

Medical record charting systems in Canada: Paper versus electronic

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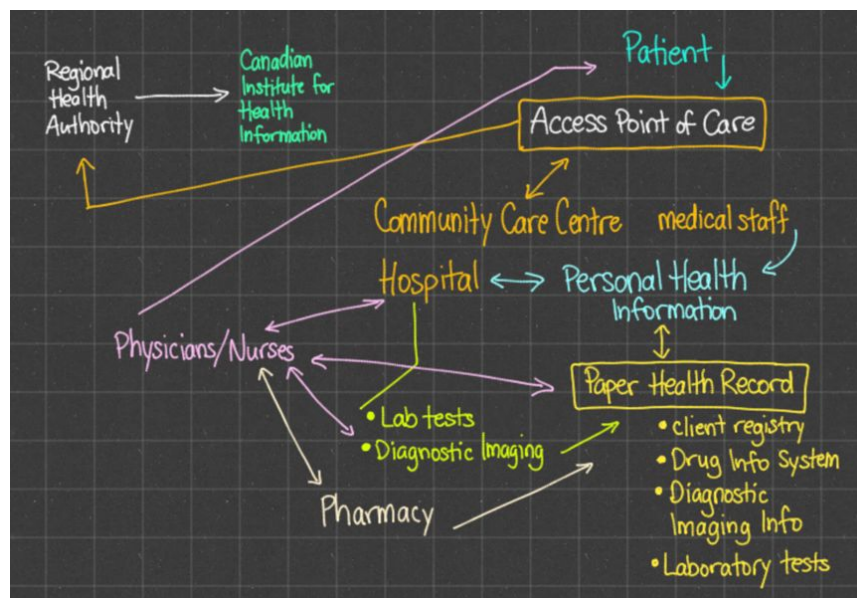
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## Medical record charting systems in Canada: Paper versus electronic

Patients are the source of health information along with family members. Once a patient enters a facility of care (Community Care Centres or Hospitals) the staff at these locations have access to a health record (mostly a paper chart along with some form of an electronic version) which contains information on patient medical history of Diagnostic Imaging tests, laboratory blood tests and drug information. The patient's personal health information is routinely updated when the patient goes for medical tests or gets ordered a pharmaceutical prescription. The updated information is read by the physicians and nurses which then inform the patient of their health status. Once the patient is discharged, the patient's chart is returned to health records for storage, and the information gets sent to Regional Health Authorities to be sent to Canadian Institute for Health Information (CIHI) for electronic reports. Canadian Institute for Health Information provides national quantitative data on various healthcare issues, such as wait times for surgery, thus highlighting the importance of electronic health records.

Fig. 1, The flow of healthcare information in Canada



### **Medical records**

This paper will analyze both paper and electronic medical record charting systems, assessing the pros and cons of each. Patient's medical records has traditionally been only paper based, but Electronic Medical Records (EMRs) / Electronic Health Records (EHRs) allow for full access to medical information (blood/lab tests, diagnostic information, etc.) and history to medical professionals but also patients (Urowitz, et al, 2008), which is uncommon in the paper based system.

One setting that has both systems of paper and electronic medical records are residential aged care facilities (RACFs), where the patient's physician comes to the facility and handwrites the prescription order on paper (Elliot, Lee & Hussainy, 2016), which gets faxed or entered electronically by nursing staff to a pharmacy. Using paper for daily charting needs while using an electronic charting system for detailed information such as prescription orders for patients is common in RACFs. Each charting system has its merits for use. This paper will discuss the problems with each and provide an analysis of the charting systems.

### **Paper medical records**

Paper based charting is taught and understood in all health professions without the further need for specialized training unlike EMR/EHRs. Paper charts do not require costly computer hardware, but suffer the costs from printing, which is why it remains the default cost factor in EMR adoption decisions. The universality of paper charts does have its drawbacks. Handwriting in charts is the only means of communication and the readability of this information relies on the person writing in the chart, which ultimately affects quality of care for the patient.

**Problems with paper records.**

The problem with paper charting is that medical calculations can occur without being aware or notification, key health information can be omitted which impacts overall quality of care, as well as the widespread issue of illegible handwriting (Wong, et al, 2017). The time it takes for nursing staff in RACFs to transmit prescription orders on paper to the pharmacy (on average 33 minutes) and for the pharmacy to enter the data into a electronic system was on average 90 minutes (Elliot, Lee & Hussainy, 2016). The combined total of 123 minutes of average data entry for prescriptions is inefficient. Information on paper is only useful for those who are reading off it, which affects availability within a healthcare setting, the one patient chart affects multiple processes from happening concurrently. Paper charts are delivered with patients to medical tests in hospital settings like an ongoing storybook written by medical staff.

Paper based charts can easily be ripped or torn, have old or incorrect information in them, and can be scanned with ease at a photocopier (which does not control who ends up with this information, thus information leaks). The control of information in paper health records is largely in the hands of those who routinely possess it, which makes it more secure from outsiders accessing its contents such as online hacking but also leaves it more susceptible to human errors.

***Security issues with paper records.***

Security issues for paper based medical records is not on the same level of EMRs, however privacy is still a major concern. Health records in hospitals and RACFs are usually housed inside binders placed on shelves inside the nursing areas for nurses and other medical staff like nursing aides (NAs) to chart. These nursing areas typically do not have locked doors to prevent theft or a policy on keeping all charts within the designated charting space. If a medical

chart is to be lost, stolen, located at another location then it impacts medical care as the one chart is required for all medical functions and procedures. Unlike paper, EMR/EHRs can be used by more than one medical professional at any given time to benefit the patient, by having faster transfer of health data.

### ***Electronic records.***

In 2017, 73% of Canadian primary care physicians use EMRs, however Canada lags 18 other countries in widespread use (Webster, 2017). The Canadian healthcare system remains paper based, and EHR implementation is behind many other industrial countries, because physicians of primary care are independent and use of EHR/EMRs is their decision (Gagnon, et al, 2016). Electronic Health Records (EHRs) are far from simplistic in its functions and features (Ancker, Kern, Edwards, Nosal, Stein, Hauser, 2014), their functions provide multiple information management operations (data, order entry, clinical decision support, communication and coordination, reporting and population health, also patient support) (Johnson, Johnson & Crowley, 2011). Unlike paper charting systems EHRs allow for drug alerts (food, allergy, disease or drug interactions), and best practice notifications for anything from immunizations, depression, cancer screenings to asthma information (Ancker, et al, 2014). Using an EMR system routinely prompts medical staff about potential problems (Rubinowicz Vedel, Sanche, Lortie, Law, Hughes, & Lapointe, 2016), which improves quality and safety of care. Improving quality of clinical decisions and mathematical functions is fostered in EMR/EHR system, as errors can be flagged and corrected (Paré, et al, 2014). Being notified about errors saves lives and avoids poor quality medical care, this function alone is of great use and benefit. When comparing task completion of paper charting versus electronic charting, there are statistically

significant differences in minutes for charting (locating chart, opening and recording vital signs) (Wong, et al, 2017).

When health information exists on a connected system, it can be used for epidemiological surveillance and for monitoring pharmaceutical trends (Birtwhistle & Williamson, 2015).

***Problems with electronic records.***

Barriers to using EHR exist for various health organizations (type of organization and size factor into EHR adoption), lack of funding resources (costs to start-up and continue system) and information sharing legality issues (McCullough, et al, 2014; Paré, et al, 2014). Technical concerns plague the adoption process; lack of computer skills of medical staff, the complexity of health systems, time to find and buy software and lack of support from vendors themselves in conjunction with other health organizations (Paré, et al, 2014). The various software packages on the market for implementing an EHR/EMR system is one factor in the slow progress in adoption, as well as lack of customization to best fit the organization's needs (Lluch, 2011), which ties to the ability to connect to other health organizations. The varied software on the market often mean incompatibility, such is the case for health organizations in Ontario where there are 11 different vendors resulting in 11 types of data (Webster, 2013), data usage only to those with the same software. Having health records connected to the internet has benefits stated above, however with anything connected to the internet has vulnerabilities, this issue of security is of most concern for the public and medical professionals.

***Security issues with electronic records.***

Privacy concerns over health information is paramount to EMR/EHR adoption. Electronic records requires advanced security techniques such as: securing physical property of

computer hardware (use locks to prevent theft), software (firewalls, encryption, administration safety, block transfer of patient data from computers offsite, and monitor software security) which are all necessary for health data (Kruse, Smith, Vanderlinden & Nealand, 2017). Access to data in EMR/EHRs is not limited to online hacking medical offices, but also medical staff - close to half of Canadian medical professionals' access data outside their medical setting, and 88% in an American study used their personal devices (Burns & Johnson, 2015; Tharmalingam, Hagens, & Zelmer, 2016). Hacking and identity theft are common concerns, as well as access from other people not directly involved with health records like insurance companies (Papoutsis, et al, 2015). Data security quality relies on people involved upholding the practices of data security.

***Analysis of EMR/EHR.*** See Fig.2, SWOT table.

Fig. 2, SWOT table analysis of EMR

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>● It's many functions &amp; features (error alerts, communication, data management, patient communication)</li> <li>● Screen alerts avoid medical errors (medication, allergy, mathematical)</li> <li>● Notifications for best practice for conditions patient may have and how to manage it or avoid</li> <li>● Increased productivity</li> <li>● Access for emergencies situations for patients outside office location</li> <li>● Reduce waste (time for data entry, tasks, charting)</li> <li>● Allows concurrent medical tests, procedures or therapies to happen instead of stalled waiting for paper chart</li> <li>● Data can help epidemiology research</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>● Mixed interoperability</li> <li>● Paper based charting is taught and understood in all health professions, not so for EHR/EMRs</li> <li>● Costs expenses (software, hardware, training)</li> <li>● No clear evidence proving overall substantial financial savings</li> <li>● Lack of funding resources for health organizations to adopt EMR/EHR</li> <li>● Lack of computer skills from staff for EMR system use</li> </ul>
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<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>● Encourage more EMR/EHR adoption by primary physicians and other health organizations</li> <li>● Mandating a standard software for the provinces to use or develop a system that is provincially supported</li> <li>● Implement policies that support advanced security procedure protocols for protecting health data</li> </ul>	<ul style="list-style-type: none"> <li>● Competing priorities for healthcare spending</li> <li>● Staff printing records off EMR</li> <li>● Various software versions on market</li> <li>● Security issues (hacking, data leak, health records seen by non-medical care staff)</li> <li>● Staff using personal devices for accessing patient EMR/EHR</li> </ul>

## Conclusion

This paper has looked at the strengths and weaknesses including security issues for both charting systems. The paper based system is widely used in most health organizations in Canada, with some exception for primary care physicians who do decide on using an EMR/EHR. Currently paper based charting systems are mostly single objects that are binder bound to a single geographical location and seen only by those in possession of the chart. Handwritten information is at the mercy of good quality penmanship, such is the case for paper charts.

Electronic health records provide the most benefits for all patients and medical professionals; safety, quality and access to records. While EMR/EHR data security is crucial, this does not take away the greater good that can come from health data being in a digital format. Information data is powerful, it can monitor epidemiological outbreaks (Naydenova, Tsanas, Howie, Casals-Pascual & De Vos, 2016). Paper charts over time will be seen like ancient stone tablets, unhackable but very much burdensome in the dynamic flow of medical information. The future is online, information is dynamic, so should be our medical charts in our health system.



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