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Health Information Management: Engaging the Next Generation

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Preface

Health Information Management:
Engaging the Next Generation

Health Information Management (HIM) professionals have assumed lead roles in the introduction of scanning and digital health solutions in public and private health institutions around the country. They are not just responding to a changing landscape in health service provision, they are creating and challenging it to perform effectively and efficiently, and then some. The integration of health care across the primary and tertiary health care divide, and the dual benefits this will bring in improving quality of patient care and patient safety and containment of costs, is now not just a goal, it is imminent.

The theme this year reflects the need for the profession to engage the next generation of health information management professionals to take us into the future. Therefore, this year’s conference was aptly titled:

Health Information Management: Engaging the Next Generation.

Whilst health is not the final frontier, we wanted to hear about your voyages in health information management. We heard in 2017 about the need for the profession to transform, and in 2018 we sought submissions that reflected our continuing mission: describe the future and the strange new world of HIM, seek out new information and practices, and engage our next generation to join us as we boldly go where our profession’s sustainability needs us to go.

The management of health information has always been an integral part of health care delivery, research, and planning for health services. With health information now increasingly documented, accessed, aggregated, mined, and shared electronically, the value and uses of health information have broadened. Our national conference brings together leading research, opinions, and case studies relating to the value and use of quality health information and clinical classification systems. These proceedings present the peer reviewed research papers, professional practice abstracts, workshop, and posters from our annual key face to face conference.

Dr Kerryn Butler-Henderson
Chair, Academic Panel

Linda Westbrook
Conference Chair

Vera Dimitropoulos
Conference Deputy Chair
Peer-reviewed papers
An Exploration of the Effect of Age, experience and training on the EHR Role in Reducing Medical Errors: Perception of Health professionals

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Abstract

Introduction: The demand for quality health services has increased tremendously over the years. The government has been under intense pressure to increase the level of efficiency in service delivery. However, this pressure on health professionals has resulted in numerous medical errors.

Aim/Objectives: The aim of this study was to probe the effect of age (years of working), experience (use) and training of healthcare professionals on the role of electronic health records (EHR) in reducing medical errors.

Method: An online questionnaire was used by professionals working in primary healthcare centres in Riyadh City, Saudi Arabia.

Results: There were 1127 respondents particularly younger and older professionals (years of working as health professionals) perceived that EHR could have an important role in reducing medical errors. Respondents aged 20–30 years of working in health profession had the highest (73.3%) level of satisfaction in using EHR to reduce medical errors. The 30–40 years (61.7%) experienced group (EHR use) agreed that experience with the EHR use in medical field has a significant impact in reduction of medical errors, followed by those 20-30 years of experience. Similarly, 63.3% of the participants agreed that training in EHR usage in medical practice has a major impact in reduction of medical errors and its impacts is evenly distributed among all the health professionals.

Conclusion: Age, experience and training are statistically significant in influencing the attitude of healthcare professionals towards the adoption of electronic health records in reducing medical errors.

Keywords. Electronic health records, EHR, medical errors, healthcare professionals
Introduction

The increasing demand for quality services in the healthcare sector produces significant pressure on health practitioners. With increased communication challenges between caregivers and patients, there is need to develop and train on a more efficient and effective system that will minimise medical errors (any events or actions that may cause harm to patients or result to inappropriate medical intervention or medication) in the medical field (Neuspiel & Taylor 2013). Therefore, the introduction of electronic health records (EHR) has been seen as an appropriate strategy for reversing the trend as it results in improved diagnoses, communication and patient safety, thereby supporting better patient outcomes (Manca 2015). However, the perception of health professional based on age (years of working as a health professional), experience (years or amount of use) and training (EHR roles’ education in medical field) has impacted the role of EHR in reducing medical errors in health care. The effects of these three factors are critical in supporting or undermining the therapeutic decisions that enable evidence-based decisions at the point of care (Cowie et al. 2017). Similarly, Alex et al. (2016) and Stockton et al. (2017) point out that even with the adoption of EHR use in medical field, there is still possibility for incidences of medical error to occur because the perception of health professions to the role of EHR in reduction of medical errors is related to their age, training and experiences in practice. It is, therefore, significant to understand the factors that influence the efficiency of EHR usage in preventing or reducing medical errors among health professionals. The focus of this paper is to probe how practitioners’ attitude and especially factors concerning age, experience and training influence the efficacy of EHR in reducing errors in healthcare. Such knowledge makes it possible to establish meaningful interventions that may increase the success of EHR application in preventing or reducing medical errors. Schulz et al. (2015) argue that young caregivers exhibit a greater willingness to adopt technology in healthcare delivery compared to those aged above 40 years. From their argument, it is notable that age plays a crucial role in technology use and hence its efficacy. Similarly, Bari et al. (2016) point out that inadequate experience contributes to up to 52% of incidences of medical errors in healthcare. This is an alarming percentage for effective adoption of EHR in medical field considering that the medical errors are also high. Lastly, in terms of training, Khamarnia et al. (2015) point out that minimal or lack of job training is a significant precursor to medical errors. This paper, therefore, aims to investigate how the age, experience and training of healthcare professionals influences the efficacy of electronic health records in reducing medical errors.

Methods

From 30 November 2017 to 30 January 2018, 1710 healthcare practitioners including physicians, nurses, laboratory technicians and pharmacists who work in primary healthcare centres in Riyadh, Saudi Arabia, were invited to participate in this study. After reading the information sheet, participants completed an online consent form, before completing the online survey in REDCap. The survey examined healthcare professionals’ perceptions about the use of EHR in primary health in Riyadh. Questions were developed after reviewing the literature about common barriers and challenges in using EHR in primary healthcare and included a 5-point Likert scale (strongly agree, agree, neutral, disagree and
strongly disagree) and open-ended short-answer questions. This ensured that the opinion of the respondents towards the topic under study was captured effectively.

Once the survey closed, the data were downloaded into a password-protected MS Excel spreadsheet, cleaned and where necessary coded, and analysed using SPSS. This part of the study was interested in examining if there was a correlation between how participants responded to questions regarding their perceptions about EHR and medical errors in primary health, compared to their age, experience and training. This made it possible to make an in-depth conclusion regarding the topics under study. Age reflected the years of working experience as a health professional), experience reflected the years of use of the EHR in medical field while training reflected the EHR roles’ education in medical field.

Results

The study received 1127 completed responses, representing a 66% response rate. It is an ideal representative sample of the whole population studied. Table 1 shows the demographic representation of the participants in this study.

The sample population showed a normal distribution (Cronbach’s Alpha 0.828) compared to the total population.

<table>
<thead>
<tr>
<th>Table 1. Demographic characteristics of the study population</th>
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<tbody>
<tr>
<td><strong>Occupation</strong></td>
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<tr>
<td>Physician</td>
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<td>Nurse</td>
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<td>Pharmacist</td>
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<td>Technician</td>
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<tr>
<td>Other</td>
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<tr>
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<td><strong>Gender</strong></td>
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<td><strong>Variables</strong></td>
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<td>Occupation</td>
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<td>Nationality</td>
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As illustrated in Table 1, the total sample size of healthcare professionals was 1127 and 32.6% of the respondents were nurses. Technicians comprised 20.2% of the total sample size and physicians and pharmacists were represented in the sample by 18.5% for each group. Other occupations made up the remaining 10.2%. It can as well be observed that 72.0% of the respondents were of Saudi nationality and in terms of gender, 55.4% of the respondents were females and 44.6% were males. Nurses formed the largest number of respondents in the study. This is an indication that the study was able to capture the ideal number of employees in the health sector. However, the number of technicians is higher than the rest of the respondents. This is important because the study focuses on their areas of specialisation. As a result, they are well placed to understand and provide a wider scope of the issues that are related to electronic health records. Pharmacists and physicians also play a critical role in utilising electronic health records. Their inclusion is important in understanding their point of view and perception towards the technology. The reason is that they understand some of the aspects that derail the success of the technology.

Correlation between perception about medical errors and age group

There was a positive correlation (p=0.006) between the age group and perception that using EHR in primary health could reduce medical errors. Respondents in the age group of 20–30 years had the highest (73.3%) level of satisfaction (agreed/strongly agreed) and the age group of 30–40 years had the next highest level of satisfaction (61.7%). The age group of 40–50 years showed a nearly equal proportion of respondents answering either satisfied (56.4%) compared to neutral or disagree/strongly disagree (43.6%). Whilst there appeared to be a reverse linear relationship between age and perception that EHR reduced the rate of medical errors, this was disproved by the age group of 50–60 years, which reported the highest level of satisfaction (74.4%). The age group of more than 60 years reported a 60% level of satisfaction. This is unlike the young people under the age of 40 years, who recorded the highest percentage. This group of practitioners understand of EHR in reduction of medical errors and are moved by the technological changes. However, those above the age of 50 years are less responsive to the changes in the new technology in reduction of medical errors. This explains the reason why their views differ significantly from the rest of the group. Furthermore, respondents under the age of 40 years are enthusiastic in regards to testing the new technology in reduction of medical errors in healthcare delivery. The higher percentage is an indicator that they are willing to incorporate the new technology into their daily work for accurateness or reduction of medical errors. Because of this observation related to the linear relationship, a symmetry measures test was performed to determine the strength and direction of the relationship (directly or inversely related). There was a statistically significant (p=0.004) negative linear relationship between age category and degree of satisfaction, confirming that the older the healthcare professional, the more likely he/she would to disagree that EHR adoption in healthcare delivery reduces medical errors. Furthermore, bivariate correlation analysis also confirmed a statistically significant (p<0.001) variation between and within the age groups.
Correlation between the perception of medical errors and experience, and training

There was a statistically significant (p<0.001) relationship between experience with EHR and the perception of EHR, even when controlled by age group (p=0.03). There was a statistically significant (p=0.001) variation in experience. Therefore, it was concluded that the older health professional with more experience with EHR usage in healthcare delivery were more likely to perceive the EHR as potential medical errors reducing device (agent). Similarly, there was a statistically significant (p=0.008) correlation between perception of EHR role in reducing medical errors and EHR training, despite the higher number of respondents who did not have any training in EHR (60%) usage compared to those who had previous training (40%) in the EHR roles in medical field. The symmetric measures test demonstrated a statistically significant (p=0.001) positive linear relationship between training and degree of satisfaction. Therefore, healthcare professionals who are trained in the EHR roles in medical field were more likely to agree that the EHR reduces medical errors.

Discussion

The results from this study showed a positive correlation between younger age (years of working as a health professional), greater experience (years of the EHR usage in medical practice), the previous training in EHR, and the perception that EHR reduces medical errors in healthcare delivery. Previous research has confirmed a correlation between age and EHR acceptance (Schulz et al. 2015). However, these figures reduce drastically among those aged above 40 years experience in medical field. This is an indication that as the generation of employees’ age by working experience, the level of acceptance of electronic health records will likely to reduce. According to a study by Radhakrishna et al. (2014), the implementation of electronic health records played a significant role in improving administration and clinical outcomes. However, similar to the results of this study, the older practitioner by theirs of working years were reluctant to use the electronic records because they believed that they are likely to not to make medical mistakes. However, Schulz et al. (2015) assert that some of the reservation by the older practitioners is associated with the drawbacks of the electronic health records compared to other devices or the amount of time taken to use the EHR in practice. Comparatively, the younger health practitioners are likely to accept and get satisfied that the EHR play a significant role in reduction of medical error possibly based on perceived benefits of the new technology in medical practice (Brčić et al. 2015; Wu et al. 2015). Similarly, the younger professionals (younger groups) are likely to embrace the roles of EHR in reduction of medical error because they respond to health reforms easily and they eager to explore in new medical devices that will increases their accurateness in decision making compared to older ones who may think by their age in medical practice they cannot doubt their judgement.

From an experience approach, the experience of health professionals with EHR roles in medical practice affects their willingness to adopt or ignore its roles in medical practice. Professionals below the age of 40 years of experience with EHR use are less eager to adopt it in their medical practice. However, this is not the same case with the older professions who have more experience with
the EHR usage. The reason is that they limited knowledge with the new system, an aspect that makes it hard for them to adjust (Heywood 2014). In addition, they are not well conversant with the technological aspects of the EHR since most of them are still training or are under training with the new devices in medical field. As a result, they are more likely to be reserved in regards to the use of EHR, an aspect that might result in medical errors. Besides, their usage experience affects their confidence in regards to the use of the new systems resulting in rejections of the EHR usage in medical field as a medical error reducing agent (device). According to a study conducted by AlJarullah and El-Masri (2013), young professionals base their perception on electronic health records with difficult experiences with other modern electronic health equipment in practice and possibly think the EHR usage may expose them to similar challenges in practice as a defensive mechanism to avoid the EHR adoption in their field. Comparatively, the older professionals based on their amount of experience with the EHR usage have lacks the necessary exposure to the EHR usage and considers the adoption will enhance their already learnt skills towards accuracy in preventing and reducing medical errors (Gorgich et al., 2016).

From training perspective, it is possible that offering the workers technical assistance would also play a critical role in changing their perception towards EHR adoption in reducing medical errors in practice. Palabindala et al. (2016, p. 32643) agree that ‘corresponding training for all users to reduce the risk of error’ is important. According to the results obtained, training health professions increases their perception (satisfaction) related to the EHR role in reducing medical errors. From the result, there is need to implement frequent and if possible mandatory training when implementing and using an electronic health record to achieve higher satisfaction level. According to Abdallah et al. (2015) theoretical approach on the EHR usage in medical field, frequent training is critical to ensure that users are up-to-date with new technologies introduced in medical field to embrace better services and accurate decisions in their medical practices. However, according to the results obtained the responses from the participants for the training impacts perception on EHR roles in reduction of medical errors was evenly distributed among the participants in all professional years of working (ages) and amount of experiences. Possibly, most health professionals want to train and effectively utilize new equipments while others think its additional burden or they can minimize errors without necessarily employing new devices (Shahrokhi et al., 2013).

**Conclusion**

Age based on years of working experience as a health professional is statistically significant in influencing the attitude of health professionals towards the adoption of electronic health records in reducing medical errors. Younger professions in medical field are more likely to perceive that EHR can reduce medical errors compared to older ones. In addition, there is a statistical significance between increased experience of the EHR use and the likelihood and easiness of use of the EHR among practitioners in reduction of medical errors. Those with greater experience are more likely to embrace electronic health records because they already know the contribution and effectiveness of EHR in their area of practice in reduction of medical errors. Similarly, training, as well as retraining, is crucial in
enhancing the use of EHR in practice thereby reducing the number of medical errors committed in practice. However, training should not be limited to the EHR usage experience or the years of working as a health professional (age) for the health professionals as the training impacts are evenly distributed among the participants. In summary, there is a statistical significance between age, training and experience of the health professionals and their attitude towards the adoption of electronic health records in reducing medical errors in healthcare delivery. However, the future studies should focus on disparities created with the EHR role in reducing medical errors among participants (younger professionals, older professionals, experienced professionals, and unexperienced professionals, trained and untrained professionals on the EHR usage).

Ethics approval: University of Tasmanian Social Science Human Research Ethics Committee number H16730.

References


Implementation of Electronic Medication Management System: From clinical pharmacists’ perspective

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Abstract. Health Information Managers maintain the patient records and clinical information. Organisations use this data to make an informed decision about the quality of care, resource allocations, and financial planning. Due to many limitations of the paper-based system, organisations are implementing Health Information Technology (HIT) systems to help them collect, monitor, access and review the health data. One of these initiatives is the implementation of Electronic Medication Management System (EMMS) to replace the paper-based medication system. While implementation of HIT system requires a lot of planning and preparation, adoption of the system by clinicians is a key to achieve the optimal result from the system. Poor adoption can hinder the performance of the system resulting in poor data quality generated from the system. This study explores the views of clinical pharmacists during the rollout of EMMS in one of the largest public hospitals in Sydney. Total of 14 pharmacists participated in the focus group interview and expressed their views. Our finding suggests that although pharmacists could see the benefit of EMMS, they were critical of the training, support, design and technical issues related to EMMS. Some design improvement, more training prior to the rollout as well as presence of more support staff in a pharmacy during the rollout is highly recommended for future implementation. Health organisations in Australia as well as internationally can develop strategies based on this finding to implement EMMS more effectively.

Keywords. Electronic medication system, implementation, digital health, pharmacy practice

Introduction

There has been growing interest in the use of Electronic Medication Management Systems (EMMS) in recent time to minimise the risk of medication errors and adverse drug events. EMMS is becoming more common in healthcare in recent time to improve patient safety, organisational efficiency and minimise the cost (1-3). There is major potential for electronic systems to reduce medical errors and adverse outcomes, particularly in the areas of medication prescribing, verification and administration, tasks largely performed by doctors, pharmacists and nurses respectively. EMMS has improved with time and inclusion of Clinical Decision Support System (CDSS) within EMMS has further improved medication safety (1). The ability to link the EMMS to CDSS is crucial to improve medication management practices. Due to CDSS in EMMS, clinicians are assisted with a drug to allergy alerts, drug-to-drug interaction alerts and drug to disease alerts. Various features of CDSS improves patient safety (1).
as well saves the cost of medication management (4).

The role of clinicians is critical during the change to EMMS from a paper-based system. While the role of doctors and nurses is studied previously in EMMS implementation (5), pharmacist’s role in EMMS implementation is not widely studied. The role of the pharmacists is crucial in any medication management system as they perform various medication-related task including medication reconciliation, medication verification, medication review and dispensing of the medication. They are a key stakeholder to drive the change as well as absorb the change from paper system to electronic system. Therefore it is paramount to understand their experience of EMMS implementation and change. Our objective is to learn from the pharmacists’ experience during EMMS implementation and inform the health informatics community for future EMMS implementation in Australia and worldwide.

Method

Setting and Implementation

The EMMS was implemented in one of the major tertiary teaching hospitals in Western Sydney, Australia. The hospital is part of the local health district which serves the population of more than 2 million people. The hospital has a capacity of 400 acute inpatient beds and has 50,000 ED presentations annually.

The hospital was the lead site for Electronic Medication Record (EMR) implementation in New South Wales and has led the digital transformation within Australia. It was also the first site to have full EMR utilisation before EMMS implementation. A newly built clinical service building and the state of the art digital equipments allowed the digital readiness for EMMS implementation.

Patient safety was the ultimate consideration in EMM implementation; hence the rollout strategy was aligned with this philosophy and maintained patient and medication safety as the overriding principle for its design. The tenet of “one patient, one chart” was held paramount – that a patient must only have either a paper medication chart or an electronic medication chart. This led to the development of an innovative model – the “patient-centric” rollout method, avoiding hybrid records and reducing medication safety risk. The EMMS was implemented on 28th February 2017.

Focus group interviews of four groups 1) doctors, 2) nurses 3) pharmacists 4) implementation and support team were attended between week 3 and week 5 post EMMS rollout to study the factors facilitating/hampering the implementation. One focus group session was organised for the pharmacists. Total of 14 pharmacists participated in one focus group session held in the 5th week post EMMS implementation. This paper highlights the implementation experience from pharmacists’ perspective from the focus group interview.

Ethics approval was obtained from Western Sydney Local Health District (WSLHD) ethics office.
Participants

All staff of the hospital pharmacy were invited via email to attend the focus group. The Director of Pharmacy also encouraged all their pharmacist staff to attend the focus group. The Director of Pharmacy did not attend the focus group to minimise the influence on other staff members’ opinion. In total, 14 pharmacists took part in the focus group interview (3 males and 11 females). Participants’ age was from 24 years to 60 years. Participants’ experience working in healthcare setting ranged from less than one year to 19 years. One participant had an experience of using EMMS in another health facility while the rest of the participants have not had experience of using EMMS in the past. The participants included junior pharmacists, senior pharmacists and pharmacist educators.

Interviews & Questions

Our interview questions were based on the unified theory of acceptance and use of technology (UTAUT) (6) as well as the user resistance to information system implementation model (URISIM) (7). Semi-structured questions were included in the interview based on these two models. The interview lasted for 45 minutes.

Data Processing and Analysis

Interview was recorded by a team of a PhD student and an academic. The PhD student worked as a registered nurse for over ten years in the acute facility. The PhD student’s previous experience of working with pharmacy staff may have influenced the interview methods although having an academic staff in the interview process minimises the possibility of reflexivity in our research. The interview was transcribed by a research student. A team member independently reviewed the transcript. Thematic analysis of the transcript was performed using NVivo software (NVivo qualitative data analysis Software; QSR International Pty Ltd. Version 10, 2012) and themes were generated based on the codes. The research team of students and academic staff met and defined the codes and themes to maintain consistency and resolve any discrepancy using consensus.

Results

Total of 18 nodes were generated from the analysis of transcript. These nodes were then grouped according to their characteristics. Total of 5 major themes were generated from the nodes as mentioned in Table 1., e.g. 1) Implementation strategy 2) Information Technology (IT) product 3) Organisation culture 4) Organisation outcome of EMMS 5) Individual impact of EMMS.
Table 1. Major themes, factors and example quotes

<table>
<thead>
<tr>
<th>Themes</th>
<th>Factors</th>
<th>Example Quotes</th>
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<tbody>
<tr>
<td>Organisational Outcome of EMMS</td>
<td>Positive Factors: Effectiveness</td>
<td>&quot;One thing, I’ve been working with our interns looking at medication interventions and from a clinical point of view [if they are followed up]. As we write notes electronically now, it’s quite impressive that the doctor will respond within an hour and change the dose”. P2</td>
</tr>
<tr>
<td></td>
<td>Positive factor: Improved legibility</td>
<td>&quot;At least the writing is a lot clearer, and the doctors cannot hide the doses anymore, whereas before they used to go back and scribble and say ‘nah that’s not what I wrote’, but now it’s all computerised, there’s no way of changing without doing a modification”. P3</td>
</tr>
<tr>
<td></td>
<td>Positive factor: Communication</td>
<td>&quot;Another thing we just come across, that if the nurse is waiting for a dose, then they can send an eRequest instead of previously page me, run up to the ward, run around the ward looking for a paper chart, come back to pharmacy to dispense the medication and you run back up. It’s time saving as well. And also it enabled us to look at the quality aspect and we see this in a clinical practice”. P2</td>
</tr>
<tr>
<td></td>
<td>Positive factor: Information access</td>
<td>&quot;At least now the medication records visually there, you can actually see how many doses the nurses have signed out from the MAR summary”. P3</td>
</tr>
<tr>
<td>Organisational Culture</td>
<td>Positive Factors: Change in the work culture</td>
<td>&quot;I think it is from my point of view, the doctor and pharmacist and dieticians have been reading my review and respond pretty quickly. So there is another aspect of pharmacy practice, they previously did not realise”. P15</td>
</tr>
<tr>
<td>Implementation Strategy</td>
<td>Negative Factors: Inadequate Training</td>
<td>&quot;I think the training was not adequate. We were only given 2 little training sessions soon before the rollout, so it was like a panic attack when it first came out. Because it was all “ahhh and all these symbols we didn’t even know, we didn’t recognise, and we’re all panicking because the support that was around there wasn’t enough. Like there were two people floating around, and there were so many of us had questions at the same time”. P3</td>
</tr>
<tr>
<td></td>
<td>Negative factor: Less support staff during the rollout</td>
<td>&quot;I recommend we need a lot more people to help in the first week. We had only one I think”. P2</td>
</tr>
<tr>
<td></td>
<td>Negative Factors: Design issue, technical issue</td>
<td>&quot;We found certain scenarios that we had never thought of would have happened only after we started. So it would have been much better had they had much more support for pharmacy during the working hours”. P4</td>
</tr>
<tr>
<td>IT product</td>
<td>Negative Factors: Design issue, technical issue</td>
<td>&quot;And our other barriers are mainly to do with listings of product that not matching with what we got and having to do all these unnecessary steps of having to change products”. P3</td>
</tr>
</tbody>
</table>
The table below provides a summary of the negative factors and example quotes from the study:

<table>
<thead>
<tr>
<th>Themes</th>
<th>Factors</th>
<th>Example Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negative factor: Technical issue</td>
<td>&quot;They started on a listing our medications one year ago. So during this year, we've got lots of medications which are new in the market, for example, today I've got one of the medications that I have to have the team to chart to prescribe it as unlisted medication because it hasn't been added (in the medication list). So if we have these new medications as well the list of the medication&quot;. P6</td>
</tr>
<tr>
<td>Impact of EMMS</td>
<td>Negative Factors: change in the way of working</td>
<td>&quot;It has totally changed our work patterns. I spend half a day, literally on computer verifying all the drug orders. I didn't have to do that before this system came in&quot;. P1</td>
</tr>
<tr>
<td>on Individual</td>
<td>Negative Factors: change in the way of working</td>
<td>&quot;One thing is that this Monday and Friday, Friday there are more discharges, so it takes some more time to verify orders of discharge. And on Monday (after the weekend), it took me nearly all day to catch up with weekend back log together with new order in one of the stroke ward&quot;. P2</td>
</tr>
</tbody>
</table>

**Discussion**

One of the organisational outcomes pharmacists perceived was that the new system is quick and fast to communicate with other staff and tasks are done quicker than with a paper-based system. Apart from the EMMS making processes more efficient, pharmacists also highlighted that the EMMS made practitioners more accountable for patients’ medication management, for example, doctors cannot change the medication without modifying the drug order on new system versus scribbling the drug order on the paper chart without signing the change. Pharmacists also highlighted some other benefits of various features of the system making their day to day work easier. Pharmacists also highlighted the visibility of task performed by nurses, for example, pharmacists can see how many drug order nurses have administered which will allow them to prepare for the supply of next lot of medication.

Pharmacists also highlighted some of the unintended benefits of the new system. Pharmacists believed that communication is not only improved between doctor-nurses-pharmacist but allied health staff is also able to quickly respond to the tasks related to medication management in the new system.

As mentioned in previous research (8), training and support during the role out are paramount to the acceptance of the change. Staff were critical of the implementation strategy, more specifically about the training and support provided to them during the rollout. Participants felt that two training modules were not adequate to prepare them for the new system. Participants also felt that scenario-based training sessions would have helped them better to tackle the change rather than how-to do-training sessions. Early and aggressive engagement strategies with stakeholder are key to the success (9) and failing to adopt this strategy can lead to the negative perception of the staff toward the adoption of new technology.

Another challenge for the pharmacy staff was to overcome some of the design and technical issues arising from the IT product during the rollout. Literature suggests that these issues do get resolved quickly and perception of the staff do change over the time (10).
Verification of the drug order was one of the paramount issue raised by a lot of the participants during the interview. Participants perceived the verification processes taking a lot of their time to complete the task which would have been used for some other important tasks. Since most of the pharmacy services are during business hours, participants faced with the huge amount of backlog of work piled up from the weekend and the challenges they face to get through it on Monday of each week. Perceived loss of control and autonomy (11) of performing their normal task among the pharmacy staff could have also led to their negative perception of the system.

Limitation

Our study has some limitations. While the Director of Pharmacy did not participate in the focus group to minimise the influence on other participants, we could not eliminate the influence of senior pharmacy staff being more vocal about their views thus suppressing the views of junior pharmacy staff. During the interview, we noticed that few junior staff members were less engaged in the discussion than the senior staff.

Conclusion

Benefits of HIT systems are manyfold such as centralised collection of health data, visibility of clinical processes, electronic record of medication management, and highest standard of data quality. But adoption of the system is key to get the maximum benefits of the system. Our study provides important evidence in the literature of HIT implementation and adoption in a large healthcare facility. While some of the issues raised in the focus group may have been mentioned in previous research studies, our study highlights the crucial role pharmacists plays in the implementation EMMS. Some of the findings of this study, e.g. improved communication and change in the work culture among multidisciplinary team members, the need of scenario-based training and more support staff during the implementation can be used in other organisations in Australia as well as internationally.
References


Development of web API for clinical classification data access

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Abstract. The Australian Consortium for Classification Development (ACCD) is undergoing a review of their current clinical classification data access processes for the ICD-10-AM and ACHI clinical classification software vendors. As a result, ACCD has decided to develop a web API to provide a uniform and transparent method for these vendors to access this data. Analysis was undertaken to identify various development approaches. The adapter design pattern was selected based on criteria such as resource usage, time and existing system modification implications. This paper outlines the analysed development approaches, methods, justifications and results for the clinical classification data web API development.

Keywords. Clinical, Classification, Integration, API, Web Service

Introduction

Commissioned by the Independent Hospital Pricing Authority (IHPA), The Australian Consortium for Classification Development (ACCD) is contracted for the ongoing development of the International Classification of Disease – 10th Edition Australian Modification (ICD-10-AM), the Australian Classification of Health Interventions (ACHI) and the Australian Coding Standards (ACS). These classifications and standards are utilised for statistical analysis and standardised code-based health management of acute patient episodes of care within Australian public and private hospitals. This work represents the development approach and methodology used for providing, authorised classification software vendors, with a consistent and reliable means to access clinical classification data through a web Application Programming Interface (API), built on the core architecture of the existing web system.

Motivation

Historically, ACCD (Australian Consortium for Classification Development) has provided clinical classification data to software vendors for each new revision of the classifications, in various formats such as database extracts, CSV files, and PDF¹. The classification data is extracted from the ACCD internal web application known as the ICD Toolkit. This software is the primary management tool for the ongoing revision of mainly three interlinked classification system: ICD-10-AM, ACHI and ACS.

ICD-10-AM is the Australian Modification² of the International Classification of Diseases Version 10 (ICD-10), which is a WHO standard³. ACHI is the Australian Classification of Health Interventions, which is unique to Australia² and currently there is no approved equivalent international classification to ACHI. ACS, the Australian Coding
Standards, defines the rules associated with the use of both ICD-10-AM and ACHI. ICD Toolkit provides a means for internal ACCD staff to develop and maintain the clinical classifications; including functions such as adding, removing or modifying codes, code attributes, and index terms. After each biennial release of ICD-10-AM, ACHI and ACS, this data is shared with various vendor organisations for printing, integrating with hospital based software systems and reference purposes. Prior to the implementation of ICD-Toolkit, the vendors were given a Microsoft Access database from which the classification was managed. Since the implementation of ICD-Toolkit, classification data is shared as SQL extracts, CSV files, and PDF versions, through the vendor portal of the ACCD website.

This method of sharing appears to be inefficient, as vendors are required to carry out the tedious task of mapping the tables and fields of the ACCD database into their own internal systems. Further, vendor feedback has provided insight into the issues associated with the current method of receiving classification data; namely, ambiguity and confusion of database tables and their usage, and relevance to the latest revision of the classifications.

Recently, a requirement within the organisation has been identified to provide secure external access to the clinical classification data for consistent collaboration with various clinical technical groups, such as the ICD Technical Group (ITG). Furthermore, the World Health Organisation Family of International Committees (WHO-FIC) have analysed their existing system infrastructure and is in the process of transforming ICD-11, the next revision of ICD, towards “a Web-based open process that is powered by collaboration and social features.”

With WHO-FIC leading the way; building an API for access to the ICD-11 Classifications and based on vendor feedback, ACCD has decided to build and deploy an API to meet the requirements of our classification data access. A key advantage of building the API is that it is platform-independent; it provides secure access for devices and systems requesting the data irrespective of the platform it is developed on. ACCD’s data sharing requirements with vendor organisations via an API provides a clear, consistent, secure and open process for vendors to access the necessary data.

This paper presents the development approaches of the API that provides access to the ICD-10-AM and ACHI classification systems. Further, this paper explores the lessons learned in the process.

Method

Prior to the implementation of the API, a thorough analysis was carried out on the WHO-FIC’s API for ICD-11. Based on this analysis, the structure and semantics of the API were established, which led to the development of the key requirements of the ACCD’s API for the access of classification systems.

Various implementation approaches such as – leveraging existing entity structures, redevelopment of the foundation of the system, or to use a design pattern such as the adapter pattern were studied and analysed prior to selecting a suitable approach for this task. The criteria used to assess the implementation approach are illustrated in table 1.
The first round of sample implementation was tested internally through focus group discussions. Then for the testing of the API, a website was created to extract the data and present it on a web-platform outside the ICD-Toolkit, so that authorised personnel could browse through this data.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Criteria Description</th>
<th>Ideal Criteria Level</th>
<th>Option 1 (Existing)</th>
<th>Option 2 (Re-develop)</th>
<th>Option 3 (Design Pattern)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resource Usage</strong></td>
<td>The required effort to implement the approach.</td>
<td>Low</td>
<td>Low*</td>
<td>High</td>
<td>Low*</td>
</tr>
<tr>
<td><strong>Flexibility</strong></td>
<td>The flexibility of the code developed.</td>
<td>High</td>
<td>Low</td>
<td>High*</td>
<td>High*</td>
</tr>
<tr>
<td><strong>Extensibility</strong></td>
<td>The ability of the code to be maintained and extended with minimal resources.</td>
<td>High</td>
<td>Low</td>
<td>High*</td>
<td>High*</td>
</tr>
<tr>
<td>* - Meets Criteria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Option Rank</strong></td>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

The implementation of the web-platform, that pulls data using the API to publish classification data, provided useful feedback that went into the refinement of the API. Further, the end user feedback on the web-platform itself provided insights into further refinement of the API.

The API will be released to the authorised vendor organisations for testing in July 2018 and the feedback from this vendor testing will be helpful in creating the final version of the API. Once this stage is completed, the API will be released through the ACCD website, for authorised vendors to directly link it with their software products.

**ACCD’s API for Clinical Classification Data Access**

**Key requirements**

The following were identified the key requirements of the API:

- Integrate with the fundamental infrastructure of the current web system
- Provide a secure and consistent means of accessing the web API
- Ensure the web API is maintainable, reusable and flexible
- Platform-independent compatibility (i.e. mobile devices, desktops, etc.)
Implementation Approach

Design patterns are a formulated attempt to provide consistent reusable solutions to commonly occurring issues. In 1995, Gang of Four (GoF) published "Design patterns: elements of reusable object-oriented software"\(^8\), establishing 23 design patterns that has won awards for its significant impact on modern Object-Oriented programming. Analysis of various design patterns was undertaken to meet the organisation’s system requirements. The pattern we deemed ‘best-fit’ for our requirements was the Adapter design pattern. GoF recommends the adapter design pattern to be used when the intent of the development is to convert an interface of a class into another interface a client expects which lets classes work together that could not otherwise\(^8\).

The adapter design pattern meets key requirements for ACCD, including providing existing classes (adaptees) with an interface (adapter) that aligns with the web API’s consumable structure (client). Application of the design pattern to the web API structure using the adapter interfaces from a hierarchical perspective provided cleaner and more consistent code across the web API as illustrated in Figure 1.

**Figure 1** – Hierarchically-Defined Adapter Design Pattern for API Consumption

As part of our initial analysis, we ensured that our consumable web API objects are all Hypermedia as the Engine of Application State (HATEOAS) compliant. HATEOAS is a component of the Representative State Transfer (REST) application architecture that defines that “clients must inspect the served resource state and choose the link to follow from there”9. A significant benefit of implementing HATEOAS for our web API is that from any object within a classification (or its index), we can traverse the entire classification and its indexes.

Given correct recursive (hierarchical) programming, this provides vendors or authorised parties with the means to data mine the entire classification, including storing hierarchical information. This is achieved through an array of entities we have defined as links; containing a relationship property and the hyperlink itself as shown in Figure 2.

![Figure 2 – HATEOAS in Action](image)

**Structure of the API**

The following table 2 contains a simplified version of the API structure for ICD-10-AM and ACHI. The entities are distinguishable from other entities of the same API entity type through the type field and all below fields are contained within a content array.

**Table 2: API structure for ICD-10-AM and ACHI**

<table>
<thead>
<tr>
<th>Classification API Entity Type</th>
<th>Entity Property</th>
<th>Entity Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICD-10-AM Tabular Code</td>
<td>Id – Integer</td>
<td>The unique numeric identifier for the ICD-10-AM code entity.</td>
</tr>
<tr>
<td></td>
<td>Code – String</td>
<td>The Code or main content for the given ICD-10-AM code entity. (I.E – “I64” or “Chapter 1”)</td>
</tr>
<tr>
<td></td>
<td>IsValid – Boolean</td>
<td>Flag identifying if the ICD-10-AM code entity is considered a valid code within the clinical coding context. For example, any code that has child codes is not a valid ICD-10-AM code for clinical coding purposes.</td>
</tr>
<tr>
<td></td>
<td>IsAsterisk – Boolean</td>
<td>Flag identifying if the ICD-10-AM code is a dagger code.</td>
</tr>
<tr>
<td></td>
<td>IsDagger – Boolean</td>
<td>Flag identifying if the ICD-10-AM code is an asterisk code.</td>
</tr>
<tr>
<td></td>
<td>IsAustralianCode – Boolean</td>
<td>Flag for identifying if the ICD-10-AM code is an Australian specific code (only exists in the Australian ICD-10 Classification).</td>
</tr>
<tr>
<td></td>
<td>CHADx - String</td>
<td>If applicable to the code, identifies the category of the Classification of Hospital Acquired Diagnoses the code resides under.</td>
</tr>
<tr>
<td></td>
<td>Attributes – Array(name, value)</td>
<td>Details the names and values of ICD-10-AM code attributes such as ‘Inclusional’, ‘ACS No’, ‘See Also’, etc.</td>
</tr>
<tr>
<td></td>
<td>Description – String</td>
<td>The description of the ICD-10-AM code entity; at higher levels is considered a title.</td>
</tr>
</tbody>
</table>
## Classification API

<table>
<thead>
<tr>
<th>Entity Type</th>
<th>Entity Property</th>
<th>Entity Property Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong> – String</td>
<td></td>
<td>Outlines the type of ICD-10-AM code entity. These include Chapter, Subchapter, Code block, Category (3 digit codes), Code (4 digit codes) and Sub-code (5 digit codes).</td>
</tr>
<tr>
<td><strong>Id</strong> – Integer</td>
<td></td>
<td>The unique numeric identifier for the ACHI code entity.</td>
</tr>
<tr>
<td><strong>Code</strong> – String</td>
<td></td>
<td>The Code or main content for the given ACHI code entity. (I.E – “30084-00” or “EXCISION”)</td>
</tr>
<tr>
<td><strong>MBS</strong> – Array(string,string)</td>
<td></td>
<td>If applicable to the code, contains an array of Medicare Benefits Schedule item numbers associated with the given ACHI code.</td>
</tr>
<tr>
<td><strong>Attributes</strong> – Array(name,value)</td>
<td></td>
<td>Details the names and values of ACHI code attributes such as ‘Inclusional’, ‘ACS No’, ‘MBS’, etc. Some of these types of attributes include HTML code such as the ‘Definition’ name.</td>
</tr>
<tr>
<td><strong>Type</strong> – String</td>
<td></td>
<td>Outlines the type of ACHI code entity. These include Chapter, Major [Heading], Minor [Heading], CodeBlock and Code.</td>
</tr>
</tbody>
</table>

### Sample use of the API

The web API has been concurrently developed alongside an ICD visualisation application. A key functional requirement of the visualisation application is that it must leverage our web API to display classification information to authorised classification users for collaboration purposes with ICD Technical Group. Throughout early analysis, ACCD recognised the visualisation application required the API to support HATEOAS for traversal purposes and parent-child relationship discovery from individual objects. The parallel development of the visualisation system with the API has significantly improved testing and feedback; providing synergy between the developers’ respective system developments. The development undertaken using the adapter pattern with higher level interfaces has already begun to provide benefits as we develop additional components that inherit from these interfaces, constructors are built and no changes to the interface or the API are necessary.

### Future Work

Several items for further development have been identified, including:

- **Integrate proposals into API**: External users will have access to specific views of the classifications and their proposals based on their access levels. For example, educators may only see the pre-final version of the classifications for a specified time period, and vendors will see the complete version.

- **Provide a proposal status user interface (UI)**: ACCD staff will be able to manage the time periods that specific proposal statuses are available for, instead of managing the existing XML access file manually.

### Conclusion

The implementation of the API with the Adapter Design Pattern has reduced financial and time costs whilst providing a consistent, flexible, scalable, and controlled solution for vendors to access a highly complex legacy clinical classification system in a simple
format without breaking the core system infrastructure. HATEOS has provided stateless identification of object context for ease of traversal, and the API platform can now be leveraged for future development of Classification Data Management and visualisation systems.

References


Will Auto-Coding be a Reality Anytime Soon?

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Abstract. Clinical coding is carried out in hospitals to support statistical analysis of clinical data that leads to funding, insurance claims processing and research. Ever expanding and changing clinical classification systems such as ICD-10-AM and ACHI, challenges in the healthcare industry are increased due to increasing set of codes, the complexity of manual code assignment, and extensive training and recruitment costs. The use of Natural Language Processing (NLP) and Machine learning (ML) techniques for computer-assisted coding or auto-coding is considered as a possible solution to overcome the problems of manual coding. This perception is questioned in this work, by carrying out experimental tests on a selected set of NLP and ML techniques, using 190 discharge summaries related to diseases of respiratory and gastrointestinal systems. The results indicate that accuracy of auto-coding ranges between 40% to 79% depending on the computational techniques used. The paper concludes that without human involvement, auto-coding would not be a reality in the current healthcare data environment.

Keywords. Auto-coding, Clinical Decision Support Systems, Electronic Health Records, Machine Learning, Natural Language Processing.

Introduction

Due to advancement in Information and Communication Technologies (ICT), the healthcare sector is rapidly evolving. Electronic Health Records (EHRs) are the digitised version of paper-based medical records used by healthcare professionals to share medical information with other healthcare providers. EHRs are used to store patient’s medical information such as age, gender, past medical history, procedures, diagnosis and any other medical interventions carried out. This collection of information is commonly referred to as an episode of care which results in a document called discharge summary. The discharge summaries are converted into a special set of codes which are called clinical codes as per the clinical coding standards set by the World Health Organisation (WHO) [1]. Clinical coding is the process of assigning alphanumeric codes to an episode of care of a patient.

Clinical codes are assigned by trained professionals, known as clinical coders, who have good knowledge of clinical coding and acquainted with latest medical classification system such as International Statistical Classification of Diseases, Injuries and Causes of Death, 10th revision (ICD-10). The health classification systems used in Australia include an alphabetical and a tabular list of ICD-10-AM (International Classification of Diseases version 10, Australian Modifications), ACHI (Australian Classification of Health Interventions) and the associated coding guidelines ACS (Australian Coding Standard). Government agencies and policymakers use coded data to analyse the healthcare system by getting an insight of disease-prone
geographical areas. Moreover, clinical coding help government to justify investment done in the healthcare industry and plan future investments based on these statistics [2]. Any inaccurate assignment of clinical codes result in delayed reimbursement, increased labour cost due to revision, the wrong prediction by government agencies as well as financial losses.

A study by Farkas and Szarvas [3], estimates that the US spends about 25 billion dollars per year for assigning clinical codes and their follow-up corrections. It is reported that the manual process of code assignment is prone to problems like human judgmental errors, typographical errors as well as inconsistency in codes. Similarly, according to a study by Santos, Murphy [4], on an average, a clinical coder assigns clinical codes to 4-5 records (or discharge summaries) per hour. This results in 15 to 42 records per day depending upon the experience and efficiency of the clinical coders [5]. Another study conducted at Turkish hospital [5], where two auditors audited 491 pre-labelled patient records found that more than half of the records were assigned wrong ICD codes. The errors in clinical coding are mainly due to limited expertise, increasing patient volumes, the subjectivity of human perception, fatigue and inability to locate critical and subtle findings.

A step towards computer-assisted coding (aka auto-coding) is proposed as a solution to this problem [6], [7]. However, despite the success of Artificial Intelligence (AI) and Machine Learning (ML) in general purpose task and areas such as robotic surgery [8] and epidemic outbreak prediction [9], its adaptation to auto-coding is still at infancy. Many research studies [6], [7], are still being conducted in developing automated coding systems that will allow clinical coding process to become more accurate, consistent, productive and efficient. Though, the process of automating coding systems is available but currently are not widely used because of unproven performance [10].

This paper aims to highlight why the implementation of computer-assisted coding using classification system such as ICD-10-CM (Clinical Modification) used in the USA, ICD-10-CA (Canadian Modification) used in Canada, ICD-10-GM (German Modification) used in Germany, and ICD-10-AM (Australian Modification) is not viable by demonstrating the inadequate performance of various AI and ML technologies options available for auto-coding.

What is Auto-Coding?

Auto-Coding, also known as Computer Assisted Coding (CAC), is a system that uses computer-based approaches to convert unstructured clinical narrative text to structured text without human interaction [10]. CAC uses NLP and ML techniques to extract clinical information for automatic assignment of the clinical codes from standard such as ICD-10, depending upon country’s specific classification systems such as ICD-10-CM, ICD-10-CA, ICD-10-GM, and ICD-10-AM [11].

Traditionally, clinical coding is performed manually by trained clinical coders but moving towards technology-driven healthcare has increased the demand for automated coding system especially with the growth in EHR implementation [12]. In the use of hybrid systems, CAC systems perform the majority of the coding tasks, and human coders address
more complex issues while auditing the CAC output. A study by Rouse [12] at American Health Information Management Association (AHIMA) found that, with the help of CAC system, coders spent 22% less time for coding a record than coders who did not consult CAC system. The study also found that combination of CAC system and manual coding gave better performance than using only CAC systems. Apart from this, the CAC systems can act as a second eye for human coders and other healthcare professionals. CAC systems can also help less experienced human coders by suggesting correct codes and can save their time in revising the wrong codes.

**Approaches to auto-coding**

The current research scenario in the healthcare industry is focused on implementing different methods and techniques that can improve the healthcare quality and reduce its overall cost. The different approaches available for auto-coding are standard for every classification system and are given below:

1. **Pattern matching approach:** In the pattern matching approach, a text-string is matched character by character within the given text [13]. When the exact match is found, codes are assigned to them. Most of the time, this approach assigns irrelevant ICD codes for the diseases that are not present in the diagnosis but have been mentioned in the clinical records for other reason [14].

2. **Rule-based approach:** In early 80’s, research in clinical text classification was focused on rule-based methods, where a group of experts define set of rules to implement the coding task [13], [15]. The manual assignment of clinical codes was successful when the classification system was limited to 3,882 numbers of codes only. With the transition from ICD-9 to ICD-10, the number of codes increased making the manual process of assigning codes, a non-trivial task [16]. Moreover, if there are any changes in the codes, rules need to be revised again.

3. **Machine Learning (ML) approach:** In ML approach, the clinical records are cleaned up using different NLP techniques such as tokenisation [17], spelling error detection or correction, stop word removal and negation detection [18] [19], [20]. The ML systems are trained with some set of clinical records along with their codes. The test is performed on a different set of clinical records that are not used for training purpose. Generally, 80% of the corpus (also known as dataset containing clinical records) is used for training, and the remaining 20% is used for testing, then the ICD codes are assigned after learning from the training data. Though, ML approach performs better than the rule-based approach, but ML systems are data hungry, which means such systems, requires a significant amount of the training data.

4. **Hybrid approach:** After 1990’s major debate regarding rule-based and statistical systems, the importance of both the approaches were clear, and this gave rise to a new approach called hybrid approach [21]. The research study by Khademi, Haghighi [22], describes that rules are defined to improve accuracy and coverage whereas ML approach improves overall F-score. Therefore, the hybrid approach, combination of rule-based approach and ML approach, takes advantage of both the approaches to overcome the auto-coding problems. Many research studies [23], [24] have proven to perform better in hybrid approaches and gave good performance than the individual ones.
Performance of Auto-coding system using ICD-10-AM and ACHI classification system

The performance of the auto-coding system was analysed by conducting an experiment using above mentioned four approaches, namely, pattern matching, rule-based, machine learning and hybrid approach using ICD-10-AM and ACHI classification system [25]. For this research, a collection of discharge summaries from hospitals all over Australia, held by National Centre for Classification in Health (NCCH) was used under Western Sydney University ethics approval with number H12628190. The dataset contained 190 anonymised discharge summaries belonging to diseases of the respiratory system and digestive system. Out of 190 clinical records, 116 belong to the digestive system and 74 to the respiratory system.

The pattern matching and rule-based approach do not require training data therefore, the results were drawn for 190 clinical records. In machine learning and hybrid approach, 152 discharge summaries (80% of the dataset) were used for training purpose and the remaining 38 discharge summaries (20% of the data) for testing. There are four stages involved in conducting the experiment using machine learning and hybrid approach as shown in Figure 1.

Stage 1: Data Pre-processing: The dataset is cleaned up in the pre-processing stage using NLP techniques such as sentence splitting, tokenisation, error detection and correction, to extract useful information which includes principal diagnosis, additional diagnosis, diabetes condition, principal procedure, and additional procedure.

Stage 2: Feature Extraction: The clinical narratives were converted into a numeric form called feature vectors using Bag-of-word model [17]. Each word is called a gram. Therefore, a sequence of one word is referred to as 1-gram, two words as 2-gram, three words as 3-gram and four words as 4-gram.

Stage 3: Classification: After feature extraction, classification was done using seven classifiers namely Support Vector Machine (SVM), Naïve Bayes, Decision Tree, Random Forest, AdaBoost, Multi-Layer Perceptron (MLP) and k-Nearest Neighbor (kNN). Each classifier uses 1-gram, 2-gram, 3-gram and 4-gram feature set.

Stage 4: Evaluation: After classification, results were drawn in terms of Precision, Recall, F-score, Accuracy, Hamming Loss and Jaccard Similarity [26]. The ideal value for Precision, Recall, F-score, Accuracy and Jaccard Similarity is one (1), whereas, for Hamming Loss, the ideal value is zero (0).
During experimental analysis, it was observed that the machine learning approach gave better results by achieving 79.20% accuracy in comparison to other approaches. The reason behind the poor performance of the rule-based approach is that rules were not defined for all the diseases and interventions present in the discharge summaries as it was a time-consuming process. As shown in Table 1, out of seven classifiers, Decision Tree gave better performance among other classifiers in ML approach and AdaBoost in hybrid approach. Due to the limited number of clinical records, machine learning system was unable to predict correct ICD-10-AM and ACHI codes.

**Table 1.** Comparison of pattern matching, rule-based, machine learning and hybrid approach

<table>
<thead>
<tr>
<th>Approach</th>
<th>Precision</th>
<th>Recall</th>
<th>F-score</th>
<th>Accuracy (%)</th>
<th>Hamming Loss</th>
<th>Jaccard Similarity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern Matching</td>
<td>0.79</td>
<td>0.42</td>
<td>0.53</td>
<td>40.27</td>
<td>0.0430</td>
<td>0.4365</td>
</tr>
<tr>
<td>Rule-based</td>
<td>0.79</td>
<td>0.69</td>
<td>0.73</td>
<td>60.53</td>
<td>0.1728</td>
<td>0.5803</td>
</tr>
<tr>
<td>Machine Learning (Decision Tree)</td>
<td><strong>0.92</strong></td>
<td>0.85</td>
<td><strong>0.87</strong></td>
<td><strong>79.20</strong></td>
<td>0.0877</td>
<td><strong>0.7453</strong></td>
</tr>
<tr>
<td>Hybrid (AdaBoost)</td>
<td>0.80</td>
<td>0.98</td>
<td>0.87</td>
<td>78.84</td>
<td>0.2973</td>
<td>0.7588</td>
</tr>
</tbody>
</table>
Other Problems Associated with Auto-Coding

The auto-coding using NLP and ML are attaining great attention nowadays, but still, there is no full-fledged system that can assign correct codes without the involvement of human coder. There are various factors attributed to the lack of automated methods which includes the use of paper-based records, inconsistent document structure and its associated content across various healthcare organisations. Some of the most common challenges in auto-coding are:

i. **Limited availability of Electronic Health Records (EHRs):** In many hospitals, the patient’s clinical information is still recorded in the papers rather than an online system. Though, there are technologies like Optical Character Recognition (OCR) [27] that can be used to recognise the handwritten text, and sometimes it becomes challenging for human experts also to understand the words correctly. The wrong estimation or understanding of the words can lead to the wrong assignment of codes.

ii. **Heterogeneous structure of clinical reports:** Every hospital has their form, format and structure for clinical reports [28]. It is quite natural for human coders to interpret the structure easily but poses a challenge for computers.

iii. **The Requirement of a large amount of training data:** One of the main challenges in conducting clinical research is to have Gold Standard data. The Gold standard data is created by experts who have good knowledge of medical science, terminologies, coding standards and rules. The machine learning and deep learning (DL) systems [29], [30] require a large amount of training data to give a good performance equivalent to human coders.

iv. **Lots of pre-processing required:** The most important process in auto-coding is to clean up the records during the pre-processing stage by extracting useful information such as principal diagnosis, additional diagnosis, procedure and ventilation details. Though, there are various techniques and algorithms available which make the task easy but still assigning the correct code to the findings require human involvement. Moreover, with the help of NLP techniques, line coding could be done but on the other side increases complexity in case coding that can be resolved by human annotators only.

v. **Compactness of text:** Sometimes in clinical reports, health professionals use abbreviations for easiness. For example, a patient is suffering from “Bronchiolitis due to respiratory syncytial virus”, but in clinical report it is mentioned as “Bronchiolitis RSV+ve”. The human coder can understand the abbreviations easily but becomes difficult for NLP and ML system.

Discussion

Many research studies aim to implement a system that uses automated methods to convert unstructured medical information to structured form for auto-coding. The factors such as paper-based records and inconsistent structure are considered as a hurdle in the implementation of auto-coding. However, with the use of NLP, ML and DL techniques, these problems can be resolved, but it is hard to resolve the issues that are associated with these...
techniques itself such as the use of a large amount of training data.

Apart from this, as shown in Table 1, none of the approaches can give 100% performance because every approach has one or more than one limitation. For example, in pattern matching, if the exact pattern is not found, codes are not assigned. Similarly, in rule-based approach, it is very difficult to define rules for 16,000 codes. The machine learning systems require a massive amount of training data. As shown in Table 1, the machine learning system can give approximately 80% accuracy. The remaining 20% accuracy can be achieved with the help of human coders. Therefore, to achieve 100% accuracy, human intervention is required. There should be some possible solutions where humans and machines can work together and achieve 100% results. Some of the possible solutions are listed below:

i. For data acquisition, the dataset requires electronic clinical records. The use of electronic health records will not only be beneficial for the researchers only but will be helpful for healthcare professionals too.

ii. In data pre-processing stage, there should be a high level of granularity with data items which reduces the need for unnecessary pre-processing.

iii. Using a centralised repository, where all coding data is centrally collected, which leads to a pool of test data that can improve the auto-coding. Though, it would not be perfect for rare conditions but help in research.

Conclusion

In Australia, the clinical codes are assigned to the patient’s episode of care based on ICD-10-AM and ACHI classification system. Insurance companies use the coded information to make reimbursement based on the codes assigned by the clinical coders. With the increase in the complexity of codes, the burden is increased on human coders. The use of auto-coding will assist the human coders and reduce their burden in assigning the codes more quickly and accurately. Though, there are various methods available for auto-coding such as pattern matching, rule-based, machine learning and hybrid approach but these methods themselves have some limitations that hinder the overall performance. Among all the four approaches, machine learning gave 79.20% accuracy which is far better than pattern matching (40.27%) and rule-based approach (60.53%). Therefore, if the machine and humans can work together, then 100% accuracy can be achieved. Many clinical coders and health information professionals believe that the auto-coding will affect their job opportunities but in reality, the auto-coding will act as a second eye to human annotators and will make their task easier, fast and accurate.

References


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Peer-reviewed abstracts
The future of secure health data is here and it’s called blockchain

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Introduction

Each day, health practitioners around Australia collect an almost limitless amount of data concerning the health of our patients. Although this data is used in a targeted way to tailor treatments for individual patients, it is not currently possible to use that data in a collective fashion. By changing the way we collect, collate and share that data, there is a solution to provide the tools necessary to solve some of health’s greatest challenges.

Problem

The incomprehensible size of health data that is created every second of every day is rising exponentially (Brian M Till, 2017). This invaluable rich resource is being wasted with a combination of lack of both data interoperability and poor participation from the public. There are many hypotheses as to why uptake rates of personally controlled electronic health record (EHR) are so low and this is an area that should be explored more formally with research. One factor is the astonishing rate of healthcare data breaches seen both here in Australia and around the world (Proteus & Data Breaches.net, 2017) with large breaches seen from reputable entities such as Argus and even the PBS. It is estimated that at least 30\% of all diagnostic tests are duplicated (Yoon, 2017) as the previous results or data cannot be accessed in a timely fashion. This is a huge economic cost to our health system and poses health risks.

The Solution

Blockchain is simply a new type of encryption technology that yields at least four unique characteristics of consensus, immutability, provenance and finality (Gupta, 2017). These qualities allow existing data silos and legacy systems to be integrated with a central database whilst ensuring privacy and stopping any chance of data breaches. Everyone on the network owns a copy of the encrypted data and therefore it is impossible to lose the data (Ainsworth, 2017) and the majority of the participants on the network are required to agree with a new transaction in order to achieve consensus.
Case study examples

We now discuss two real world case studies that illustrate excellent use cases for this new technology.

Our first case involves an 85 year old lady that lives alone in the community and suffers a life threatening acute subdural hematoma whilst on anticoagulation therapy. By using a universal ‘single-source of truth for everyone medication information, we can have confidence that we instantly have the ‘the whole picture’ of a person’s medical history and current medications.

The second case describes the current ‘opioid epidemic’ that is being seen both around Australia and in the US. Being able to prescribe in real time and again with a ‘single source of truth’ has the potential to eliminate this problem overnight. With soaring numbers of ‘Doctor Shopper’s’ describe around Australia at present, we believe this technology can’t come quick enough.

Conclusion

In conclusion, blockchain technology is already here and will soon be integrated into every digital interaction we have. We have an opportunity to stay ahead of the game and reap the benefits of this new and exciting technology if the medical and health information management community understand and consequently demand it.

References


Post-Acute Care and Referral Management: Coordination + Collaboration + Continuity = Connecting the Continuum of Care

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Introduction

A physician executive once indicated that post-acute care has long been an archipelago of small islands, with no bridges, poor transportation, and limited communication options to the rest of the health care system [1].

With the worldwide shift of patient centred care moving from the four (4) walls of the hospital into post-acute care settings, and the transition of care process is often the period of highest risk for patient safety, how can the healthcare sector help bridge this gap? One way might be the implementation of a proper referral management solution.

Professional Practice

The post-acute care space includes a variety of facilities and organisations that help to continue to care for patients transferred or discharged from a hospital setting. The goal of a post-acute care facility is to provide necessary care and treatment to maintain a patient at their highest level of health and functioning and minimize the need for acute inpatient hospitalisation. Communication with the transferring facility, the patient and their support system and the multidisciplinary care team is of critical importance. Connecting the continuum of care is vital to safe and effective patient care, the transfer of relevant medical information and the continuation of medically necessary treatment.

Implementing a referral management solution helps ensure the effective and concise information exchange between acute and post-acute care organisations. It can also cut down the time it takes the post-acute care facility to review a case and determine that the patient can be effectively cared for based on their needs prior to the admission.

Implementation and Experience

Providing care for patients in a post-acute setting can be challenging and difficult. Oftentimes the clinicians and allied health professionals are working with an incomplete patient record and searching for information stored in disparate systems or through stacks of paper records. This in turn causes delays in care, therapy and the discharge of the patient to their home. At worst, patients may receive incomplete or inappropriate care or therapy, further compromising health. To prevent these complications, the post-acute care facility can...
better manage their referrals in order to capture the correct, relevant information quickly.

When looking for a referral management solution, look for one that:

- Facilitates the transfer of the appropriate document types to the organisation;
- Empowers staff to make well informed clinical and business decision prior to admission;
- Provides timely communication with referral sources;
- Improves the organisation’s relationship with patients as well as their families and support systems;
- Allows you to capture all needed information in an easy secure way; and
- Improves processes, including admissions, by offering a streamlined design.

The audience will take away the following learning points:

1. Suggested document types to include in the referral process;
2. Benefits of electronically managing the Release of Information (ROI) requests to securely share protected health information (PHI); and
3. Determination where automation can replace checklists, manual intervention, human error and bottlenecks.

Conclusion

Post-acute care settings help reduce re-admission to hospitals by closely monitoring the patient for complications and changes in their conditions. If the post-acute care staff detects a new or recurring problem, it is early enough for treatment in the post-acute setting. Having a referral management solution that captures the correct information at the time of the patient referral and provides secure direct communication between the referring facility and post-acute care setting is imperative to keeping the patient healthy, happy and cared for based on their individual needs.

References

Real-time Regular Routine Reporting for Health (R4Health): Lessons from the Implementation of a Large Scale Mobile Health System for Routine Health Services in the Philippines

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Background

The Philippine government aims for a modern information system to enhance data quality and provide more rational evidence to support timely and efficient delivery of health care, management of health systems, programs and policy. Hence, the Real-time Regular Routine Reporting for Health (R4Health) mHealth application was developed and field tested in 246 isolated and disadvantaged municipalities to support the campaign for Universal Health Care and the achievement of the Millennium Development Goals. The R4Health collected point-of-care-specific data on services routinely provided at the rural health facilities, aggregated them and presented in a dashboard for use by program managers and policy makers.

Case Study Description

This paper describes the use of R4Health, a mobile technology-based health reporting system. It will discuss the context of the R4Health implementation, its development and deployment to 246 municipalities in the Philippines. Furthermore, the paper sought to determine enablers and challenges to the adoption of R4Health in routine health care.

Implementation/ Experiences

Data was collected through surveys, focus group discussions, participant-observation and review of project reports. Quantitative data was summarized using descriptive statistical methods; qualitative data underwent content analysis. A total of 515,855 R4Health reports equivalent to 48,856 patient transactions were received from 246 municipalities within a nine-month observation period, supporting the viability of the R4Health as an alternative option to the existing manual and paper based health information management to improve the quality of data. R4Health utilizes a tool that everyone is familiar with, can easily be incorporated in their workflow, can be brought and used anywhere and has an application that is clear, understandable, and easy to learn and use. R4Health data elements, however, have overlaps with other government health reporting systems and is already misconstrued to further duplicate work.

Conclusion

More discussions are warranted to coordinate and integrate systems. Given the general positive perspectives, integration of this alternative system to the Rural Health Unit workflow, an improved R4Health, has a high potential of being accepted and adopted by the first-line health workers across the country.
Examining the current clinical documentation improvement practices in Australia

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Introduction

Clinical documentation is a foundation for clinical communication, data collection, coding, research and funding.[1] It is therefore essential that good quality documentation is produced to achieve these activities. Whilst the literature surrounding methods to improve clinical documentation is limited, it has been reported that the clinical coders’ engagement with clinical staff leads to improved documentation.[1] However, the quality of clinical documentation is a pressing and topical issue for the coders and coding industry. Some of the common issues about poor documentation include missing, incomplete, or inconsistent information.[2-3] Inaccurate or incomplete documentation can prevent efficient DRG’s assignment, which impacts on financial payment.[4] The issue of poor documentation imposes great risk for the data quality factors such as data accuracy, completeness, validity, relevance, accessibility, consistency, and integrity. Therefore, hospitals require adequate clinical documentation improvement programs to be in place to support the improvement of documentation quality. Yet, methods for successful clinical engagement for clinical documentation improvement have not been examined in an Australian context, and an evaluation for best practice has not been undertaken anywhere in the world. This abstract outlines a study that examined the current practices for clinician engagement with the aim to improve clinical documentation for clinical coding purposes in Australian acute care hospitals.

Method

The study was developed as part of a Health information Management Association of Australia mentored research project. A small group of practitioners were mentored through the process of study design, ethics approval, data collection, data analysis, and dissemination. The study sought to survey the individual who undertook the overall administration of the clinical engagement strategies for each acute care hospital in Australia. The recruitment strategy included first identifying the most appropriate contact for each hospital, to ensure only one person per site completed the survey. Where a site has a team responsible for engagement activities, the ‘best-fit’ person was
the one responsible for administering and developing clinician engagement strategies, but they would respond on behalf of the team. Where there is a regional person responsible for multiple sites, this person may respond for more than one hospital. Once identified, this person was invited via email to complete the survey.

The survey was deployed online during April and May 2018 through the University of Tasmania REDCap (Research Electronic Data Capture) system. The first page of the survey included information about the study and obtained the informed consent of the participant. The second page asked for the demographics for the hospital. The remainder of the survey was developed based on the literature review to identify potential practices in clinical engagement to improve clinical documentation for clinical coding purposes. This included the activities the hospital actively participates in, and how effective each was in engaging clinicians. Free text fields also allowed respondents to provide feedback. Participants responding for more than one hospital were provided an opportunity to respond for another hospital. Participation was voluntary and the research team recognized not all hospitals would complete the survey. The team monitored responses to ensure there was at least a 30% representation of public and private hospitals, from each state, and from metropolitan/regional/rural areas.

Once the survey closed, the data was downloaded from the REDCap system and imported into a password protected Excel document on a secure drive at the University of Tasmania, and de-identified. The data was analysed using descriptive statistics, with free text responses undergoing thematic analysis.

**Results and recommendations**

Findings from this study will be presented, including:


2. Aggregated findings across states, sectors (public/private), and region (metropolitan/regional/rural).

3. Examining what the industry considers to be best practice in this area at this point in time.

Recommendations for how acute care hospitals in Australia should engage clinicians with the aim to improve clinical documentation for clinical coding purposes will be discussed.
References


Do other health professionals read my clinical notes?

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Introduction

The clinical record (paper-based or electronic) is a communication tool supporting patient care. The aim of the study is to assess the effectiveness of clinical documentation within a Queensland tertiary-level hospital from the perspective of clinicians.

Method

A qualitative design using semi-structured interviews with 27 clinicians (allied health professionals, nurses and medical officers) was undertaken at a public hospital in urban Queensland. Data was recorded across multiple themes associated with clinicians’ perceptions on effectiveness of clinical documentation, including their views on use of their notes by their colleagues.

Results

A number of themes reflecting clinician perceptions on the effectiveness of clinical documentation emerged from the data: clinicians spend up to half of their working day documenting but were uncertain whether anyone read their documentation; quantifying the amount of time spent reviewing documentation is difficult and there are some common factors influencing the process of clinical documentation including why information is duplicated.

Discussion

Our study revealed, disparate perspectives amongst clinicians, as to whether the entries they had made were read by others.

Conclusion

Our study provides evidence the historical practices of documenting clinical care must be reviewed.
The Millennial HIM

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Introduction

As Millennials take up management positions in organisations, there’s a distinct difference engaging them compared to generations before (Twaronite 2015). Described as those born between the early ‘80s and late ‘90s, this generation grew up in highly competitive environments, with multiple technology changes, along with an advocacy for freedom. As a millennial, I’ve seen firsthand how those traits have influenced my personality and HIM career. This is my millennial HIM story.

Age: 21 – 24

Millennials are competitive with very high expectations for themselves. After graduating from HIM at the University of Sydney, I went into the competitive world of media (because health librarian didn’t seem so ‘cool’ at 21). However, four years later, I decided to come back to health and be part of something meaningful.

My first manager in the health industry was also an old university friend. Our similar age and friendship brought out a healthy competitive nature between us. It allowed us to understand our roles better and learn how to excel in them together (Gay 2017). But the fun couldn’t last forever, as an extrovert Millennial, I was full of charge and completely outcome/goal focused (Rezvani & Monahan 2017) which lead me inevitably to a manager position at another paper record hospital.

Age: 25 – 27

Technology was and still is a big part of a millennial’s life. It was the generation growing up from writing on paper to typing on a computer, the birth of the internet and social media (Omar 2016). Having honed my skills in the paper department for a year, I wanted more from technology and a move to a scanned records system. Hence, I acquired a job as the Document Imaging Manager at the Children’s Hospital at Westmead (CHW).

The new role allowed me to work closely with the EMR team as well. Interested in the interactive media and workflow (Moreno et al. 2017, p.137), I wanted something where all necessary health information can be gather by a touch of a button (Hershatter & Epstein 2010). The EMR was technology after the paper world and blurred the lines between traditional and non-traditional HIM roles. So, after two years as the manager and two scanning projects later, I knew the EMR was my future.
Age: 28 – 31 onwards

Forbes contributor, David K. Williams (2016), notes from his experience that if you give Millennials freedom to do their job, they will exceed your expectations. The Sydney Children’s Hospitals Network (SCHN) have definitely provided me with a lot of freedom. They’ve supported me in courses to help pursue my EMR interests. When the opportunity presented, I was free to move into the EMR team and become the Project Lead for our EMR2 Project.

Millennials in the workplace constantly want constructive feedback (Rezvani & Monahan 2017). My superiors did just that and guided me in the right direction. The opportunity to move into the EMR space lead to two more completed EMR projects – CHW EMR2 and CHW Electronic Medication Management.

A KPMG study by Kurian (2017) noted flexibility on working hours and location are key for Millennials. SCHN understood my needs for flexibility as my life changed and supported me. I felt with so much information in the EMR, extracting meaningful data will be the next technological trend. So I joined the data team and implemented clinical dashboards and participated in preventative care to help clinicians make better decisions and improve patient outcomes.

Conclusion

The competitive need to learn and to always be at the forefront of technology are what millennials thrive on. Harnessing their adaptive nature, organisations need to invest and engage us with a sense of freedom and learning opportunities in order to retain millennial talent. HIMs as a collective need to show/tell the next generation how far health information management can reach now. If I had known it was more than just being a librarian I wouldn’t have wasted four years in media.
References


Investigating breaches of confidentiality in the Tasmania Health Service Digital Medical Record

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Introduction

The Tasmanian Personal Information Protection Act 2004 (PIP Act) complements the Commonwealth Privacy Act 1988, which sets minimum standards for the collection, maintenance, use, correction and disclosure of personal information by the Commonwealth Government and other organisations [1].

The PIP Act, including ten Personal Information Protection Principles (PIPP), were developed in response to community concern about how governments control personal information and was intended to ensure transparency in the way that Tasmanian State and local government bodies collect, use and disclose personal information.

In accordance PIPP 2, the medical record should only be accessed, used and disclosed for the purpose for which the information was collected. Within the THS this is provide or support the provision of clinical care. Within this principle, ‘use’ refers to the communication or handling of information by a personal information custodian. ‘Disclosure’ is to reveal, communicate or transfer personal information.

Health Information Management Services (HIMS) is responsible for managing the Tasmanian Health Service (THS) medical record including ensuring appropriate access, storage, use and disclosure of personal information. Therefore, a process is required to investigate any potential breaches of confidentiality.

Process

Assessment of Breach

When assessing a breach of confidentiality, it is important to consider what information is classified as confidential.

Patient data and information within the THS must be managed in accordance with the PIP Act which groups information into personal and sensitive. Sensitive information includes health information such as physical, mental, psychological health and all other information collected to provide a health service [2]. Confidentiality is a legal right of patients under the PIP Act but is also an ethical right. The Australian Charter of Health Care Rights (2008) charter states patients have a right to the privacy and confidentiality of their personal information [3]. To the THS this translates to handling that personal health and other information appropriately.
Identifying Potential Breaches

HIMS will be notified of potential breaches of confidentiality from a variety of sources including patient complaints, staff observations, managers, human resources and patient safety. HIMS will also proactively audit for high profile patients i.e. when a patient name has been in the media.

Investigation and Management

To determine if there has been a breach under PIP Act an investigation is required to determine circumstances in which information was accessed or released.

The investigation includes an audit of the Digital Medical Record (DMR) metadata as well as the medical record itself. Depending on the type of investigation this could be an audit of the individual patient record or an audit of a staff member’s activity. The metadata is compared to the medical record to determine if the staff that accessed the medical record was directly involved with the care of the patient. If the audit identifies staff access that have not been involved in the care of the patient, contact is made with Patient Safety and Unit Manager (for staff who are not involved with the care) to determine if any documentation audits, root cause analysis or other type of investigation is currently underway. If no reason is identified for the access, then a meeting is arranged with the staff member to discuss the findings.

Consequences and Findings

Consequences

Distress to the patient is a possible consequence of a breach in patient confidentiality [4]. Further patient consequences include harm to a patient’s reputation or result in lost opportunities, financial and personal humiliation [5]. There are also consequences to the patient-provider relationship [6] if patient does not trust the service [7].

Findings

Audits undertaken within the THS have revealed the following breaches which have occurred by staff:

- Access to obtain copies of medical certificates for payroll purposes
- Accessing records of family members
- Accessing records of other staff to identify why they are on sick leave
- Accessing records of patients whose name was in the media
- Student placements accessing information of family and friends.

Applicability to other settings

Sharing experiences with other sites and services facilitates understanding of practices, behaviours and processes that are commonly misunderstood with accessing patient information. This allows education materials to be created with real life examples to improve understanding.
References


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Breaking up is hard to do…

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Introduction

With personalised and integrated health care system becoming more and more apparent - the State of Queensland is on the digital health journey with the publication of the Digital Health Strategic Vision for Queensland 2026 and the ongoing investment in eHealth (State of Queensland (Queensland Health) 2017). Queensland Health has 16 Hospital and Health Services (HHS) under its jurisdiction. Caboolture Hospital comes under the Metro North HHS. It is a 216 bed hospital providing a range of clinical and allied health services (State of Queensland [Queensland Health] 2017), with a looming election commitment to increase capacity by 130 beds at a minimum (61%) and upgrade supporting services in line with projected service planning expectations. The demand for health care in this region since 2015 has been growing exponentially (Mena Report 2016). eHealth Queensland has also published its intention to schedule Metro North into its support program for transition to an IeMR (eHealth Qld, 2018).

Case Study Description

Caboolture Hospital uses paper based records and had a Health Information Service (HIS) operating across multiple facilities within the HHS. Changes to executive structures within the HHS have led to site based management teams. With a change in leadership within HIS came an opportunity to forge our own path as a separate Caboolture Hospital based service, and formulate a structure more accommodating to change and growth. HIS also incorporates a satellite service to Woodford Correctional Health and Kilcoy Hospital.

Implementation/Strategies

Part of the change management process incorporated a review of structures across each HIS within Metro North to identify opportunities for consistency, efficiencies and networking. Initial engagement processes have been sustained to become formal peer support networks and process review committees.

Human Resource and industrial relations processes have been challenging to say the least due to shared positions across facilities and changes to positions held substantively. This resulted in a lengthy human resources consultation process.

Due to a staged approach towards implementation, there was an extended period with no permanently appointed Director of HIS within the service at either facility. There was also a further extended period of dual reporting lines for several positions within HIS. This caused immense disruption to services and capacity at a time when health service funding growth opportunities were attainable (COAG, 2011/ COAG, 2016). There’s no doubt this would have been
minimised if a separation of the HIS had been undertaken as a single process.

With the changing structure and environment in which HIS operate, an emphasis on professional development has been harnessed with support for progression to formal qualifications in place for many of our staff through a variety of pathways: HIM degree, diploma of Leadership & Management, Certified Health Informatician Australasia, and certificate IV qualifications.

Other considerations to progress separation included splitting a joint forms catalogue, SharePoint sites, ServiceNow assignment queues, file directories, duplication of shared procedures and work user guides and HIS presence on QHEPS. The big consideration was; what will the new structure look like and how do we future proof the department in preparation for Digital Health Strategic Vision for Queensland 2026 and utilise the current skill-mix of staff. Once HIS leadership was permanently appointed and consultation completed, it was decided to strategically align HIS structures across MNHHS. Fig1.1 New Stream Structure for Caboolture HIS is representative of the HIS structure as implemented across Caboolture-Kilcoy Hospital and Redcliffe Hospital in alignment with the existing The Prince Charles Hospital HIS structure.

**Conclusion – lessons learnt**

Through the process we have built a more cohesive department that is better equipped to be responsive to the needs of the hospital. The change in culture has been tangible with a team focussed on supporting each other and striving for the best possible outcomes in partnership with other services within the facility. Through the challenges presented to the team, an environment of comradery has been forged with a realisation that a team of well supported individuals creates a team stronger than a selection of individuals in competition for recognition (Bart de Jong, 2016). We are on a path to improve our state of digital readiness, with a more adaptive model to transition into the IeMR space.
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Sharing health information management research, work projects and opinions through publication: practical strategies on how to present our work in journals and at conferences

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Introduction

Health Information Management Professionals are trained and educated in how to best manage and protect patient information and how to utilise technology to improve efficiencies and effectiveness in communicating health information. Through work experience and ongoing education, we acquire new knowledge but few of us share that knowledge and experience with our peers and the wider research community. We often undertake studies and write reports for our individual institutions but we neglect to consider publishing our findings in journals or presenting at national conferences. Doing so is vital to encouraging and supporting the next generation of trained HIM professionals working in the variety of roles which our profession encompasses. Through sharing, we advance the knowledgebase of our profession and promote our expertise in the management and use of health information. The best way to accomplish this dissemination is through publication. We can also benefit from the experiences of others and this is only possible through publication or conference presentations.

Professional practice/case study description

The area of HIM is very broad with many players (e.g. HIMs, clinical coders, doctors, nurses, health informatics specialists, allied health professionals, government managers, policy makers, IT vendors, computer specialists, etc). HIMs and Clinical Coders are in a unique position - we know the data, we know the systems and we can lead and/or collaborate with others to improve health information systems, improve the use of IT to manage health information and consequently improve health outcomes for the community. We also have a responsibility to promote our expertise in a climate where unskilled, unqualified players believe they are equally suited to perform the roles traditionally undertaken by those trained in our professional skill set. This practice erodes our profession rather than engaging a new generation to continue building knowledge and improving outcomes. Publication of your expertise, your research, your experience and your qualified opinions shows how necessary your skill set is to the fields of digital health; HIS
implementation; informatics; coding and classification; casemix; activity based funding; patient safety and the impact of poor documentation and data quality; standards;

**Implementation/experiences**

This presentation will provide detailed case studies showing how to extend the work we currently do, in analysing our systems and our coding, to the next stage - publication. It will provide participants with concrete examples, from health information management and clinical coding areas, of how to publish and options of where to publish. The objective is to encourage HIM professionals to look at their work from the perspective of how their experiences can encourage, educate and support their peers: each of us can have a personal publication strategic plan.

**Conclusion – lessons learnt**

Publishing our work, research, experiences and opinions acknowledges our central position and expertise in the management of health information systems and clinical coding. Continual exposure of our stories is vital in engagement with the next generation of HIM professionals and to cement our position as experts in the management of health information.
Quality Assurance Process for Digital Medical Record in North West Tasmania

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Introduction

The quality assurance process for the Tasmanian Health Service digital medical record (DMR) ensures clinical information on patients is available at the point of care. The process checks that clinical information available in the DMR is scanned to the correct patient, correct episode of care and correct identifiers. High quality information assists the clinicians to quickly find information required to deliver safe patient care.

The process is robust and is effective in ensuring information scanned is of high quality. A regular audit cycle has been implemented across the two major hospitals and three rural inpatient facilities in North West Tasmania. All of these sites are audited against the same criteria to ensure consistency and the ability to compare information.

Process

Patient Focus

The quality of the information contained within the DMR can directly impact on the care of patients. This is at the forefront of the decision making of the clerks when scanning clinical information. For each document the clerk will consider what a clinician would call the document or where they would look for the document, this supports the correct assignment of form identifiers.

Effective Leadership

The quality process is part of the role for all staff that prepares and scans clinical information to the DMR. For the medical records clerks it forms part of their performance development plans with KPI’s and quality is standing agenda items at team meetings. Daily audits are completed at the 2 main hospitals by the medical records clerk due to the volume of information. Audits are conducted at the District Hospitals three times a year by the Manager Health Information Services or Supervisor Medical Records.
Audits

Auditing is the final step in the scanning process and looks at the documents from the user’s perspective. There is a two pronged approach to the auditing of the scanning of information into the DMR. A 100% audit is completed at the time of scanning followed by a quality assurance audit of between 10-20% depending on previous audit results. The percentage is based on previous audit results.

The audit at scanning is to ensure all documents received have been uploaded to the DMR. This audit includes:

- Count of documents to be scanned versus actual number of documents scanned
- All count discrepancies are reviewed and rectified via scanned batch processing
- A physical check that the documents have appeared in the correct patient and correct location in the DMR.

A further quality assurance sample audited prior to destruction. The staff member performing the audit will have the physical paper document in front of them and perform the check directly against what is stored in the DMR. Staff must not audit their own work.

There are thirteen audit criteria under three main categories:

- Error A – represents irretrievable loss and can potentially impact on clinical care with information being scanned to the incorrect patient or not scanned
- Error B - can impact on the integrity of the record, the information is still available and would not jeopardise patient care in a normal situation
- Error C – does not impact on patient care but would be frustrating to the user.

For management of workload and for tracking of errors, it is recommended that these audits are completed daily in the larger hospitals and 2-3 times per year in the rural inpatient facilities. Each site determines the percentage of batches for the quality assurance sample audit based on volume of work, staffing and previous audit results, for example if a previous audit report had less than 1% of errors (>99% accuracy) then 10% of records are audited.

Applicability to other settings

Members of the Health Information Management Association of Australia (HIMAA) eHealth and Scanning Special Interest Group share their local scanning, quality and auditing processes to help others. There is potential for this group to identify key audit criteria that could be applied to participating scanning sites, thus supporting benchmarking and shared learnings across facilities.
Development of a bespoke software tool to manage all aspects of coding and medical record scanning in a seamless and connected way across ten private hospitals

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Introduction

St Vincent’s Health has developed a bespoke in-house software tool, known as the IMC, which has enabled us to improve the management of our processes and workflows within Health Information Services (HIS) across ten private hospitals. It has transformed the way we manage our HIS services and people.

The IMC software tool connects all our Patient Administration System (PAS) data from 12 hospitals, both publics and privates, along with data from our clinical systems and payroll system to create a data warehouse. We have created a user friendly front end to the warehouse, a web portal which provides a visual display of key performance indicators and measures on daily key business activities such as coding productivity, medical record scanning, coding optimisation and reporting of hospital acquired complications and other clinical indicators. Linking with the PAS and clinical systems means IMC displays real time medical record scanning and coding throughput data.

Outcomes:

The outcomes of this initiative include:

1. Efficiencies in managing medical record scanning workflows
2. Improvements in timeliness and quality of coding data
3. Better management of coding productivity
4. Implementation of robust processes for documentation coding queries and
5. Real time data to our financial and quality teams.

Medical record scanning workflows are managed through the IMC. The process begins when a patient is discharged from hospital. The IMC receives the discharge information making it easier for team leaders to roster staff based on activity. When the episode notes are scanned, the episode is automatically added to the coding picklist thereby creating a seamless and connected process from discharge to coding. No manual lists or spreadsheets are required and the episode is only identified as ‘ready for coding’ if the appropriate forms have been scanned eg operation report. There is a process in place to identify the discharge notes not scanned and allow for timely follow up with the wards. Scanning KPIs are generated and are key to managing the staff and scanning processes to ensure scanning is achieved within agreed timeframes.
Improvements in timeliness of coding data has been achieved through the development of electronic coder pick lists. Work is allocated based on where the coding and scanning resources are available and where the work is required. It allows us to match our coding workforce to hospital activity. For example Melbourne coders can remotely code records for our interstate hospitals in NSW and QLD. The picklist will auto generate an outstanding coding worklist based on the coders profile and will lock out other coders from selecting the same episodes and therefore reducing the chance of two coders coding the same record.

Better coding data has been achieved through the development of coding algorithms that flag episodes for review within a day of coding. The algorithms are based on results from our internal and external coding audits, Australian coding standards, MBS item numbers, conditions previous coded and published advice from ACCD. The review process occurs daily at all our hospitals and supports real time feedback to coders resulting in improved coding and DRG accuracy. This targeted and timely review allows us to focus our coding education where it is needed most. We have developed and implemented coding education training packages for all coding staff along with coding competencies.

Coding productivity is managed in the IMC. Coding statistics are automatically calculated and displayed that shows by coder, the number of episodes coded per day, by DRG split, cost weights, same day and overnight splits and documentation coding queries generated. This automated process supports our management and coders in measuring productivity and ensuring our teams are resourced appropriately based on acuity and activity. Trainee coders are tracked in the IMC which supports the progression through the SVHA coding training program.

Documentation coding queries are managed through the PAS system and the information is automatically captured in the IMC. We can quickly identify the coder who has created the documentation coding query, the reason for the query and which doctor was sent the query along with the response. Outstanding queries are also easily identified and followed up in a timely way. Documentation coding query results are shared with specialty craft groups and clinical documentation specialists to target documentation education and improve the clinical content of the medical record.

We have showcased this initiative with several other Public and Private hospitals and feedback has been positive. We continue to develop the tool and have realised the benefits in all aspects of health information management.
Patient Care vs Patient Privacy in Clinical Systems

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Introduction

With the increase in the take up and use of electronic medical records, clinicians have access to more information via clinical systems than ever before. With that wealth of online patient information, and new innovations like My Health Record, there are rising security and privacy risks being identified – with the question of “how” these are to be mitigated within these systems without compromising patient care.

Due to the nature of the risks and interpretation of various regulations, each hospital (or Group of hospitals) are expected to find and agree an acceptable position between these competing risks, but also to continually review them as regulations change and usage increases.

St Vincent’s Health is a group of 10 private and 2 public hospitals across three States. This issue has been discussed at length due to:

1. Introduction of the new Australian Privacy Principles and Data Breach Legislation;
2. Implementation of scanned medical records access for our Visiting Medical Officers (VMOs) both within and remotely to the hospitals; and
3. Patient queries relating to My Health Record and other privacy related questions
4. Increased scrutiny of legal and audit implications of privacy due to a few specific incidents

Current State

In discussions with other private and public hospitals, the vast majority give “open access” to clinical information which is contained within an EMR or similar clinical system. This access is usually considered the most appropriate given the difficulties in being able to identify a specific health care team for any patient on any given day. However, it is only auditable retrospectively.

This is not to say it’s a perfect solution, as there are many incidents where the access to clinical systems have not been able to stop misuse of patient information, for example:

- Doctors have reviewed other Doctor’s notes (Private Hospital) and used that information with malicious intent;
- Sections of a patient’s record (mental health) have not been accessible at time of care by those on the healthcare team which led to negative outcomes;
- “Celebrity” patient information has been leaked by clinicians;
• Patient’s records have been reviewed by family (staff) members without consent

In general, most hospitals seem to follow this type of clinical information security model:
• Limit or disallow use of generic accounts to clinical systems
• Ensure clinical systems have an audit log function, where reports can be run (if required) to identify or confirm – retrospectively – a breach has occurred, or to monitor usage
• Duo authentication for remote access of clinical systems
• Privacy training at orientation / annually for clinical staff
• Data breach / privacy breach ‘consequences’ and confidentiality clauses as part of contracts

Even with the above mitigations, there is a growing sense of unease with the holus bolus nature of open access in clinical systems when noting the changes and consequences of new legislation.

Review and Trial

At St Vincent’s we reviewed what it would mean to limit access to clinical information to that patient’s health care team. It was concluded that whilst admirable and possibly a way of mitigating ‘misuse’ of patient information, the practicalities of implementation were unsustainable as the restriction of patient information to an (admitting) VMO or a defined “team” is difficult to achieve is that it is both not easily defined and is variable over the course of an admission.

• Patients move physically through different locations (Theatre, Ward, ICU, Ward)
• Patients can have a number of VMOs involved in the care including Anaesthetist, Physicians
• A transfer of care or a consultation by another VMOs is not usually a “planned” event, therefore patient information would not be available to that second VMOs
• Nursing staff regularly change locations and specialties, and therefore not easily “allocated” to patients which may be under their care
• Nursing staff who are (validly) reviewing patient records of patients who are not currently under their care due to a patient or family query, clinician review of notes or managing care temporarily
• Locums and agency staff are regularly used and cannot perform their duties if not able to view patient information

Another mitigating factor is the high resourcing cost that would be involved in supporting and maintaining these restrictions on a day-to-day basis:

• This would require functionality within the clinical system to match VMOs with their patients (not possible with Anaesthetists, second consultants / VMOs also caring for the patient)
• This would require an integration with payroll at each site, so that Nurses were matched daily with the location of patients under their care
Resource would be required at each site to manage the daily shifts of resources to ensure the right staff were matched with the right patients – i.e. any Agency staff for Nurses on leave, any Locums, Registrars would need to be allocated to patients.

Proposed Solution

So at St Vincent’s we have designed a solution based on the accepted and understood paper medical record process. That is, to allow open access via clinical systems to all admitted patients, but restrict access once a patient has been discharged.

This mimics the workflow of the paper medical record which follows the patient through their admission, but is then returned to Health Information Services (HIS) once the patient is discharged. Access to that paper medical record after that, is then managed by HIS and further usage is documented.

Within the proposed solution, a break-glass functionality would be implemented so that access is not ‘denied’ but identified at time of viewing. And with some roles being allowed full access, e.g. HIS for coding purposes.
The utility of the ICD-10-AM classification for identifying the burden of genetic disease

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Introduction

Advances in genomic medicine have led to an increase in conditions being classified as having a genetic aetiology (Mattick et al. 2014). Estimates of the burden of genetic disease (BoD) on paediatric hospitals have been previously undertaken using various methodologies; hospital based medical record reviews and analysis of population administrative data coded according to the International Classification of Diseases (ICD). These studies have found varying rates of BoD and have identified limitations when classifying on the basis of ICD coded data alone (Carnevale et al. 1985; Day & Holmes 1973; Dye et al. 2011; McCandless, Brunger & Cassidy 2004; Yoon et al. 1997).

Current health information management research being undertaken as an Honours project in 2018 at the Murdoch Children’s Research Institute, involves investigating the BoD at the Royal Children’s Hospital (RCH), Melbourne. Specifically, this presentation will focus on the secondary objective of the study; to compare the burden of genetic conditions ascertained through the ICD-10-AM classification system alone, to the burden of genetic conditions obtained using the complete EPIC electronic medical record review.

Method

This study involved reviewing all admitted episodes, discharged from the RCH between the 1st and 14th of March 2017, inclusive. Each eligible admission was assigned a BoD category based on a pre-existing classification of conditions, developed by an expert panel of clinical geneticists. Categorisation relates to the degree of genetic aetiology, ranging from chromosomal conditions through single gene, or multifactorial disorders to ones with no known genetic cause. Two methods of classification were used to determine the BoD. The first category was assigned to the ICD-10-AM version nine codes via the clinical coding process. To assist in the classification, the Tabular List was reviewed for the inclusion terms and full description of the ICD-10-AM code. In comparison, a second BoD category was assigned to the admission after careful review of the EPIC record. The record was reviewed for diagnoses, co-morbidities, reason for admission and family history. All diagnoses, even those not directly related to the episode of care were included. The concordance between the two methods of classification was measured.
Results

This study classified 1,882 admitted episodes that were discharged during the two-week period in March 2017. The utility (or not) of ICD-10-AM coded data for determining the BoD was analysed. This study is ongoing and preliminary results will be demonstrated through the presentation of several real-world examples.

Discussion

Research has shown that when the ICD classification system is utilised as the only source of determining BoD it is insufficient to capture all cases accurately and it underestimates the frequency of genetic disorders. As an illustration, McCandless, Brunger and Cassidy (2004) report that 25% of genetic conditions identified by a medical record review, were not represented through ICD-9-CM codes. This presentation will discuss the factors which impact the utility of ICD-10-AM coded data for purposes such as epidemiological research.

Conclusion

Comparison of the two methods of classification, will determine the proportion of genetic diseases missed when outcomes are based upon the coded data only, and will enable the researchers to quantify the value of utilising coded data for determining the BoD in future studies.

References


Better policy through quality data - Barwon South Western Region Stroke Transfer Framework

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Introduction

More than ever, timely, reliable, accessible and accurate data is needed to enable better decision making and policy. A healthcare delivery system is reliant on data that measures healthcare costs and expenditures, the use of service and the health status of a population in order to examine the need for a potential new service to fill in the gaps already provided. (Cassidy, Dowell and Bloomrosen 1992).

The Barwon South Western Region Stroke Transfer Framework (2015) is an example of how health information managers can make a difference in the world of policy making. The Framework was developed to support stroke services in the Barwon-South Western region of Victoria by outlining the process of coordinating the urgent transfer and repatriation of people with stroke back to local health services for ongoing care and rehabilitation.

Framework description

The framework endeavours to maximise access to timely evidence-based hyper-acute and acute stroke care for all people with stroke, achieved through centralising acute stroke care at three public hospitals in the region, namely: Barwon Health (University Hospital Geelong), South West Healthcare (Warrnambool) and Western District Health Service (Hamilton).

The framework was considered a success because it gained regional agreement from all public hospitals, community hospitals, multi-purpose centres, bush nursing centres, Ambulance Victoria and the Primary Health Network of Western Victoria to accept timely, appropriate and supported stroke transfers to and from health facilities in the region.

Process

Data from the Victorian Admitted Episodes Dataset (VAED), Number of separations based on list of 60 ICD-10-AM 8th edition codes to define stroke/TIA as per Stroke care strategy for Victoria (2007) and Victorian Emergency Minimum Dataset (VEMD), Number of presentations based on list of 60 ICD-10-AM 8th edition codes to define stroke/TIA as per Stroke care strategy for Victoria (2007) were used in the planning and analysis of the framework.

Data starting from 2010 revealed that the region averaged 981 stroke episodes on an annual basis, with most people with suspected stroke presenting at various health services and GP clinics. Study also found that in the region, only three hospital sites had the capability and capacity to effectively and efficiently respond...
and provide timely stroke care due to having a stroke unit care with 24-hour computed tomography (CT) imaging and the capacity to administer thrombolysis therapy. These facilities are Barwon Health (University Hospital Geelong), South West Healthcare (Warrnambool) and Western District Health Service (Hamilton).

The framework was instrumental in bringing the community together, represented by various clinicians in the working party. The framework enabled stakeholders in the region to work collaboratively to develop and maintain guidelines and protocols to enable and support timely and appropriate transfers, monitored through a continuous quality improvement process and supported by a robust clinical governance system.

**Conclusion**

To engage the next generation, who are the future of the profession, and support them in having a successful transition into the workforce, Davies (2006), proposed that the HIM curriculum should include materials to develop an understanding of the context for health services management. This might include an introduction to the major themes in health policy and an overview of policy development to give students some perspective much broader than health information and to develop their ability to interpret and respond to change in any environment.

He added that the curriculum should also include some grounding in a range of disciplines which include health economics, epidemiology, sociology and the history and philosophy of science. The purpose of including these subjects would be to equip students with a range of concepts that would assist them in engaging with clinical colleagues and in interpreting the diverse challenges of their own practice.

Information needed for decisions at the executive level begins at the clinical and coding level, where raw data must be converted by health information managers into quality and accurate readable information. Therefore, health information management (HIM) professionals must be armed with the skills and tools to serve as leaders within the healthcare environment, using quality information to achieve the triple aim of reduced costs, better care, and improved population health.

**References**


Clinical Terminologies: To Boldly Go Where Few Have Gone Before

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Target audience

HIMs, Clinical Coders, Data Analysts, Clinical Content Specialists, Clinical Standards Specialist, eHealth Lead.

Learning needs/objectives

"Space: the final frontier. These are the voyages of the starship Enterprise: her five-year mission to explore strange new worlds…"

-- opening narration, the original Star Trek

Reflect on these words in the context of a HIM professional and clinical terminologies. First, why are clinical terminologies a frontier? Few HIM professionals have ventured into this healthcare space. Second, why a voyage? It is time to leave the sanctuary of classifications. Third, why a mission? Having a mission creates a clear and focused direction to follow. And fourth, why are clinical terminologies a strange new world? Because clinical terminologies are quite different in definition and application than the universe of classifications.

Taking these aspects together, consider the following:

Structure and learning strategies

Workshop will consist of lecturers, online polling, and the use of tools.

Star Trek: The Original Series

This lecture centres on classifications – their purpose and use cases. The disease classifications of ICD-10, ICD-10-AU, ICD-11, ICD-11-MMS will be addressed. Engagement is through online polling exercises.
The Next Generation

The focus of this lecturette is clinical terminologies. – their purpose and use cases. Attendees will take part in a review of SNOMED CT and SNOMED CT-AU through online Browser, e.g., Shrimp.

Deep Space Nine

During this lecturette, HIM competencies for clinical terminology roles are illustrated. Similarities and differences regarding skill set for a clinical coder versus a map specialist will be explained. There will be an opportunity to create maps using a mapping tool.

Voyager

The final lecturette involves evaluation and discussion of career paths showing potential HIM opportunities in the clinical terminology space. Attendees will choose via polling the positions that they would like to pursue to become the next generation of HIM professionals.

Intended outcomes

At the conclusion of this workshop, participants will be able to:

1. Explain the differences between a classification and a clinical terminology

2. Give examples of a use case for a classification and a clinical terminology

3. Assess the skill set needed to capitalise on emerging clinical terminology opportunities

4. Summarize career options and determine which one to focus on

Evaluation

Based on the content of the workshop, the mission ahead will be made into a puzzle for the attendees to solve.

Attendees also have an option of submitting a tweet on Twitter as a final thought on their insights or plans following the workshop such as “Next up for me is enrolment in the SNOMED CT Foundation course https://elearning.ihtsdotools.org/mod/book/view.php?id=1314&chapterid=317”

References


Harnessing eHealth for improved health service delivery in the Western Pacific Region

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Introduction

The growing burden of chronic health conditions and the re-emergence of communicable diseases is impacting many countries’ ability to achieve universal health coverage to promote equitable service access. Having integrated health service delivery has been identified as a useful approach to ensure better quality, equity and sustainability of services to lead to improved health outcomes. The rapid advancement of e-health in recent years has the potential to contribute to improvements in health service delivery, however many countries are challenged in how to best use e-health to achieve these improvements.

In response to the needs of countries in the World Health Organisation (WHO) Western Pacific Region (WPR), the WHO WPR Office commissioned a range of international experts to collaborate to develop a Regional Action Agenda on Harnessing eHealth for Improved Health Service Delivery in the Western Pacific. This Regional Action Agenda will be presented to the 69th session of the WHO Regional Committee for the Western Pacific in October 2018. This will assist countries to determine how best to progress with eHealth implementations and to guide WHO support for work in this area.

Aspects of eHealth reviewed

When commissioning this work, the WHO WPR Office identified 5 streams of work which were allocated to 5 different eHealth experts, namely:

- mHealth
- telemedicine
- Electronic Medical Records/Electronic Health Records (EMR/EHR)
- Architecture and interoperability
- eHealth implementation, sustainability and scalability.

The Australian Institute of Health and Welfare was contracted to undertake the component on EMR/EHR, which included a desktop review focused mainly on country experiences in the use of EMR/EHR’s and their contribution to integrated health service delivery in Region. This included outlining key progress achieved and identifying the challenges faced in different countries. Country case studies that demonstrate progress and best practices and highlight achievements were also requested.
EMR/EHR in the Western Pacific Region

The report produced highlighted the wide variety both within countries and between countries in the uptake and use of EMR/EHR’s with the WPR. A number of country case studies were included, grouping countries into high, upper-middle and lower-middle income groups, with an additional group for extremely small populations of which there are a number in the Pacific. These country case studies demonstrate the diversity of approaches to the use of technology across the region, especially driven by population size and income level.

Conclusions and findings

The key findings and conclusions reached showed that, regardless of level of income, development, ICT uptake, etc, a number of factors are crucial for successful EMR/EHR implementation. These included:

- Governance arrangements, including:
  - eHealth strategy and plan
  - national health leadership commitment
  - data and interoperability standards
  - privacy/security controls
- Adequate and ongoing funding commitment
- Physical infrastructure, including:
  - reliable power supply
  - internet access with adequate bandwidth
  - integration and access across care settings
  - access devices that are ‘fit for purpose’
- Change management, including:
  - clinical ‘buy-in’ and leadership
  - business process ‘re-engineering’
  - national health identifiers

It is hoped that this work will assist countries in the WPR to prioritise and sensibly invest in eHealth solutions that will assist them to deliver high quality health care to all.
Implementing Ground Air Medical qUality Transport Quality Improvement (KPIs) for international comparison

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Introduction

A 24 hour 7 days per week, state-wide service of NSW Health provides expert clinical advice, clinical co-ordination, emergency stabilisation, and inter-hospital transport of neonatal and paediatric patients for specialised care. This specialised service demands monitoring of the quality of care provided during transport and its impact on patient outcomes.

The Ground Air Medical qUality Transport (GAMUT) database is a free resource for transport teams to track, report and analyse their performance on transport specific quality metrics by comparing against other programs (GAMUT n.d.). The American Academy of Pediatrics Section on Transport Medicine held a Quality Metrics Summit in 2012, and agreed on 12 core neonatal and paediatric transport quality metrics. In 2013 the Air Medical Physician Association gained consensus on a national metric set applicable to adult transport best practices (Schwartz et al. 2015). After successfully testing the tracking and reporting of the two metric sets, the GAMUT database was created in January 2014, offering a mechanism for sharing results of metric sets and gauging the quality of performances through comparison with retrieval services.

Implementing the GAMUT key performance indicators (KPIs) would enable this service to compare internationally with other retrieval services and to improve any KPI performing below standard.

Implementation

The KPIs were implemented and the initial data for April 2014 was submitted to the GAMUT database. Included in the KPIs were: intubation success and verification; neonatal hypothermia; medication administration errors; dislodgement of therapeutic devices; medical equipment failure; patient and crew injury; cardiopulmonary resuscitation performed; serious reportable events; standardised patient handover; and mobilisation times.
Methods

The tasks in implementation were:

• Add KPIs to the clinical database
• Provide training to clinicians
• Add data items to weekly audit report
• Create a data extract
• Conduct quality assurance to ensure data integrity
• Learn how to use and enter data into REDCap, the database used by GAMUT
• Await and review biannual report
• Report on findings to management
• Feedback to staff
• Definitions reviewed and improvements in definitions were added

Results

The GAMUT 2015 and 2017 Summary Reports were compared. These included de-identified data designed to give representation of a high-level cumulative overview of each services’ performance. This service’s performance in 2015 and 2017 was compared with the GAMUT participants. The results of the comparison are:

• The service is achieving above performance compared with other GAMUT participants in nine of twelve KPIs. Three KPIs listed below fell below range:
  o Intubations with successful first attempt
  o Transport– related patient injuries
  o Medical equipment failures.
• One KPI remains unchanged at 100%:
  o Medication administration errors (at zero).
• Six improved:
  o Unintended neonatal hypothermia
  o Device dislodgement
  o Missions involving CPR
  o Average mobilisation times
  o Transport related crew injuries
  o Serious reportable events.
• Five fell below range:
  o Endotracheal tubes confirmation of placement
  o Intubations with successful first attempt
  o Standardised patient care handoff
  o Transport-related patient injuries
  o Medical equipment failures.

The above results and current reports comparing this service with similar services has resulted in the implementation of research and quality which will improve clinical practice. The process was used to feedback to staff as part of the quality cycle. The findings need to be taken in context e.g. achieving first pass intubation. Safe intubation without compromising the patients’ physiology is preferable to intubation at first pass whilst allowing oxygen levels to fall to dangerously low levels (direct communication with State Director).
Conclusion

Implementation of the GAMUT KPIs has identified errors for both morbidity panel review of cases and areas for research. One research project is the Intubation Project, which is a mannequin based project aimed at increasing the number of intubations staff undertake, with the goals of improving safe first pass success rates of retrieval teams when intubating patients. Three other audits currently in progress are: airway and intubation, medication errors and neonatal hypothermia. Initial talks to collaborate with two similar international retrieval services have commenced.

References


The Future Is Looking ‘Appy’ In Kids Health Care

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1. The Sydney Children’s Hospital Network, Sydney, NSW, AUSTRALIA

Introduction

Imagine your child has an ongoing medical condition but the medication they are on is not as effective as previously. Imagine with just a touch of an app, you could message your child’s clinical care team for them to assess and subscribe the appropriate new medication dosage rather than wait for an appointment. Imagination is now reality with the launch of The Sydney Children’s Hospitals Network (SCHN) ‘My Health Memory’, a new integrated smartphone app combining communication, education and health records.

The Sydney Children’s Hospitals Network ‘My Health Memory’ App

The ‘My Health Memory’ app significantly benefits patients and their families as it allows fast, secure and transparent communication between the patient and clinicians. The app is integrated into Cerner’s eMR (electronic medical record) system to allow the SCHN clinical care team to see any changes to treatment plans or communication with the patient from within their current clinical workflow.

Some of the exciting key functionality of the ‘My Health Memory’ app include:

- **Direct message function** – to allow fast, secure and transparent communication between patients and their SCHN clinical care team that is captured as a patient note in the patient’s health record
- **Ability to confirm or reschedule appointments** – giving patients total control of their clinical schedules all via their smart phone
- **Access to health content rich information** – empowering, holistic and collaborative approach to patient care through education and awareness

The SCHN ‘My Health Memory’ app is the first direct patient application of its kind to be integrated into an eMR. Co-designed with ‘Oneview Healthcare’ (who specialises in the development of innovative technology solutions and patient engagement services for the healthcare) the app has proven to be a winner with patients and their families with over 3000 registered users since go live in 2017.
The organisation

SCHN is made up of six specialised children’s health organisations:

1. The Children’s Hospital at Westmead (CHW)
2. Sydney Children’s Hospital, Randwick (SCH) – CHW and SCH being the two major tertiary and quaternary children’s hospitals in metropolitan Sydney
3. Bear Cottage, a specialist hospice for children with life-limiting conditions
4. NSW Newborn and paediatric Emergency Transport Service
5. NSW Pregnancy and newborn Services Network and
6. The Children’s Court Clinic

Each year the SCHN services combined manage over:
- 51,000 inpatient admissions
- 92,000 Emergency Department presentations
- Over one million outpatient service visits

Conclusion

‘My Health Memory’ app is now fully live and operational at the Children’s Hospital at Westmead with plans to implement at the Sydney Children’s Hospital at Randwick next year.
Managing the Tsunami of Information

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Introduction

Cancer reporting is a legislative requirement in all states and territories of Australia. In Victoria, pathology laboratories, hospitals and radiotherapy services are required to submit cancer registrations to the Victorian Cancer Registry (VCR) under the Improving Cancer Outcomes Act 2014 and associated regulations. The registrations are consolidated at the person and tumour level and pertinent information is abstracted and classified using the International Classification of Diseases for Oncology.

This valuable asset contains information of all cancers diagnosed in Victoria. The cancer data collected is used to monitor cancer trends and to assist in the planning, management and assessment of Victorian cancer control activities. The data also contributes to the national Australian Cancer Database and international cohorts.

Over the years as increasing screening techniques and new pathological test types have been developed to detect cancer or the likelihood of developing cancer, it became challenging for the VCR to capture complete and accurate reporting from pathology laboratories. Historically, a histology report was primarily the diagnostic measure of the presence of cancer. Artificial intelligence software (E-Path Reporter [1]) was piloted to select reports diagnostic of cancer and is now implemented in thirteen of the largest cancer reporting pathology laboratories in Victoria.

This tsunami of electronic pathology data has obviously decreased the administrative burden for both the VCR and laboratories, but it has resulted in the VCR having to re-evaluate its processes, the data we collect and seek further efficiencies to maintain our timely reporting of cancer incidence and mortality in Victoria.

Implementation/experiences

E-Path Reporter is an electronic cancer data delivery system that completely automates the selection and reporting of cancer cases. It uses artificial intelligence to identify reportable diagnoses of cancer and a secure messaging engine to deliver selected reports electronically in near real time.

There were many advantages of implementing such a system including improving accuracy and completeness, a standard report format, decreased administrative time managing paper and follow-up of missing reports. Since 2012 thirteen pathology laboratories have implemented the E-Path Reporter software and another two are currently in progress of. This has resulted in a 45% increase (from pre 2012 to 2017) in the number of reports submitted (including a substantial increase in reporting of haematological cancers) and a 19% decrease in ineligible reports submitted.
Conclusion

VCR is now receiving 94% of all pathology electronically. This has resulted in an increase in the number of pathology reports; an increase in the tumours reported and improved classification of tumours.

Given the burden of cancer is expected to continue to rise over the next 10 to 15 years by 38% (from 2012-2016 data projections [2]), the burden from those reporting laboratories is set to rise equally.

A continuing challenge for the VCR will be how to best manage and process this data to ensure timely provision of the much utilised cancer information we generate. As a result of electronic standardisation of pathology, investigation is being undertaken to further utilise artificial intelligence to auto-extract data elements and to enable additional data elements to be collected by the VCR. This will overall improve reporting outcomes.

Additionally, further streamlining of processes including a review of what the VCR collects and why, is an ongoing task. Work on benchmarking within the processing team and possibly externally is continuing to ensure the Registry is appropriately resourced to manage this tsunami of information into the future.

References


Transition to Implementation of ICD-11 – What do we need to consider?

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Introduction

The International Classification of Diseases, Eleventh Revision for Mortality and Morbidity Statistics (ICD-11 MMS), referred to in this paper as ICD-11, has had several phases of development since the formal launch of the ICD revision process in 2007. The process incorporated a wide range of clinical, scientific and technical advice, and requirements of future users of the classification for statistical and clinically-related purposes.

A version of the ICD-11 was released for World Health Organization (WHO) Member State comment at the ICD-11 Revision Conference in Tokyo on 12 October 2016. Following this, focused field trials of the classification, through some WHO Family of International Classifications (WHO-FIC) collaborating centres occurred in the latter half of 2016 and more extensive and specialised field trials continued during 2017.

Member State comments and feedback from the field trials and comments from statistical stakeholders were used in the final phase of development to prepare ICD-11 to ensure it is fit for purpose (i.e. for mortality and morbidity coding, data collection and reporting) for implementation from June 2018.

During the latter stages of development, centralised editing of ICD-11 occurred at the WHO, advised by the ICD-11 Joint Task Force (JTF) that included experts in the use of ICD for mortality and morbidity coding, data collection and reporting of statistics. The JTF has provided strategic and technical advice to the WHO for the finalisation of the ICD-11 and input to the classification has drawn on scientific advice, where recommended by the JTF and/or WHO.

The ICD-11, is now available for implementation. This Eleventh revision is a considerable advance on the Tenth Revision, with features that mean transition to it will involve a range of activities that need to be planned carefully in each country. The paper provides some background related to the development of ICD-11 as well as vital information to countries on the benefits of ICD-11. An outline will also be presented around important issues that countries will need to consider leading up to transition, during transition and implementation.

It is anticipated that the transition process and considerations will be similar for both mortality and morbidity purposes, so most of the information in this document applies to the use of ICD-11 for both mortality and morbidity, although some information is specific for one use or the other.

Transitioning requires forward planning. Parallel running of two classifications at the same time may be required (e.g. maintaining the current classification whilst implementing the new classification to ensure a seamless transition) for a defined period. Costs and benefits analysis should be undertaken at the outset and evaluated to inform decisions.
around a forward thinking strategic plan. Change management and implementation projects should be developed with transition, implementation and post implementation phases included to ensure a successful introduction to the ICD-11 MMS within countries. Time and motion studies (e.g. dual coding studies – current versus new) may be needed to determine the need for any increase in the health information workforce (especially at the outset).

Considerable lead time will be required to build IT infrastructures to support the new classification structure (e.g. health information management systems, morbidity coding tool software developers, mortality coding systems such as Iris). Mapping (crosswalks, bridge coding) will be vital to ensure consistency with time series analysis and development of casemix/activity based funding systems (groupers). Individual countries may want to develop standards or guidelines around how they use specific features to ensure consistency in mortality and morbidity (including primary care) coding and reporting nationally.

Education, awareness and stakeholder buy in regarding the ICD-11 MMS is needed up front (before transition commences). Timing of transition involves balancing costs against benefits. In the longer term, remaining with ICD-10 will become increasingly difficult, due to outdated content and lack of updates (i.e. the last ICD-10 updates were those agreed at the World Health Organisation, Family of International Classifications (WHO-FIC) Annual Network Meeting and Conference in Mexico City in October 2017).
The International Classification of Health Interventions (ICHI): now available for testing

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Introduction

Development of the World Health Organization’s International Classification of Health Interventions (ICHI) has been underway since 2007. Once finalised, ICHI will provide a standard basis for collecting, aggregating, analysing, and comparing data on health interventions across all sectors of the health system. Development of ICHI is being undertaken by the ICHI Development Group, within the WHO Family of International Classifications Network.

ICHI is built on a tri-axial structure, with each intervention described in terms of three axes: Target (the entity on which the Action is carried out), Action (the deed done by an actor to the Target), and Means (the processes and methods by which the Action is carried out). Each axis consists of a coded list of descriptive categories, and each intervention is represented by a title and a unique seven-character ‘stem code’ denoting the axis categories for that intervention. For example:

‘Closed biopsy of trachea’ (JBA AD AD)

    Target: Trachea (JBA)
    Action: Biopsy (AD)
    Means: Per orifice endoscopic (AD)

Features

Features of ICHI that distinguish it from existing classifications (such as the Australian classification) include:

• Broader scope: ICHI covers the full range of diagnostic, medical and surgical interventions, as well as content not found (or incompletely covered) in national classifications, including interventions relevant to allied health, assistance with functioning, nursing, community health, mental health, rehabilitation and public health.

• A wide range of extension codes for recording additional information about interventions, including medicaments, assistive products and therapeutic products, as well as information such as quantification, laterality, interventions provided together, and a more detailed description of anatomy.

• Consistency with other WHO reference classifications ICD and ICF.
Extension codes can be added to ICHI stem codes when needed to more fully describe a given intervention. This use of post-coordination, modelled on the post-coordination mechanism within ICD-11, means that the size of the classification (i.e., the number of stem codes) can be contained without compromising the richness of information captured. ICHI also allows interventions provided as part of a package to be liked, or ‘clustered’, together, for example where several interventions to be delivered by different providers are combined within a rehabilitation program.

Availability

ICHI is publicly available online via a purpose-built user interface: the ICHI Platform. It is possible to view classification content organised according to either Target, Action or Means, or to browse through the four sections of the classification:

1. Interventions on Body Systems and Functions
2. Interventions on Activities and Participation Domains
3. Interventions on the Environment
4. Interventions on Health-related Behaviours

The ICHI Platform includes a search tool and a comment facility through which users can have input into the development of the classification. Guidelines for Users provide assistance with identifying the most appropriate ICHI code to assign for a given intervention and explain coding conventions for the use of extension codes and cluster coding.

The first alpha version of ICHI was produced in 2012, and a beta version was released for testing in October 2017. Following an initial round of coding trials, reviews and mapping exercises in the first half of 2018 a formal program of beta testing will be conducted by the WHO, commencing in October 2018, with a view to release for implementation in 2019.

This presentation will introduce the classification, describing its underlying tri-axial structure, organisation and content. The wide variety of potential ICHI use cases will be outlined, including for producing internationally comparable data on health interventions, redeveloping or extending the scope of national classifications, supporting global initiatives such as the Sustainable Development Goals and Universal Health Coverage, and use for collecting data by countries that lack a national classification. Current opportunities for commenting on the ICHI Beta version will be outlined. Finally, possible implications for countries like Australia, which have an existing interventions classification, will be discussed.

The current version of ICHI can be accessed via: [https://mitel.dimi.uniud.it/ichi/](https://mitel.dimi.uniud.it/ichi/)
Chronic Diseases Study: the outcome for Eleventh Edition of ICD-10-AM and the ACS

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Introduction

The burden of chronic diseases is increasing because of Australia’s aging population (Australia’s Health, 2016). In response to this challenge, in 2014, the Australian Consortium for Classification Development (ACCD) undertook a revision task for the Ninth Edition of the International Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM) and the Australian Coding Standards (ACS). It resulted in the introduction of a set of 29 supplementary codes for chronic conditions implemented on 1 July 2015 (ACCD, 2014). These codes listed in ACS 0003 Supplementary codes for chronic conditions were developed to capture those chronic conditions that have not been actively managed (under the criteria used for coding additional diagnoses in ACS 0002). The supplementary codes for chronic conditions are only to be assigned where it is evident that the condition is part of the current health status of the patient during the episode of admitted care (ACS Ninth Edition, 2017).

Method and data

Given the supplementary U codes (SU) codes have been collected for two years now, it is timely to analyse the new data so the continued improvement of ACS 0003 is evidence based. The primary questions we wanted to ask are whether episodes containing SU codes are different from episodes with corresponding codes from other chapters within ICD-10-AM; and from other episodes that do not contain both SU and other chapter codes. This analysis was undertaken to determine the need for coding chronic conditions from both a clinical picture perspective as well as whether they have any impact on the use of hospital resources. The cost comparison between these three groups will be analysed at the Diagnosis Related Group (DRG) level, recognising that DRGs contain clinical and resource homogenous episodes (AR-DRG Ninth Edition, 2017). One year (2015-16) of the National Hospital Cost Data Collection (NHCDC) was utilised for costing analysis and two years (2015-16 to 2016-17) of the Admitted Patient Care (APC) data were used for length of stay (LOS) analysis.
Summary of findings

Our discussion will focus on three major areas of findings of the statistical analysis as summarised below:

1. Within a great majority of Diagnosis Related Groups (DRGs), episodes that contain SU codes use less resources than those episodes that have corresponding chapter codes, measured by the mean cost and average length of stay (ALOS). This is consistent with the principles in ACS 0002 Additional diagnoses, which maintains that: “The national morbidity data collection is not intended to describe the current disease status of the inpatient population but rather, the conditions that are significant in terms of treatment required, investigations needed and resources used in each episode of care.”

2. Also within a majority of DRGs, episodes containing SU codes use relatively more resources than those episodes without pre-existing chronic diseases (i.e. episodes that do not contain SU and corresponding chapter codes), although the degree of the difference is not as great as that identified within the first comparison.

3. There are exceptions in some DRGs where the presence of SU codes seems to be associated with more resource utilisation than those episodes with corresponding chapter codes. These exceptions require further studies.

To date, only a limited amount of data has been available for analysis. We consider that there appears to be substantial value in continuing to collect chronic condition information in relation to better understanding episode costs and LOS.

The continued use of SU codes to collect chronic disease data (not captured under ACS 0002) may not be a practical ongoing option. It would be preferable to code chronic diseases within the ICD-10-AM categories, and to flag those conditions that do not meet ACS 0002. Until such a flag is in place, it would be important to maintain the current SU code approach which has yielded valuable information in a short time period.

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What to expect in AR-DRG Version 10.0

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**Introduction**

The Australian Refined Diagnosis Related Groups (AR DRG) classification groups together treatments and services provided to admitted patients to enable hospitals to be funded for these services using activity based funding arrangements. All public and private hospitals in Australia use the AR DRG classification system. While the AR DRG classification is instrumental to activity based funding, it is also used for many other purposes including performance management, benchmarking, epidemiology and research.

The Independent Hospital Pricing Authority (IHPA) is currently developing AR DRG V10.0. It is anticipated AR DRG V10.0 will be approved by the Pricing Authority in November 2018 and released mid-2019. This presentation will provide an overview of how IHPA undertakes AR DRG development, how proposals for change are assessed and the areas of refinement that were reviewed for AR DRG V10.0.

**AR DRG refinement process**

In developing AR DRG V10.0, IHPA identified the priority areas for AR DRG development from the many submissions received. Following this, every proposal and potential areas of refinement that were considered went through an analytical and clinical review process, followed by wider stakeholder consultation, as demonstrated in Figure 1.

*Figure 1: Illustration of inputs to AR-DRG refinement process*
Areas under review for AR DRG V10.0

A wide variety of proposals were assessed in the development of AR DRG V10.0. Full details of all proposals considered in the development of AR-DRG V10.0 can be found in the Consultation paper on Australian Refined Diagnosis Related Groups Version 10.0 (IHPA 2018). These proposals were sourced from a number of areas, including issues held over from AR DRG V9.0 development, areas identified through IHPA’s pricing work and submissions from stakeholders to consultations on the annual Pricing Framework for Australian Public Hospital Services (IHPA 2017) and the AR-DRG public submission process.

Major proposals considered in the development of AR DRG V10.0 included:

- Refinement of the Episode Clinical Complexity Model, the method for calculating patient clinical complexity within the AR-DRG classification. This refinement particularly focused on ensuring stability of the model between versions and a clinical review of the entire set (12,558 codes) of diagnosis codes currently in scope for the Episode Clinical Complexity Model. In particular, codes that may be considered ill-defined or not clinically significant in contributing to episode complexity, and codes with a high rate of increase in assignment that coincided with the introduction of pricing using AR-DRG V8.0 on 1 July 2016 were flagged for clinical review.

- Differentiating between types of caesarean sections according to whether they occurred before labour has commenced or after labour has commenced, given that ‘in labour’ caesarean sections are 26 percent more expensive than caesarean sections performed before labour has commenced.

- The classification of interventions for nephrolithiasis to create a more clinically coherent grouping for nephrolithiasis interventions and to remove the sameday variable that resulted in some episodes with nephrolithiasis interventions being classified to a medical DRG if they occurred in an overnight admitted episode.

- Reviewing the classification of newer technologies which are increasing in number, such as endovascular clot retrieval and transcatheter aortic valve implantation, to ensure they are appropriately accounted for in the AR DRG classification.

- Reviewing the DRG related to dental extractions and restorations, due to stakeholder concerns that the AR DRG classification was not accounting for the cost and complexity of these services.

- Reviewing the DRGs related to drug and alcohol treatment, due to stakeholder concerns that they lacked clinical validity and did not differentiate between the complexities of different drug dependence and withdrawal treatments.

References


Revising the scope of the AR-DRG Complexity Model

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Introduction

A high priority identified for development in Version (V) 10.0 of the Australian Refined Diagnosis Related Groups (AR-DRG) classification was a review of the stability of the Episode Clinical Complexity (ECC) Model to ensure that it is robust and fit for purpose. As part of this process a review of the list of diagnosis codes considered in-scope or out of scope in terms of receiving a complexity value was undertaken.

Background

A number of diagnosis codes are excluded from consideration in the ECC Model based on guiding principles formalised during its initial development. The guiding principles aimed to characterise the scope of the ECC Model in terms of diagnoses considered relevant for DRG classification purposes. Generally codes were removed that would not normally be assigned in an admitted acute setting and/or could undermine the ECC Model by either providing perverse incentives for code assignment and/or allowing the model to be devalued by the indiscriminate assignment of codes for unspecified, ill-defined and transient conditions or by codes that provide additional detail or context to other diagnosis codes already present on the record of the acute admitted episode of care.

Review

The guiding principles for exclusion developed in the initial V8.0 development were expanded and evolved in consultation with the Independent Hospital Pricing Authority’s (IHPAs) Classifications Clinical Advisory Group (CCAG). The entire in-scope code set was reviewed against these principles (12,558 codes). A particular focus was to review the ‘other’ (‘.8’) and ‘unspecified’ (‘.9’) or ‘residual’ codes that may be considered ill-defined or clinically insignificant, codes with a high increase in assignment, coinciding with the introduction of pricing using AR-DRG V8.0, and also new codes from the Tenth Edition of the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM) that had been added to the in-scope code set for V9.0. Potential exclusions were flagged and reviewed in consultation with clinicians from CCAG who provided clinical opinion as to whether these conditions fit within the inclusion or exclusion principles. This resulted in a clinically informed list of 1,548 codes proposed for exclusion in V10.0, with the potential to decrease the current in-scope codes by approximately 12%. Some codes were retained even though in many instances they did not represent conditions which add to the
complexity of an admitted episode of care. For example, they may have been deemed significant when assigned in the context of other conditions, such as immunosuppression or neoplastic disease. The complexity model will also benefit from refinements to

**Australian Coding Standard (ACS) 0002**
Additional diagnoses in terms of restricting assignment of codes when deemed insignificant to the admitted acute episode of care.

**Next Steps**

The review of in-scope codes was completed in early April and IHPA is now in the process of seeking wider review of the updated list of diagnosis exclusions through its committees and a public consultation process to be undertaken in May. The list of proposed diagnosis exclusions will be further refined based on feedback received from IHPAs committees and through the public consultation. Impact analysis will also be undertaken to ensure the updated list of diagnosis exclusions does not undermine the stability of the AR-DRG classification or that codes which have a material impact on describing cost are not removed. The final list of diagnosis exclusions for AR-DRG V10.0 will be presented to IHPAs board for approval in November 2018.

**Conclusion**

Long term stability of the complexity model has been the overall goal of the diagnosis exclusion review to ensure that it is not undervalued by the assignment of codes that do not reflect true complexity in an admitted episode of care.
Unique classifications - Development of the Australian Teaching and Training Classification Version 1.0

Claessen S

Introduction

In December 2014, the Independent Hospital Pricing Authority (IHPA) provided advice to the Council of Australian Governments (COAG) Health Council that it is feasible to transition funding for teaching and training activities from block funding and grants to Activity Based Funding (ABF) arrangements. The work has resulted in the development of the Australian Teaching and Training Classification (ATTC) version 1.0.

The teaching and training classification is unique, in that it captures the number and mix of students, graduates and postgraduate students a public hospital is training. Several steps were taken in the process of determining whether or not teaching and training activities might be suitable to transition to ABF arrangements. These included a project to define teaching and training and to identify associated cost drivers for ABF purposes. The definitions and cost drivers project was an initial step in the teaching and training work program and was intended to: develop a set of nationally agreed definitions for teaching and training; identify and analyse cost drivers for teaching and training; and produce a classification development framework which considered meaningful ways in which identified cost drivers could be grouped to explain resource usage. The outcomes of this project underpinned IHPA's advice to the COAG Health Council and formed the basis for IHPA's work on classification, counting, costing and pricing processes for teaching and training.

In addition, IHPA conducted a costing study to collect teaching and training activity and cost data at a sample of Australian hospitals, and produced costed data to inform the development of a teaching and training classification. To support the classification, activity data have been collected through a data set specification on a best endeavors basis since 2014. There has been a substantial increase in data reported by jurisdictions over this time, which supports the development of systems which underpin ABF for teaching and training.

This presentation will describe the ATTC Version 1.0, the development process followed by IHPA and some of the challenges to incorporating training activities at hospitals for ABF. The work undertaken by IHPA supported the collection of significant information about the health professional group, stage of training, type of qualification, and year of training. However, until more data can be collected for modelling what best predicts costs of teaching and training in the hospital setting, the first version of the classification includes fewer points of
variations than is seen in other classifications produced for pricing ABF, such as the AR-DRG classification.

Developing the ATTC has broken new ground for activity based classifications. The Pricing Authority which governs IHPA’s work, approved ATTC version 1.0 in April 2018 and the classification will be released for national use on 1 July 2018.

References


The challenge with using clinical information for classification development

Higgins A¹

1. The challenge with using clinical information for classification development

Introduction

Healthcare classifications are designed to group information into groups that reflect similar clinical or resource use. Such classifications have many uses, from research, service planning to funding allocation [1].

Increasingly, classifications are being developed for healthcare areas where resource utilisation and cost is determined through patient characteristics and services [2]. These patient characteristics and services will vary considerably depending on the primary purpose of the type of care that is required. As such, the variables that capture this information for classification purposes differ between the type of care being provided. In acute care, the diagnoses and procedures that are the key determinants of resource utilisation and clinical complexity and are captured through the coded diagnosis and procedure data [1]. However, in other types of care, the characteristics and services may best be captured through clinical assessments and outcome measurements. These assessments provide standardised, objective information, that can be used to measure changes in health and social determinants [3] which is a key component in healthcare classifications.

Clinical assessment and outcome measures in classification development

Drawing on experience and examples in classification development, a brief overview of the use of clinical information in healthcare classifications is provided with a review of the challenges that exist in using clinical information for classification development and refinement. The use of clinical data for secondary purposes is discussed, with the importance of standardisation and inter-rater reliability for assessment and outcome measures, and the impact of local business rules and decisions when collecting clinical information.

Clinical data such as triage in emergency care, stage of illness in palliative and mental health care, and outcome assessments (functioning and cognition assessments such as the Standardised Mini-Mental Examination and Health of the Nation Outcome Scales) are developed to support treatment plans and evaluate care provided. As such, the use of this data needs to be carefully evaluated for limitations and applicability for secondary use in classification development. Additionally, when seeking to use this data, the training, collection and reporting methods should also be assessed in terms of standardization and comparability when seeking to use the data in classification development and refinement. The challenges that exist with the current data can be attributed to the fragmentation of Australia’s health system, variations in local business rules and assessment practices,
information systems architecture and the perceived clinical utility of assessments and outcome measures. Examples of these challenges can be seen in regional variances of care type allocation, the intersection of collection protocols and single report, multiple use data policies and differing education and training requirements.

The importance of clinical engagement in all aspects of health information and informatics is highlighted as a key driver in the improving the utility and robustness of data gathered from clinical information. Additional steps that would add to this include the use of training, education and audits.

References


eLearning Environments: The Future for Coding Education & Training in the Workplace: Design, Development and Engagement

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Introduction

The purpose of this session is to present an approach to developing and adopting an eLearning environment for coding workplace education and training. Attendees will be exposed to new ideas from which they can consider if an eLearning environment would be feasible and valuable in their workplace. In this session the following will be discussed:

• Design: Utilising technology to enhance current program delivery
• Development: From concept into reality – the challenges, successes and learnings
• Engagement: Bringing the team on the journey

Professional Practice/Case Study Description:

Epworth HealthCare implemented our ‘Coding Portal’: a learning management system, in April 2017. Since this time it has evolved into what it is today and with continuous enhancement will extend its capabilities into what it will be tomorrow. Currently, the Coding Portal consists of various sections serving unique purposes:

• Group performance: Progress on daily and weekly group targets are updated several times a day,
• News Feed: A platform for coding updates, coding tips and resources along with industry information,
• Training: Speciality modules developed for blended learning throughout the organisation’s Training and Induction Program
• Education: Clinical information (relevant to clinical classification) available to reference and Coding Quizzes to demonstrate understanding and application of coding standards, rules and advice.
Implementation/Experiences:

The establishment and growth of an eLearning environment requires commitment and dedication to content development and maintenance. Discussion points on our experiences with design, development and engagement will include:

- Framework for and refinement of content
- New content opportunities
- Software limitations and workarounds
- Feedback and modification

Conclusion

The vision of our Coding Portal remains as a single point of reference for Coders to go to for any resource they need to succeed and excel in their roles. To this end there is still work to do and ideas to be implemented in order for this vision to come to full fruition.

Development of an eLearning system is an ongoing process, as is learning. As new functionality is created or becomes available it is about trial and error. Attendees will be encouraged to embrace what doesn’t work as an opportunity to create a better way forward.
Introduction

The introduction of eLearning within the Coding and Health Information Management space is something we must all start to think about. Whether out of necessity or innovation, eLearning; utilising a learning management system, enables us to re-think how we provide education and training.

eLearning presents the opportunity to meet the demands of the modern (albeit short-staffed) HIM/ Coding workforce, providing consistency and efficiency in education and training delivery.

Whilst still providing support to the individual or team, it encourages autonomous learning which will develop and expand the expertise of the workforce, as well as facilitating ongoing professional development.

In this session we will work through the:

- **Evaluation**: data analytics to target education and training
- **Impact**: Resources and Staffing - has the time and effort in setting up an eLearning module from scratch been a ‘benefit or burden’?
- **Outlook**: professional development Vs essential education - what role does eLearning play?

Professional Practice/Case Study Description:

We implemented our eLearning packages out of necessity in January 2018 and are working towards them being the ‘one-stop-shop’ for the continued education and development of Health Information Managers and Clinical Coders; both old and new.

There are two core components to these eLearning Packages; eTraining and eEducation. The former providing assistance with self-directed learning for new graduates or staff that are undertaking a comprehensive training schedule, and the latter incorporates all resource material required to provide continuous education and encouragement of professional growth and development for both new and current staff.
We will look at how these online education packages have been received by staff, how they have improved staff education and accountability, and provided a revised resource allocation in a short-staffed environment.

**Conclusion**

We still have a lot of work to do in order to achieve the overall desired outcome of the eLearning packages, but they are a valuable resource that we are able to provide our staff in order for them to excel as Coders and HIMs. The eLearning packages provide coding staff at all levels, an additional resource for enhanced learning using accountability and autonomous learning, as well as an opportunity for professional growth.

The road ahead is still long, but one with endless opportunities in the way of online education and training.
Creating a skilled Clinical Classification workforce in the Kingdom of Saudi Arabia- Challenges and Successes.

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Introduction

Saudi Arabia is currently transforming their whole health system in line with their Vision 2030 program. This National Health Transformation Program 2020 (NHTP 2020) is an ambitious program that aims to improve performance, accountability and transparency with measurable value based healthcare.

Due to Saudi Arabia not having a certified or recognised Clinical Classification training program to support value based healthcare, steps were initiated to implement this program across all 249 Ministry of Health (MoH) hospitals.


This paper discusses the way in which a unique training program was rolled out which saw experienced Clinical Coders native to Saudi Arabia become Assistant Trainers. This pilot program then having a twofold effect of both training the Assistant Trainers and educating new Coding Trainees. The program involved 100 new trainees and 12 Assistant Trainers and was delivered across the five regions in Saudi Arabia.

Project development and implementation

The Vision Realisation Office (Finance Stream) was charged with ensuring that Clinical Classification data was valid for data collection, analysis and reporting purposes and supported the Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI) to provide training to the Ministry of Health (MoH) Clinical Coders.

A successful but ambitious and unique pilot program was put into place with the intention of training 28 current MoH Clinical Coders, this required all students from across the
Kingdom of Saudi Arabia (KSA) to attend classes in Riyadh for 14 weeks.

Based on the challenges faced by the students being away from their home environments for 14 weeks the next phase of the program was adjusted to deliver two thirds of the course contact hours into the five regions. Assistant Trainers who underwent a two weeks intensive train the trainer course prior to the commencement of the course assisted in delivering the educational material, and were supervised by experienced educators from Australia.

**Challenges**

As with any new project there are challenges. Some of the challenges encountered with this project included overcoming cultural differences in educational delivery, language barriers, and logistic issues. A challenge for both Assistant Trainers and Coding Trainees was the pre-selection process with some students having very weak English comprehension skills and/or no clinical knowledge. Ensuring consistency in the content and delivery of materials across the educational experience for Coding Trainee’s was a priority.

With ICD-10-AM only being available in English the students who struggled the most were those with poor English comprehension. The logistics proved to be challenging with certain issues arising which were outside of the scope of CBAHI’s educators.

**Conclusion**

The program results demonstrated students had an increased understanding of the requirement of providing quality clinical coding data with greater than 63% of the Coding Trainees achieving a successful outcome. Information and feedback that was obtained from both Assistant Trainers and Coding Trainees will be used to make improvements to future training programs. It is hoped that this initial program will be improved upon and continued as a support mechanism for local hospitals in Saudi Arabia for the training of new Clinical Coders.
Posters
Coding Data for all Purposes: NSW District Network Return Audit

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Introduction

The NSW District Network Return (DNR) is an annual data submission of health service cost results at patient and service level. The DNR, combined with other state equivalent collections, forms the basis of the national efficient price and price weight derivation by the Independent Hospital Pricing Authority.

The NSW Ministry of Health Activity Based Management Unit has developed a comprehensive state wide DNR Audit Program to assess compliance in the delivery of consistent and accurate cost results.

The aim of the audit is to ensure that each District and Network in NSW adheres to state costing standards and associated processes. The audit is mandatory and takes place every 12 months, conducted by internal audit officers.

In the 16/17 Financial Year (FY), the Sydney Children Hospital Network (SCHN) costing team worked with stakeholder departments including Patient Administration, Coding, Emergency and Theatres to improve the quality of clinical data used within the costing process. This enabled the network to improve their data quality score from 74% to 87%.

The costing team was also tasked with providing evidence to demonstrate SCHN’s compliance to data collection, governance & quality expectations, ensuring robust process had been established aligned with the NSW ABF Costing Accounting Guidelines.

The DNR program also audits the integrity of patient data, to ensure it is reliable and accurate. The coding unit was required to demonstrate that controls were in place to review and rectify critical coding errors. Since the onset of the DNR audit program the coding unit has been able achieve a 50% reduction in critical error rate from 3.8% in 14/15 FY to less than 1.5% in16/17 FY, improving NWAU outcomes for patient costing.

The coding unit continues to trend and analyze errors and engages the support of the NSW coding Leadership Review group and system vendors to assess the logic of indicators and their application in a paediatric facility.

This poster presentation with provide a summary of the DNR audit program, provide some examples of assessment criteria and results, and also outline audit recommendations.
Mixed Method Examination of Nursing Documentation Quality in an Early Parenting Centre, translating to clinical code in the Medical Record.

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Introduction

The importance of accurate and informative nursing documentation highlights the complex work done by nurses. Clinical coders rely on accurate documentation in the health record to code services. This is supported by nurses accurately documenting a patient’s interventions and progress in the record.

Background

The literature supports accurate clinical documentation within an acute setting as vital for activity-based funding. Clinical documentation is an area of focus for organisation’s working to improve quality of care and resource utilisation. Literature on the narrative within the health record that informs the clinical code in an Early Parenting Centre (EPC) has not been found.

Aim/Objectives

The aim of this research was to investigate the quality of documentation in the medical record of the registered nurse (RN) which then is used to by the clinical coders to generate ICD-10AM diagnostic and procedural codes.

Method

An integrated mixed method design, to review the nursing documentation pertaining to the infant’s health record was used.

The process used was:

- Quantitative – retrospective data collection tool auditing 75 medical records.
- Quantitative – Demographic staff survey open to RNs working in the residential units.
- Qualitative – Semi structured interviews for RNs and clinical coders which were audio-recorded after obtaining both the participant’s verbal permission and written informed consent.
**Results**

The outcomes will highlight areas of concern to facilitate accurate coding. Areas for improvement will be identified to support changes in nursing documentation in the Early Parenting Centre to increase the accuracy in coding.

**Discussion**

The research outcome indicated further investigation was needed using a validated health record audit tool and inclusion of all health records in the EPC. There is an indication that a education program is warranted within the EPC. This project has contributed to the development of new knowledge on nursing documentation practice and validate the work by nursing staff within the EPC.

**Conclusion**

This research will work towards improving the accuracy of clinical coding and contribute to productivity, service efficiency, and quality of documentation and staff skills within the Early Parenting Centre.
Engaging patients through the hospital website for health record requests

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2. University of Tasmania, Launceston, Tasmania, AUSTRALIA

Introduction

As hospitals in Australia embrace the digital age, patients are being encouraged to actively participate and take an interest in their own healthcare. To achieve this, patients need to access their health records, which they are entitled under privacy legislation. Patient information is stored in many forms of electronic health records and the rights of patients to apply to access their information is still fundamentally important.

In an information age, patients want immediate access to information and want to find this information quickly and easily on the internet. This includes information on how they can access their hospital health record. Yet, anecdotally, information about patient record access isn’t well documented on hospital websites. This study will examine how patients seek information about how to apply for access to their health record, and how relationship marketing plays a role in using web resources to better inform patients about health record requests. The study will be testing an audit tool to determine how patients engage with health organisations to process these types of requests.

Following assessment of the hospital websites and the patient experience, a framework will be developed to assist hospitals to improve their web information to engage and service its customers, the patient. The ease of access and usability of a hospital website allows patients to interact with the hospital in applying to access their health information and increase in engagement with the healthcare provider to take control and participate actively in their healthcare choices for better health outcomes.
Data verification for quality and validity.

P Nilsson1

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Introduction

Data quality can be affected by user entry error, system calculation error and discrepancy between data sets. Verified data is more reliable can be used in reporting and decision making with confidence. Without validation of data through audits and review, the quality and validity of data is unknown and the presence of errors should be assumed (Flood et al. 2017; Munyisia, Reid & Yu 2016).

Published studies of data reviews have shown that data error adversely affect aspects of the health service. Electronic health records have changed the way data is collected and verified. Unverified data may adversely affect funding, performance and service planning (Hespe et al. 2018; Munyisia, Reid & Yu 2016).

Strategies for improving data quality include improved auditing practice and ownership of data validation role. Role development for health information managers as responsible owners of the data verification process may be a step toward both professionalism and improved data integrity (Hill et al. 2017; Monto et al. 2016).

Awareness and an appreciation of the significance and scope of the data verification process warrants dedicated role development to give reported data reliability and confidence (Monto et al. 2016). Data verification is important for health data with integrity, and may also provide professional role development for health information managers.

References


eMR, the source of truth: Health Information Managers engaging with staff to ensure patient data is integrated into a single location

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Introduction

*SCHN* is working on a centralised Health Care Record with all patient information held and accessed in the eMR and it is expected that important patient information will be held here. The objective is to appropriately not only identify the areas that retain patient health care records outside of the eMR but also the detail of what type information is retained, in what format and volume to ensure that all patient health care information is viewable in the one place at any time from any location “single source of truth”.

The Health Information Unit manager is responsible for integrating the patient health care records into the eMR.

While the days of paper health care records are becoming a thing of the past, information is stored in databases, electronic drives. The challenge now lies in integrating the patient health care records stored outside of the eMR into the eMR while maintaining the reason why the information originally became stored outside of the main patient health care record while observing the relevant privacy requirements and expectations.

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