptions and repeating prescriptions for patients (21).

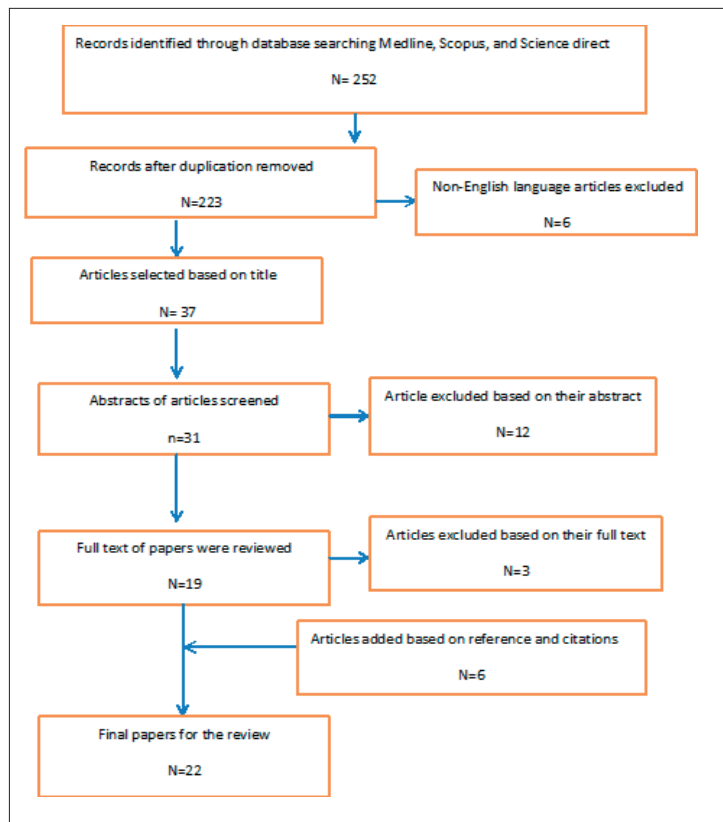


Figure 1. Flowchart of selecting studies for the review

3.3.2. PARTICIPANTS OF THE INFORMATION EXCHANGE

Two categories of participants were identified through exploring the included studies: organizations and people.

Participants in the category of organization include hospital (3, 10, 12, 13, 17, 26), laboratory (12, 17, 27), radiology (12, 18, 27), pharmacy (12, 17), public health centers (12), primary care practices (10, 17, 18), Internal medicine (15, 18), cardiology (14, 18), dermatology (18), gastroenterology (14, 18), general surgery (18), hematology/oncology (18), neurology (18), obstetrics and gynecology (18), ophthalmology, oral and maxillofacial surgery, orthopedic surgery, otolaryngology, pathology, pediatrics, psychiatry, urology, pulmonary disease (18). Participants in the category of people include administrative staff (3), GPs (3, 25, 26, 28), hospital specialists (3), radiologists (27), pharmacists (27), payer (12), physicians (13, 15, 17, 27), phlebotomist (13), Orthopedics (14), secretarial staff (27), midwife (18), Nurse practitioner (18, 27), Pediatrics (18), and patients (3, 13, 16, 27-29) and their parents (27).

3.3.3. TOOLS AND METHODS OF INFORMATION EXCHANGE

Tools and methods for exchanging information in general practice were another aspect of GP information exchange presented in the included studies (3, 10, 13, 14, 16, 17, 19, 22, 25, 26, 28-30). The most prevalent tool mentioned for exchanging information was E-mail (3, 10, 13, 14, 16, 17, 19, 22, 28). Fax (13, 17, 25, 28), direct dial connection (3, 10, 22), online forms (19, 28) were other tools and methods deployed for exchanging information in the studies. Portable memory devices (19) and Smartcard (29) were the least favourite tools used for exchanging the information. Not many of the papers provided information

First author	Year of study	Study Location	Data Content										Data Exchange				
			Demographic	Problem list	Procedures	Diagnosis	Medication list	Medical history	Clinical status	Progress notes	Test results	Referrals	Discharge summary	Methods and tools	Barriers	Benefits and motives	Use case
Crowe[3]	2010	England				*	*					*	*			*	*
Kolsek[29]	2009	Slovenia	*	*	*		*	*	*	*	*	*	*				*
Fontaine [12]	2010	America					*							*	*		*
Patel[16]	2012	United States					*			*	*	*	*	*	*	*	*
Ross[17]	2010	United States					*		*	*	*	*	*	*	*	*	*
Tandjung [28]	2011	Switzerland			*	*	*				*	*	*			*	*
Friedman[13]	2014	United States					*			*		*	*			*	*
Rudin[18]	2011	United States								*	*						*
Kern[15]	2012	United States						*		*	*	*	*				*
Muller[26]	2005	Germany			*	*	*			*	*	*	*				*
Englin [22]	2000	Australia	*	*			*	*	*			*	*				*
Liaw[23]	2003	Australia	*								*	*	*			*	*
Hayrinen[27]	2008	Finland		*	*	*	*	*	*	*	*	*	*				*
Gandhi[14]	2000	United States		*	*		*			*	*	*	*				*
Smith[19]	2005	United States	*	*			*	*		*	*	*	*				*
Newton[24]	1992	Australia	*	*			*	*			*	*	*				*
Bell[10]	2009	United States	*									*	*				*
de Lusignan[20]	2011	England										*	*				*
Haarbrandt [25]	2013	Germany										*	*		*	*	*
Fontaine[11]	2010	United States										*	*		*	*	*
Bartolome[9]	1980	United States															*
Wood[21]	1995	United kingdom															*

Table 1. Summary of findings on data content and exchange in GP systems

about standards of data content and its exchange. HL7 (20, 26), CDISC, BRIDG (20), ANSI, xDT, and XML (26), CDA (26) were the only standards discussed in the studies.

3.3.4. INCENTIVES FOR THE INFORMATION EXCHANGE

Incentives reported for the GP information exchange in the studies can be classified in financial, governmental, organizational and quality motives.

Financial motives reported for the information exchange include mandates of billing (12), pay-for-performance incentives (12), increased reimbursements (12), cost savings (11, 12, 25), and increased revenue (11).

State and federal mandates (12) were only governmental motives found in the publications. In category of organizational incentives, motives such as time savings (11, 12), efficient staff work flow (11, 12), improvement of communication between doctors and their patients (16), efficiency (12, 17), sustainable business model in participant organizations (17), ability to deliver a demonstrable benefit to providers (11), organizational requirements for quality reporting (12) were reported in the studies.

Incentives found in the class of quality were availability of patient data from locations outside the practice (12), completeness and accuracy of medical record (16), im-

provement of medical record security and privacy (16), realization of continuity of care (25) promotion of public health (11, 12, 15, 16) and improvement of quality of health care (11, 12, 15-17) and patient safety (11, 12, 25).

3.3.5. BARRIERS OF THE INFORMATION EXCHANGE

Different types of barriers for the information exchange had been reported in the studies including technical, personal, financial, organizational, and security obstacles. Technical barriers reported in the studies include differences among primary health care systems, lack of interoperability (11, 12), lack of availability and supply of IT to primary care (12), and other non-specified technical issues (11, 15, 17). Lack of the willingness of family doctors to use technology at the point of care was the only barrier mentioned in the category of human hindrance factors (12). Financial barriers of the HIE enlisted in the studies include its related costs (11, 15, 17) and lack of buy-in for the goals of the HIE (15).

Organizational obstacles highlighted in the studies were lack of sustainable business model (11, 15), liability (11) and absence of leadership for the HIE (11).

Security and privacy concerns were other category of barriers for the HIE (11, 15, 16).

4. DISCUSSION

In this paper, we aimed to review finding of studies about the content and exchange of data in GP systems. Only the main classes of the data content were identifiable in the included studies. No information had been provided on the details of data contents for each of the classes except for the demographic ones.

We found two types of the information exchange including inter and inter-organizational communications. These exchanges were for both sending and receiving information by GP.

The most prevalent application of the information exchange was for clinical use cases (3, 11, 13, 16, 17, 21, 23). This is in line with the importance of clinical communication for general practice (31, 32) and it is in accordance with the fact that exchange of clinical data among health care professionals improves coordination of patient care through the continuum of health care (33). Due to importance of this information exchange, use of hyper links to various information sources in electronic patient records has been suggested as a solution for better communication of different clinical data between primary and secondary care (34).

Usage of the information exchange for research was found to be very scarce among the studies. This can be attributed to the lack of appropriate mechanisms for communication between GP systems and research centers or privacy concerns related to patients' data. It might be also related to the fact that importance of GP data for research has not been recognized.

Technical issues (11, 12, 15, 17) and privacy concerns (11, 15, 16) are among reported barriers to the information exchange. Despite many incentives for the information exchange, it suffers from different obstacles. Therefore it cannot be utilized for multiple purposes across the health system. The most highly mentioned organizational participant of the information exchange was hospital (3, 10, 12, 13, 17, 26) followed by Laboratory (12, 17, 27) and Radiology (12, 18, 27). This is in accordance with evidence documenting cost effectiveness of the information exchange between GP and hospital (35).

Among the participants in class of people, patients were the most highly observed entities in the included studies (3, 13, 16, 27-29). Patients are of great importance in patient-centered model of health care and their engagement is the key attribute of the new model of primary care practice (36, 37). Communicating information to them is vital to realization of such model. Majority of the information flow found in the studies was in individual level rather than the aggregated level. One possible explanation for this could be that the studies' focus had been more on importance of the information exchange on patient care at individual level rather than its flow in aggregated and population level.

Most of the tools mentioned in the studies for sharing information were non-electronic (3, 10, 13, 14, 16, 17, 19). Similarly there was low proportion of the studies mentioning standards of electronic sharing of data (20, 26). To some extent this can reflect existing research gap in domain of GP electronic data exchange.

5. CONCLUSION

Considering importance of data content and its exchange for GP and health system, it appears that research in this domain is not enough and comprehensive. This might be related to the limitation of key words searched in this review or excluding papers written in languages other than English. Some studies might have been missed due to these restrictions. Future research on GP should be directed toward comprehensive model of data content and exchange for GP systems toward continuity of patient care. Providing such framework or model can foster the success of GP systems in realization of their vision.

CONFLICT OF INTEREST: NONE DECLARED.

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