Canadian Validation of German Medical Emergency Datasets

Josh KOCZERGINSKI[a][1], Kendall HO[a], Riley GOLBY[a], Elizabeth M. BORYCKI[b],
Andre W. KUSHNIRUK[b], Judith BORN[c], and Christian JUHRA[c]
[a]Faculty of Medicine, University of British Columbia,
[b]School of Health Information Science, University of Victoria,
[c]University Hospital Muenster, Germany

Abstract. Medical Emergency Datasets (MEDs) are brief summarizations of an individual's medical history, providing vital patient information to emergency medical providers. A recent German study [1] evaluated whether MEDs are useful to local emergency physicians and paramedics, and which health data were relevant to their medical management. To validate of the German study internationally, Canadian physicians and paramedics were recruited to provide feedback on the utility of the German MEDs as well as their specific content. Original documents and surveys were translated to English directly, with a goal of collecting quantitative and qualitative feedback. Overall, physicians and paramedics found the MEDs to be useful in their evaluation of hypothetical medical scenarios. Most of the MED content was very useful, with some items appearing extraneous. The findings of this study will be used to inform future development of MEDs as well as to drive future research.

Keywords. Electronic Health Records, Health Information Exchange, Emergency Treatment, Medical Emergency Datasets

1. Introduction

Pre-existing medical information about patients is critical to first responders and physicians in delivering emergency services [2]. Unfortunately, this vital data is often unavailable to providers due to language or geographic barriers, or from patient incapacitation [3]. Even when prior medical records are available, they can be challenging to access in a timely fashion, and may have incomplete, difficult to interpret, or inclusion of extraneous data [3]. Many health regions in Canada and other countries have implemented electronic medical records (EMRs) to improve accessibility of medical records to care providers [4]. Yet, these records are uncommonly organized to provide the most essential information about the patients to be rapidly accessible to health providers in emergencies to guide optimal care.

Over 388,000 German travelers visited Canada in 2017 [5]. Newly enacted legislation in Germany mandates that each German citizen has the right to have a medical emergency dataset (MED) created by their general practitioner which may be accessed electronically by emergency medical providers domestically [4]. Medical emergency datasets included medical information organized in five categories (Table 1). A recent study demonstrated MEDs are very useful to German paramedics and emergency physicians (EPs) treating acute patients in simulated written scenarios [2].

_____

[1] Corresponding Author: Dr. Josh Koczerginski, jkoczerg@gmail.com

Table 1. Medical emergency dataset categories & example items within each category

Category	Example Items
Diagnoses	ICD 10 code, diagnosis name
Medication	Drug name, dose, prescriber
Allergies	Substance, reaction
Medical Implants	Date, type
Special Notes	Pregnancy, communication barrier

The study further showed certain items in the MED (i.e. medical diagnoses and medications) are valued greater than others (i.e. allergies and medical devices).

The current technical infrastructure in Germany in which the MED is stored prohibits the digital utilization of these records internationally [1]. Therefore, to aid international acute care providers treating German travelers with medical or traumatic emergencies, the MEDs are currently being adapted by a German research group led by the University Hospital Muensters Office for eHealth to be accessible in mobile devices and in other languages. In collaboration with the University Hospital Muensters Office for eHealth, we sought to test the usability and relevance of MED by surveying Canadian paramedics and EPs to obtain their opinions and feedback. The purpose was to internationally validate the results of the 2015 German study, and to provide constructive feedback on how to best adapt the German MED for Canadian healthcare providers.

2. Methods

The researchers used previously developed German patient MEDs in paper form translated into English in combination with written emergency medical scenarios to obtain quantitative and qualitative feedback from Canadian paramedics and EPs on the usefulness of the medical data to their care of the simulated patients. The feedback forms were also direct translations from the 2015 German study in order to accurately validate their results in a Canadian setting.

2.1. Participants and Recruitment

Paramedics with at least two years of prehospital experience, attending EPs, and senior resident EPs with minimum two years of emergency medicine training were invited to participate in the study. Following ethics approval, recruitment emails were sent to physicians at an academic, tertiary care hospital in Vancouver, BC, as well as to paramedics in British Columbia. Interested individuals contacted the researcher directly if they wished to participate in the study. Electronic communication was used to share study purpose, procedures, MEDs, and other study material. Consent was obtained via email.

2.2. Procedure

Each paramedic and EP was provided with four MEDs and two written emergency medical scenarios. The participant was asked to use an MED corresponding to a hypothetical emergency scenario (i.e. a 70-year-old male on an anticoagulant medication who was in a motor-vehicle collision). Two of the MEDs were applied to the first

scenario, and the remaining two MEDs were applied to the second. Subsequently, the participants were asked to complete five brief surveys (one for each MED, and one for global feedback). The surveys included sections for categorical responses, and additional free text space for written feedback. The study was conducted either in person in an academic office with a study investigator present, or online at the participant's preferred location.

2.3. Analysis

The number of times participants (in the rankings from the survey) rated each category of information (each of the categories and example items listed in Table 1) was summarized as either: "necessary/very useful", "somewhat useful" and "not necessary". For each category the frequency was converted to the percent of times participants considered each of the information categories in terms of being necessary/very useful, somewhat useful or not necessary, and this was tabulated and organized in descending order (from most necessary to least necessary). This analysis was done for both groups – the paramedics and the EPs. In addition to analyzing the ratings obtained from participants regarding information categories, participants' comments were recorded and organized according to the category of information they were referring to (in order to identify recurrent themes about the usefulness of different categories of information).

3. Results

The results discussed in this section focused on the quantitative analysis of the items included in the MEDs, as well as the qualitative themes obtained through free text responses. In total, 25 EPs and 25 paramedics analyzed two MEDs each paired with two medical scenarios. Overall 200 responses (from 50 participants each responding to four total scenarios) were included in the results.

3.1. Quantitative Results

Tables 2 and 3 give the most highly rated information items (organized in descending order, from "necessary" to be included in a MED, down to less necessary). The results are generally consistent across both paramedics and EPs. For example, diagnosis name, date and site were considered the most important aspects of the category "diagnosis", while ICD-10 codes, diagnosis confidence and person who made the diagnosis were not.

Both EPs (74%) and paramedics (81%) found the MEDs to be useful in evaluating the medical scenarios. Specifically, information regarding past diagnoses (EPs = 78%, paramedics = 76%) and medications (EPs = 84%, paramedics = 82%) to be very useful in the MED. Within these categories, some data were considered to include extraneous information (i.e. diagnostic confidence, ICD10 code, who prescribed a medication, and person who made a diagnosis). Similarly, EPs and paramedics described information regarding medical devices and implants (EPs = 32%, paramedics = 52%) as well as special notes like pregnancy and communication barriers (EPs = 28%, paramedics = 27%) to be less useful in their assessments. Only the paramedics considered the allergy section to be useful (EPs = 52%, paramedics = 78%)

3.2. Qualitative Results

Analysis of the qualitative comments also reflected and were consistent with the above rating patterns. For example, one physician noted "I don't need to see diagnostic confidence. Either the patient has a diagnosis or they do not", which was consistent with the low rankings of importance of diagnostic confidence in Tables 2 and 3. Furthermore, another physician stated that "I don't need to know who diagnosed this", also consistent with the lowest ranking for the name of the person making the diagnosis as the category ranked lowest for being necessary in a summary (this also applied for a low ranking for being necessary for the category of who prescribed a medication, which was also found to be not necessary).

The qualitative results for the paramedics mirrored the results from the EPs. For example, one paramedic stated that "Don't care who diagnosed it". Also regarding medication information another paramedic stated that "Don't believe prescriber and form of medication is necessary".

Table 2 – Percentage Rankings of Importance of Information Items for Paramedics

Category	Item	Necessary	Somewhat useful	Not necessary
Diagnosis				
	Diagnosis	**74**	26	0
	Date	40	**49**	10
	Side localization	17	34	**48**
	Dx confidence	10	36	**54**
	ICD10	1	6	**93**
	Person who made Dx	1	11	**87**
	Overall useful	**76**	18	6
Medication				
	Drug name	**60**	30	10
	Agent name	**46**	42	12
	Dose	25	**46**	29
	Taking	12	33	**54**
	Prescriber	2	5	**93**
	Overall useful	**84**	10	6
Allergies				
	Substance	**94**	3	3
	Reaction	**69**	28	3
	Person who made dx	0	3	**97**
	Overall useful	**78**	4	17
Implant				
	Implant	**48**	39	13
	Type	23	**43**	33
	Date of implant	10	40	**50**
	Person who made dx	5	10	**85**
	Overall useful	**52**	28	21
Special notes				
	Communication barrier	**64**	14	21
	Other	28	**59**	14
	Road danger	17	17	**67**
	Pregnancy	8	17	**75**
	Overall useful	27	9	**64**

Table 3 – Percentage Rankings of Importance of Information Items for Emergency Physicians

Category	Item	Necessary	Somewhat useful	Not necessary
Diagnosis				
	Diagnosis	**89**	9	2
	Date	**47**	42	11
	Side localization	25	37	**38**
	ICD10	7	6	**88**
	Dx confidence	6	38	**56**
	Person who made Dx	1	22	**77**
	Overall useful	**78**	14	7
Medication				
	Agent name	**74**	14	13
	Dose	**71**	12	17
	Drug name	**56**	15	29
	Taking	**54**	18	28
	Prescriber	1	22	**77**
	Overall useful	**82**	11	7
Allergies				
	Substance	**85**	6	9
	Reaction	**85**	6	9
	Person who made dx	10	19	**71**
	Overall useful	**51**	9	40
Implant				
	Implant	**77**	15	8
	Type	**50**	42	8
	Date of implant	38	38	23
	Person who made dx	18	0	**82**
	Overall useful	32	26	**41**
Special notes				
	Other	32	18	**50**
	Pregnancy	0	0	**1**
	Road danger	0	0	**1**
	Communication	0	0	**1**
	Overall useful	28	15	**57**

Comments made regarding other categories such as allergies also indicated the importance of some categories, such as the name of the substance causing the allergy, and the reaction to it. However, including the name of the person who made the assessment was considered not necessary by both groups – as one paramedic states "Person who set the diagnosis is not necessary".

Comments regarding the information in the summary overall were also useful and included some interesting recommendations, such as "Should collect more free text on relevant diagnosis" (made by an EP) and "making it more concise with only what is necessary – there was a lot of information that was not useful." Other suggestions concerned the delivery platform, with one paramedic stating that "possibly have is as a smart phone APP".

4. Discussion

Both EPs and paramedics from Vancouver overwhelmingly describe the English-translated German MEDs as very useful in their assessments of unknown patients in simulated acute medical scenarios. These results are similar to those from the previously described German study, and support the hypothesis that MEDs positively impact the emergency care provision in Germany as well as in Canada.

Not every category and item were deemed valuable by medical providers. Of note, both physicians and paramedics identified the same items in the same order of priority for each of the five themes. Emergency medical providers considered medical history and medications to be particularly useful. However, it was noted multiple times that the necessary information (like diagnosis and medication name) were combined with distracting, less useful data (ICD10 code and prescriber). This feedback should be considered when compiling MEDs for tourists who will be visiting Canada.

As German tourism to Canada continues to gain popularity, there will continue to be challenges for Canadian paramedics and physicians treating these visitors to their cities. Language and medical barriers to communicating medical history can be detrimental to emergency care. With English MEDs associated with international visitors, acute care providers will be able to assess and manage their patients with vital clinical information easily accessible. Feedback from Canadian physicians and paramedics will be provided to the German Medical Association so that they may continue to optimize the MED for international, English speaking medical providers.

The participants in this study describe a need for a similar, accessible MED for Canadian citizens as well. Future investigations should look to develop and refine a strategy for allowing Canadians to travel domestically and internationally with a record of their medical history so that they too may receive optimally informed emergency care beyond their provincial borders. The ultimate goal of an integrated electronic medical record for each Canadian citizen will require similar studies to determine what health data is useful for care providers.

Limitations to this study include the small geographical region of the study participants. It is unclear if emergency providers in Vancouver adequately represent the rest of Canadian EPs and paramedics. Additionally, to maintain internal validity, only four patient MEDs were analyzed in this study. The feedback provided is being generalized to guide future MED construction. There will certainly be variation in data included in real patients' MEDs, which we were unable to account for in this study.

Future research is required to further validate the utility of MEDs in a global context. Furthermore, there are larger questions regarding technological implications of MED design and accessibility which were beyond the scope of the present study. Finally, ethical and philosophical implications of MEDs (for example, patient ability be able to modify their data; and addressing discrepancies patient and physician opinions) should be considered in future research.

References

[1] J. Born, J. Albert, E.M. Borycki, N. Butz, K. Ho, J. Koczerginski, A.W. Kushniruk, J. Schenkel, and C. Juhra. Emergency Data Management – Overcoming (Information) Borders. *Stud Health Technol Inform*. **231** (2016), 18 – 22.

[2] J.S. Shapiro, J. Kannry, A.W. Kushniruk, G. Kuperman & The New York Clinical Information Exchange (NYCLIX) Clinical Advisory Subcommittee. Emergency physicians' perceptions of health information Exchange. *Journal of the American Medical Informatics Association : JAMIA*, **14**(6) (2007), 700–705. http://doi.org/10.1197/jamia.M2507

[3] A. Stiell, A.J. Forster, I.G. Stiell, and C. van Walraven. Prevalence of information gaps in the emergency department and the effect on patient outcomes. *CMAJ: Canadian Medical Association Journal*, **169**(10) (2003), 1023–1028.

[4] J. Born, J. Albert, N. Butz, S. Loos, J. Schenkel, C. Gipp and C. Juhra, C. The Emergency data set for the German electronic health card - Which Benefits Can Be Expected? *Stud Health Technol Inform*, **212** (2015), 206-10.

[5] Destination Canada. *Market Background: Total Arrivals to Canada from Germany*, 2018. Retrieved on August 20, 2018 from https://www.destinationcanada.com/en/markets/germany.