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Assignment #2- Executive Summary

Nursing 654: Design in Healthcare

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Executive Summary: Prepared for Faculty of Engineering Students for the March 5, 2022, Hackathon, in Collaboration with Nursing 654 Students.

**Background & Context**

Patients experiencing moderate to severe infections may require intravenous antibiotics as part of their treatment plan. Treatment offered in the Home Parenteral Therapy Program (HPTP) can reduce hospitalizations, decrease emergency department visits, and facilitate treatment in a patient's home. This project's scope will focus on the four Calgary adult-based HPTP clinics and available supports. Our goal is to improve patients' experiences and outcomes by improving access to technology-based education.

Patients often arrive at the HPTP clinic feeling unwell, exhausted, and alone. To facilitate home-based IV antibiotic treatment, many patients receive a portable pump that delivers antibiotic infusions at predetermined times. Patients are provided with written, verbal, and video teaching to help support their learning. However, patients may feel overwhelmed by the amount of information combined with the challenges of being sick. Sanches, & Cooknell (2017) highlight the importance of patient education in reducing readmissions to the hospital. In the HPTP context, improved patient education can reduce admission to the hospital, decrease additional Emergency Department visits, and minimize additional HPTP clinic visits.

Calgary HPTP patients are supported by the clinical team, including regular check-ups in the hospital-based HPTP clinic and on-call nurses who provide phone-based support until 9:00 pm. However, there is no clinic support from 9:00 pm - 7:30 am. Patients that have trouble with their pumps, venous access, or infections may unnecessarily access other health services and experience anxiety or complications. Research has demonstrated that technology-based education can improve outcomes for some patients (Halldorsdottir et al., 2020). The utilization of technology can improve patient access to education and troubleshooting.

**Design Criteria & Strategy Description**

           As domain experts, we categorized the criteria into three areas: Must have, should have, and nice to have, as well as exploring the functional and non-functional parameters. Risling & Risling's (2020) user story template (Appendix C) assisted in identifying a technology to bridge the gap for patients.

**Must Have (version 1.0) – Patient education and trouble shooting portal**

|  |  |
| --- | --- |
| * Usability. (Appendix B-Wireframes) * Patient teaching videos * Ability to access FAQ / trouble shooting * Direction for when one requires higher level of care * Q.R. code * Ability to function on both desktop and mobile device | * Secure transfer of information * Storage of personal information * Make as needed appointments for troubleshooting * Feedback (other questions, did this meet your needs, suggestions for improvement) |

**Should Have (version 2.0) – Integration with patient care record**

|  |  |
| --- | --- |
| * A.I. chatbot. * Accessible - text to talk and talk to text * Voice to dictation (smart mirror) - NLP - natural language processing. Ability to ask questions and receive answers. * translation to multiple languages * Appointment times | * Able to produce reports (metrics - Numbers / frequency of users, common questions), Did this decrease clinic time, return HPTP visits, ED visits, 811 calls, improve outcomes, decrease days on therapy * Option of live chat/video with RN * Encryption and 2-factor authenticator |

**Nice To Have (version 3.0) – Integrated patient education, troubleshooting and A.I.**

|  |  |
| --- | --- |
| * Virtual clinic tour * Integration with pump number (notification at clinic that patient requires follow up).  Prompts follow up call to patient to ensure stability (closed-loop) * Integration with My Health Alberta and Netcare with application programming interface (API) technology * Notification of appointment time and that clinic is running late. | * Lab evaluation, interpretation, and recommendation * Patient feedback (Patient and family centered care).  “How was your experience in your HPTP / ED / with app” etc.  - Rating scale 5 stars * Developing while operating to integrate patient feedback (DevOps Model) * Qualitative data - are we making an impact |

**Functional vs Non-functional**

|  |  |
| --- | --- |
| ***Functional Requirements*** | ***Non-Functional Requirements*** |
| * QR code for launch * Chatbot / AI guided troubleshooting * Web based & mobile accessibility * Storage of personal info * Cloud storage * Make as needed appointments for troubleshooting * Feedback (other questions, did this meet your needs, suggestions?) * Accessible - text to speech, translation to multiple languages | * Screens must be clearly legible for colour-blind users * Secure * Scalable * Reports must not take longer than 90 seconds to generate * System must be available and operational 99.995% of the time each year * User friendliness. |

**Project Status & Update**

This project is currently in the 'exploratory - identify user needs' phase (Risling & Risling's, 2020). A review of relevant research highlighted the potential benefits and challenges of incorporating technology in patient education. Stakeholder interviews (Appendix A) helped identify current gaps in the delivery of care in the Home Parenteral Therapy Program in Calgary and confirmed the need for enhanced patient education with the aid of technology. Next, through a hackathon, Nursing domain experts will collaborate with University of Calgary Engineering Students for the 'prototype design – iterated design idea' stage to design a web-based application to improve patient access to HPTP information and troubleshooting.

**References**

Halldorsdottir, H., Thoroddsen, A., & Ingadottir, B. (2020). Impact of technology-based patient education on modifiable cardiovascular risk factors of people with coronary heart disease: A systematic review. *Patient Education and Counseling*, 103(10), 2018–2028. <https://doi.org/10.1016/j.pec.2020.05.027>.

Risling, D.E, & Risling, T.L. (2020). Advancing nursing participation in user-centered design. *Journal of Research in Nursing*, 25(3) 226-238. https://doi-10.1177/1744987120913590

Sanches, L.M. & Cooknell, L.E., (2017). The Power of 3: Using adult learning principles to facilitate patient education. *Nursing2017*, 47(2), 17-19. https://doi-10.1097/01.nurse.0000511819.18774.85

**Appendix A**

Data Collection & Analysis

Stakeholders and Feedback

**C.M. -Previous HPTP Patient (Feb 10, 2022)**

Here are my thoughts based on what I can recall:

* Being fitted with an IV setup in a fanny pack and walking around with it in day-to-day life isn’t “normal”, and regardless of how well a nurse sets you up, there will be follow on questions/concerns
  + These questions/concerns are likely minor enough that they don’t warrant following-up at the hospital (I can’t recall if there was a “help line” phone number that was provided)
* To more easily address those ongoing questions/concerns, I can see a web app working well
  + Would this app be specific to one clinic? Or would it work for all similar clinics’ province wide? Gauging the potential number of Users would help justify a more robust application
* From your points below, it looks like you are considering general info (i.e. videos, links to antibiotics) as well as personal information (i.e. appointment manager)?
  + If so, I would ensure the general information is available without having to have an account to sign-in with - this would allow for people who are only briefly (a week or so) using the clinic to get the information without worrying about privacy issues (maybe that’s just me, but I’m hesitant to create new accounts for every app I come across)
* Chat bot would be a nice way to address simple questions, and direct to the appropriate resource when needed
* Stretch goal: allow the user to take a photo of something (i.e. injection site, possible infection) and then use AI to identify any issues — that redness is okay vs. Being a sign of infection

 I think most of the general type information would be easy to get up and running, and will provide the most value to all Users. The personal type features are likely highly valuable to a smaller set of Users but significantly harder to get up and running properly (privacy being the main concern). I would suggest starting with what is essentially a well thought out website that provides the general information that would help people feel comfortable (videos, chat bot, etc), and then add in the specific User component after.

Hopefully this helps. Let me know if you have any follow-up questions   and I’d be happy to answer. Good luck, and let me know if you need help putting the app together — I can probably put you in touch with some companies/people.

**G. Y. Previous HPTP patient (Feb 11, 2022)**

What gaps in care did you see when you were treated in HPTP?

Some uncertainty with the technology – how to manage it, sleep with it on. Lots going on in the moment.

 What role could you see technology playing in patient education for patients undergoing HPTP?

Being able to check back and see how to manage would be helpful.

 We are proposing a web-based application to help support patients undergoing HPTP therapy.

Some of our thoughts include:

* + Access to pump teaching videos online
  + Current links to information on antibiotics (side effects etc), further teaching on common infections,
  + Appointment manager (Clinic is running late, please plan to arrive 30 minutes later),
  + Virtual clinic tour (to help reduce anxiety)
  + AI guided trouble shooting (My IV hurts, what are my options, my pump is beeping, what should I do?).

o   If required, bot will connect or direct you with most appropriate health care provider (HPTP RN, 811, 911, Emergency room)?

Would this type of support have helped you? Could you see this being a benefit to other HPTP patients?

Videos would have been very helpful – I would absolutely have consulted. If things went wrong, that also would have been an important resource. Paperwork often gets lost. If the clinician helped me to log in from my phone while in the department, that would ensure that I had the site accessible along with contact information for when support was required.

 Appointment manager would be very helpful as a central organizing location.

 Any further feedback?

This would be very worthwhile to pursue – getting it to the top of IT’s to-do list at AHS might be more difficult! Sounds like a terrific idea!

**Ines Gates, Clinical Nurse Educator, Rockyview General Hospital Home Parenteral Therapy Program (Feb 17th, 2022)**

Feels this is a strong idea with potential for many patients.  Worries about elderly patients struggling with it.

**Jennifer Evangelista, Clinical Nurse Educator, Foothills Medical Centre Emergency Department (Feb 7/2022)**

 This is amazing!  I think this would be very helpful. I agree with Jen discharge resources and map with directions

A section for healthcare providers and or a “leaving the ED” section for the patient to have all they need prior to leaving ED (eg. IV saline locked, appointment booked, etc)

**Jennifer Jordan Quality Improvement Registered Nurse, Foothills Medical Centre Emergency Department (Feb 7/2022)**

 Scheduling is a bit confusing right now - with COVID so if the app assisted with scheduling for the health care providers that would be amazing

 Ensuring the most accurate patient discharge resources are available including the map and address via a link so the patients could put into the app directions to the clinic

**K.C. -patient perspective – (Feb 6/2022)**

-each time leaving the hospital -once leave having extra unanswered questions

-when to follow up, what is bad sign, needed an extra opinion -need to talk to someone, reach out for medical advice ?811

-not properly filled out discharge information, -not delivered verbally to patients and families

-spent so much time waiting was numb, worried, stressed

-lacked closed loop communication to check for understanding

-missing information

-lack of completeness by Ortho tech follow up

 appointment booking

-likes to be called to have follow up appointment

-happy to have notifications if Clinic is running behind

-what would to expect when you get there, where to park, directions, location of the bathroom

**Appendix B**

Wireframe: <https://balsamiq.cloud/s3912ef/p2ix3r6>

**Wireframe 1 (Welcome page)**

Qr code

Description automatically generated

**Wireframe 2 (new vs current patient)**

Graphical user interface, text

Description automatically generated

**Wireframe 3 (New patients)**

Graphical user interface, application

Description automatically generated

**Wireframe 4 (current patients)**

Graphical user interface

Description automatically generated

**Wireframe 5 (Menu – accessible from each page using ?)**

Qr code

Description automatically generated

**Wireframe 6 (current supports)**

Graphical user interface

Description automatically generated

**Wireframe 7 (education page)**

Graphical user interface, application, email

Description automatically generated

**Wireframe 8 (links to myhealth.alberta.ca common infections)**

Graphical user interface, text, application, email

Description automatically generated

**Wireframe 9 (appointment booking)**

Text

Description automatically generated

**Wireframe 10 (Need help?)**

Graphical user interface, text, application

Description automatically generated

**Wireframe 11 (virtual nurse)**

Graphical user interface, text, application

Description automatically generated

**Wireframe 12 (speak to a human)**

Graphical user interface, text, application

Description automatically generated

**Wireframe 13 (feedback)**

Graphical user interface, text, application, email

Description automatically generated

**Appendix C**

Risling & Risling:

Acknowledgements:  This application will not benefit all. Some patients may not have access to adequate technology to support this application, and others may choose not to.

A patient-stakeholder of a mobile application to support improved clinical outcomes for patients in the Home Parenteral Therapy Program:

We want AI guided problem solving so that patients can independently manage minor challenges.

We want digital patient education so that patients and families can access online teaching when desired.

We want integration with myhealth.alberta.ca so that education is consistent, and patients can view their lab work.

What most concerns us about the digitization of education is:

Ensuring information remains updated and relevant, staff and patient hesitancy, and lack of access to the required technology.

But we feel good about increasing access to information, increasing patient autonomy, and reducing unnecessary stress to patients, and reducing unneeded trips to the emergency department or calls to 811.

The technology application we most commonly use lets us navigate easily, understand information easily and allow us to access further help when required.

**Appendix D**

**Requirements and Analysis output (Risling & Risling 2020)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| What do I want? | What do I want to accomplish? | F/NF | Additional Data prompts | Open Coding |
| Usability | Easy and intuitive for patients to use | NF |  |  |
| Patient teaching videos | Patients to be able to access teaching videos at home | F |  |  |
| Ability to access information to help with troubleshooting | Easy access to relevant patient education and further assistance when required. | F |  |  |
| Direction given when patient requires higher level of care | Direct patient to call nurse, or go to hospital if concerns indicate that higher level of care may be required | F |  |  |
| QR code | Allow easy access to web based platform. | F |  |  |
| Secure | Ensure privacy and confidentiality of patient data | NF |  |  |
| Storage of personal information | Log in data is not traceable | NF |  |  |
| Makes appointments | Patients can make appointments from home without waiting for call from clinic | F |  |  |
| Functional on desktop and mobile | Ability for patient to access patient education from multiple devices | F |  |  |
| Scalability | Grow from version 1-3 and allow for additional functionality | NF |  |  |
| Feedback section | Collect data regarding patient satisfaction and suggestions | F |  |  |
| Accessible | Easy use of app for all users. | NF |  |  |