User perceptions of the implementation of an electronic medication management system (eMMS) in a paediatric setting

Rae-Anne Hardie\textsuperscript{a}, Melissa T Baysari\textsuperscript{a,b}, Rebecca Lake\textsuperscript{a}, Lauren Richardson\textsuperscript{a}, Cheryl McCullagh\textsuperscript{c}, Johanna I Westbrook\textsuperscript{a}

\textsuperscript{a}Australian Institute of Health Innovation, Macquarie University Australia
\textsuperscript{b}St Vincent’s Clinical School, UNSW Australia
\textsuperscript{c}The Sydney Children’s Hospitals Network Australia

HIC Brisbane
9 August 2017
Successful implementation of eMM systems

Studies in adult hospitals show this depends on:

• Availability of super users (doctors and nurses)
• Training, including multiple training methods to suit staff needs
• Ongoing user support
• Strong leadership
• Interdisciplinary planning and implementation group
• Comprehensive implementation strategy
• System that is fast, reliable, and user friendly
• Anticipation of workflow changes well before implementation
## Why study eMMS implementation?

<table>
<thead>
<tr>
<th>User acceptance</th>
<th>Paediatric setting</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Failure to consider all aspects of a system implementation may lead to poor acceptance of the system by users</td>
<td>• No literature exists on user experiences in eMMS implementation in a paediatric setting</td>
<td>• Previous studies did not follow user experiences over time</td>
</tr>
</tbody>
</table>
Aim of the study

• To explore the views of nurses and doctors about the strategy used to implement an electronic medication management system (eMMS) in a paediatric hospital

• To identify changes in their views over time, with week 1 interviews, then follow up at 3 and 6 weeks to identify if views changed over the implementation time frame
Method

Setting
• 8 wards in a children’s hospital in Sydney
• Following roll-out on 2 wards, one new ward implemented the system each week for 8 weeks

Participants
• Doctors and nurses using the eMM
  – Residents, registrars, specialist consultants, and surgeons
  – Registered nurses, nursing unit managers, clinical nurse educators, enrolled nurses
• Two interviewers visited the ward each study week
• Recruited by direct approach (whoever was on ward)
• 90 users in total (60 nurses, 30 doctors)
Method

Interviews
• Short (~10 min) semi-structured interviews held
  – Week 1 (3 days post implementation)
  – Week 3
  – Week 6
• Audio recoded and transcribed verbatim

Analysis
• Qualitative analysis classifying attitudes and perceptions into themes
• Three researchers came together to ensure consistency
• Disagreements resolved by consensus approach
Interview questions

1. What is your overall impression of how the eMMS is going?
2. How has the eMMS changed your prescribing (or administration) of medications?
3. Do you think the eMMS is safer or less safe than the paper system? Why?
4. How is the eMMS helping and/or hindering your work?
5. Have any new problems or issues emerged?
6. Can you think of any ways the eMMS can be improved?
7. Overall, do you think implementation of the eMMS has been positive or negative for you as a health professional? For patients? For the organisation as a whole?
Results

THEMES RELATED TO IMPLEMENTATION
# Overall themes

<table>
<thead>
<tr>
<th>Theme</th>
<th>Positives</th>
<th>Negatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training</td>
<td>✔</td>
<td>!</td>
</tr>
<tr>
<td>Support during implementation</td>
<td>✔</td>
<td>!</td>
</tr>
<tr>
<td>Resources</td>
<td></td>
<td>!</td>
</tr>
<tr>
<td>After hours help</td>
<td>✔</td>
<td>!</td>
</tr>
<tr>
<td>Roll-out strategy</td>
<td></td>
<td>!</td>
</tr>
<tr>
<td>Planning</td>
<td></td>
<td>!</td>
</tr>
<tr>
<td>Overall impression with implementation</td>
<td>✔</td>
<td></td>
</tr>
</tbody>
</table>
User-specific differences

• Some views were more often expressed by doctor or nurse users
• Nurses perceived that doctors and specialists had not received adequate training
• There were no doctor super users, therefore doctors relied on nurses for assistance in navigating the system
  – However the interface for nurses and doctors is not identical
• This highlights the importance of super users for each type of user
### Implementation factor

**Positive**
- Training was available and provided as needed
- Super users available every shift

**Negative**
- Limited practice on a real patient
- Training too early before implementation
- No super-user doctors, only nurses
- Insufficient training for senior doctors
- Lack of training in some work process changes (e.g., location medication is checked)

---

“It’s been positive in that we’ve had lots of backup and there’s lots of help in that first few days when we were all still very new to the system.” Nurse, week 3

“…if we maybe had done the simulation earlier on with a fake patient and had to administer some sort of medication, then I feel like I may have retained that information a little bit more.” Nurse, week 1
## Support during implementation

<table>
<thead>
<tr>
<th>Implementation factor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive</strong></td>
</tr>
<tr>
<td>• Hospital asked for feedback on the system</td>
</tr>
<tr>
<td>• Support staff available</td>
</tr>
<tr>
<td>• Technical problems fixed quickly</td>
</tr>
<tr>
<td>• IT support</td>
</tr>
<tr>
<td><strong>Negative</strong></td>
</tr>
<tr>
<td>• Insufficient staffing on wards during implementation</td>
</tr>
<tr>
<td>• Staff working overtime to complete tasks</td>
</tr>
<tr>
<td>• Slow responses to problems</td>
</tr>
<tr>
<td>• Support people unavailable when needed due to covering multiple wards</td>
</tr>
<tr>
<td>• Lack of long term and weekend help on wards</td>
</tr>
<tr>
<td>• Support staff not listening to concerns with system</td>
</tr>
<tr>
<td>• Difficulty getting access/training for agency and casual staff</td>
</tr>
</tbody>
</table>

Simple stuff is fine and that’s resolved quickly. ” Nurse, week 1

“We can’t do what we used to do if it’s going to take that much time, and we’ve had issues along the way, and getting answers to them have been a little bit difficult…” Nurse, week 1
**Resources**

### Implementation factor

**Negative**
- Insufficient power points to charge computers
- Need computers at bedside
- Would prefer tablets or mobile devices
- Laptops are heavy
- Computers and network very slow
- Logging on/off system slow and plagued with errors
- Laptop computers take up too much space
- Desktop computers preferred to small screen, slow laptops
- Lack of computers at peak times, e.g. rounds

---

“*It is difficult to get close to the patient with the portable COW {computer on wheels}.*” Nurse, week 6

“I think it’s vital that we have a device at every bedside, but then the issue with that is logging in just takes so long and a lot of our prescribing is done on ward rounds…there are some wards that have individual computers and just the logging in process takes, almost the whole time that we spend with the patient….*” Doctor, week 6
## After hours help

<table>
<thead>
<tr>
<th>Implementation factor</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td>• After hours help has been good</td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>• Trouble finding help quickly on weekends/night</td>
<td></td>
</tr>
</tbody>
</table>

“When I’ve had issues…calling the generic IT number they often don’t know the answer and have to refer me to someone else who may or may not be available at the time and then that’s not very practical when you’re trying to prescribe on the spot.” Doctor, week 6

“So the only thing we’ve found a bit difficult is on weekends and part of that is just training.” Doctor, week 3
Implementation factor

Negative factors
• Difficulty caused by hybrid system (whole system didn’t go online at once)
• Potential for errors due to patients moving between wards where system was or was not yet implemented
• Fast roll out with lack of infrastructure to support it
• Issues not fixed before rolling out to other wards
• Some wards (e.g. respiratory) rolled out in their busiest month, better planning required for this

“In theory, it works well, however I think the roll out was perhaps too fast, the infrastructure is not quite there” Doctor, week 1

“…it would be better if the whole system was electronic because at the moment handover takes a while to do because you've got paper and you've got forms and it would be a lot easier if everything was electronic.” Nurse, week 3
Planning

Implementation factor

Negative factors
• Lack of input in designing the system from junior doctors, sub-specialty teams and nurses
• Lack of backup for system downtime or crashes, no way to administer medications
• System is not user friendly
• Some IT solutions do not fit with common ward procedures

“…many wards took up the system without a lot of input from junior doctors, and we’re the ones who use it a lot, and particularly a lot of the sub-speciality teams.” Doctor, week 1

“I think it’s been a reasonably difficult transition. I think the system is not particularly intuitive.” Doctor, week 1
Overall impression with implementation

<table>
<thead>
<tr>
<th>Implementation factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Implementation positive for users, hospital and patients</td>
</tr>
<tr>
<td>• Users see potential for implementation to be positive over time</td>
</tr>
</tbody>
</table>

“I don't know. I can see where it's going to be - in the end where it's all kind of nutted out and smooth and it's all whatever, that will be great.” Nurse, week 3

“Yeah, positive. I mean, it was always going to happen and it's good that - it's worked - it's been a lot more smooth than I thought it would be, definitely.” Nurse, week 3
Some themes emerged over time

Week 1

- Implementation
- Support during implementation
- Roll-out strategy

Week 3
- After hours help

Week 6
- Resources

Planning
- Training
Conclusions

• Majority of doctors and nurses perceived implementation to be positive overall, across all six weeks
• Early during implementation, users mentioned
  – **Support** (lack of staff, overtime, long waits to access support staff) and problems with **planning** and **roll-out strategy**
• Over time, as users became more familiar
  – Improvements to the system and **resources** (access to computers, network speed)
  – Specific **training** needs
• Doctor and nurse users had certain unique concerns
• Acceptance of a new eMMS by users relies on these implementation factors, therefore understanding users’ experiences may be valuable to other paediatric or adult hospital sites planning for eMMS implementation
Acknowledgements

We thank all participants who were interviewed for the study.

Ethics approval was obtained from the hospital’s Human Research Ethics Committee.

Funding: NHMRC Partnership Grant 1094878

E: rae-anne.hardie@mq.edu.au