High-Fidelity, Low-Burden Experience Prototypes

Adapting to the complex systems within healthcare settings

Hospitals and emergency departments are complex, high-stakes environments with the potential for patient harm. This makes testing new service concepts challenging. Experience prototypes must be appropriate for clinical practice and situated in the real context of care (high fidelity), while minimising disruption using temporary processes and workflow supports (low burden).

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We propose that a high-fidelity experience prototype for healthcare settings has two important attributes: 1) it is assessing a new concept that is sufficiently developed to be appropriate for clinical practice; and 2) it is deployed in the real context of care.

While co-designing with stakeholders can yield new service concepts that are well-informed and more likely to succeed, the complexities of healthcare delivery can't be fully simulated through planning alone. Accurately assessing new concepts requires real-world conditions.

Testing in the real context of care can impose both system-level and clinician-level burdens. Changes to existing systems such as electronic health records are resource-intensive. This effort is often reserved for full-scale implementations that are evidence-based and intended to be permanent. Even minor changes to existing processes can burden front-line clinicians with training and workflow adjustments. A low-burden experience prototype for healthcare settings minimises both system-level burden and clinician-level burden. This is because it relies on temporary processes, which bypass changes to existing systems and are quicker to put in place; it assesses a service concept that was co-designed with clinicians to fit workflows; and it eases participation through supportive materials.

This article describes a two-phased approach to high-fidelity, low-burden experience prototyping in a Department of Veterans Affairs (VA) medical center's Emergency Department (ED) in the United States. The first part describes developing a new ED discharge education tool that is aligned with clinicians, their workflows and health system priorities. The second part describes prototyping the experience of using the new discharge education tool in the real context of the ED.

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MEDICAL RECORD                                           Progress Notes
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NOTE DATED:
LOCAL TITLE: EMERGENCY DEPARTMENT DISCHARGE NOTE
STANDARD TITLE: EMERGENCY DEPT DISCHARGE NOTE
VISIT:
EMERGENCY DEPARTMENT DISCHARGE NOTE

NAME OF THE DOCTOR(S) WHO SAW YOU TODAY:
DISCHARGE TO: Home


=      =      =      =      =      =      =      =      =      =

DIAGNOSIS:COPD


=      =      =      =      =      =      =      =      =      =

GENERAL INSTRUCTIONS: o Today we gave you a COPD Action Plan
(instructions to help you if you become sick
again), TeleHealth information (a nurse will
contact you this week to get you started), and
medications.  Please follow up with
TeleHealth so we can help keep you healthy
at home without needing to come back to the
Emergency Department.  When the
TeleHealth nurse calls you, they will check
your information and send a small machine in
the mail that will measure the oxygen level in
your blood.  TeleHealth can watch your
oxygen level this way so that they can find
out if you are getting sick and help you get
better faster.

Return to Emergency Department for worsening symptoms.


MEDICATION CHANGES:
     Please START the medication: prednisone and azithromycin

     Please STOP the medication:
Continue all other regular medications.


=      =      =      =      =      =      =      =      =      =

FOLLOW UP:
I will send a message to your Primary Care Clinic about this visit. You will be
called regarding a follow-up appointment.


Please keep your scheduled appointments.
No Future Appointments

The examination and treatment you have received has been given on an
               ** THIS NOTE CONTINUED ON NEXT PAGE **
-----------------------------------------------------------------------
ZZTEST,TEST                                  Printed:
          DOB:              Pt Loc:
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The VA medical center's existing discharge instructions

Project background

The leadership of this urban medical center's ED invited a design team from the Institute for Healthcare Delivery Design (University of Illinois at Chicago) to develop and test a new discharge education tool. The new discharge tool would supplement existing discharge instructions for patients (Veterans) being discharged from the ED after a Chronic Obstructive Pulmonary Disease (COPD) exacerbation, or flare-up. COPD is the fourth leading cause of death in the United States.[1] COPD flare-ups, characterised by shortness of breath, are life-threatening but can often be avoided through good self-management. Without good self-management, COPD flare-ups can contribute to avoidable ED visits and hospitalisations.[2]

Discharge instructions are an important information bridge between the ED and home, but patients and clinicians widely perceive the existing discharge paperwork as hard to understand and use. It relies solely on text which is written at an advanced reading level, making it difficult for a patient population which can struggle with health literacy.

1 Kochanek K.D., Murphy .SL., Xu J.Q., Arias E (2016). Mortality in the United States, 2016. NCHS Data Brief, no 293. Hyattsville, MD: National Center for Health Statistics. 2017.
2 Potentially Avoidable Hospitalizations. Content last reviewed June 2018. Agency for Healthcare Research and Quality, Rockville, MD. https://www.ahrq.gov/research/findings/nhqrdr/chartbooks/carecoordination/measure3.html

We, the design team and ED partners, aimed to develop and test a discharge education tool that better prepared patients to manage their COPD in the crucial five days after an ED visit, when they are most vulnerable to repeat COPD flare-ups.

Phase 1: Developing a new "fit for purpose" discharge education tool

In the context of the ED, a 'fit for purpose' discharge education tool would be considered: 1) acceptable by ED doctors, nurses and pharmacists by improving discharge conversations; 2) appropriate for clinical practice by promoting guideline-based care of COPD; 3) appropriate for patients by addressing their physical, cognitive and emotional human factors, and 4) feasible by integrating with ED workflows.

We engaged 13 ED clinicians and staff, three pulmonology experts, 16 people with COPD, and 30 patients through in-context interviews, participant observation and intercept interviews to understand guideline-based care for COPD and the perspective of patients with COPD. We generated four different discharge education tool prototypes and 25 variations, which were merged into a single testable prototype. This consisted of a two-sided 11-inch x 17-inch (A3) sheet folded in half, creating a front cover, inner spread and back cover. It is written in simple English (a U.S. 5th grade reading level), contains illustrations to make complex regimens easier to understand and perform, and has a typographic hierarchy to help clinicians and patients jointly review the key points.

User reviews suggested that the final discharge education tool met the requirements of acceptability, appropriateness and feasibility[3] and therefore warranted further assessment in the context of care. The VA medical center's patient education board approved the new discharge tool for use in clinical practice, enabling us to plan and launch an experience prototype.

### Phase 2: Planning and launching the experience prototype

To determine the tool's effect on clinician workflows and discharge conversations, we followed a four-step process to prototype the experience of using the new tool in the context of ED care delivery. These activities improved alignment between the experience prototype and the people, processes and systems already in place.

Step 1: Planning for a high-fidelity, low-burden experience prototype

We firstly needed to observe current discharge processes. We received full access to the ED and were provided data on COPD patient volume to help identify high-volume days and times for observations. The team observed 65 patient discharges, eight of which involved COPD patients.

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3 Proctor, E., Silmere, H., Raghavan, R., Hovmand, P., Aarons, G., Bunger, A., … Hensley, M. (2011). Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. Administration and policy in mental health, 38(2), 65–76.

The new discharge education tool
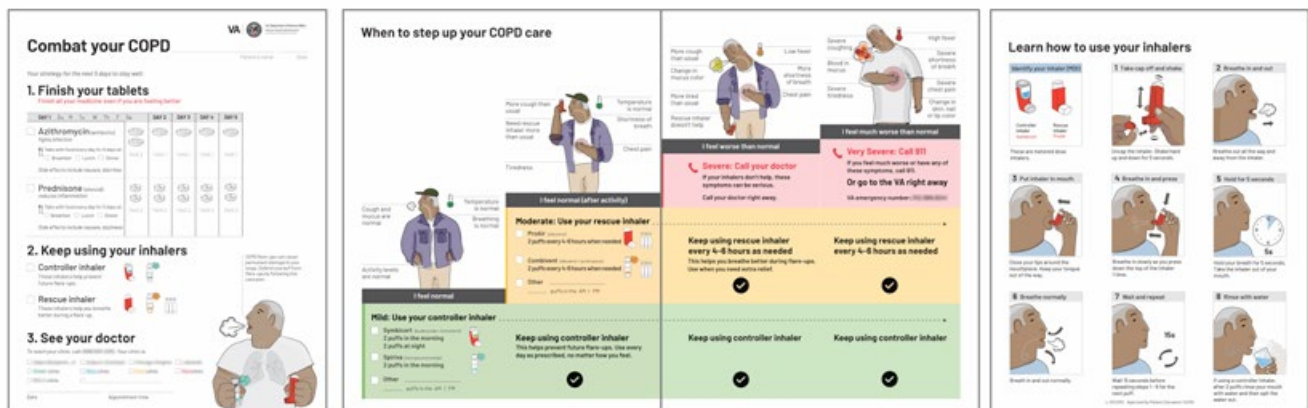
Front page:
What to do in the five days after ED discharge (until follow-up)

Inner spread:
Long term care connecting symptoms to medications to action

Back page:
Simplified inhaler instructions

People (training, champions)

Processes (workflows, tools)

Products (reminders, supports)

Temporary experience prototype supports in the ED included 1) nurse trainings, 2) nurse champions, 3) a pilot workflow, 4) a data protection workflow, 5) weekly update emails, 6) new discharge tool storage and signage, 7) a promotional animated GIF to embed in emails, 8) donuts to kick off launch week, 9) progress update board, 10) workflow 'cheat sheets

Observations revealed operational realities that interviews had failed to surface. We learned that some clinical staff rotate monthly and some work only part-time. Therefore, we expanded the project timeline from eight to 12 weeks to ensure the experience prototype captured an adequate number of staff rotations and COPD patients, better simulating a full-scale implementation. We also observed eight meaningfully different variations in discharge processes which impacted the clinician groups included in the experience prototype.

We did not initially recognise nurses as a primary user of the new discharge tool, until we observed them performing the bulk of COPD discharges. As a result, we engaged nurse leadership, who approved nurse participation in development of the experience prototype (and continued to support design, launch and assessment activities). Finally, our observations highlighted the busy and chaotic nature of ED work. We hypothesised that clinicians would need environmental prompts to remind them to use the new discharge tool and workflow supports to help them use it as intended. We used these insights to adapt the tool and design the experience prototype.

Step 2: Designing the experience prototype

We designed an experience prototype process in which ED nurses and pharmacists would: 1) fill out the new tool for COPD patients being discharged home; 2) document use of the new tool by making a photocopy and securely storing it; 3) review the completed tool with the patient along with other discharge paperwork. To promote and ease participation in this new process, we created a suite of supportive materials and experiences.

These materials and experiences specifically targeted three known barriers to clinician engagement[4]:

Awareness – Do staff know about the concept and understand it?

Agreement – Do staff believe and agree this is the right thing for their setting, role and patients?

Ability – Do staff have the time, bandwidth, resources and support to participate in the experience prototype?

Step 3: Launching the experience prototype in the context of care
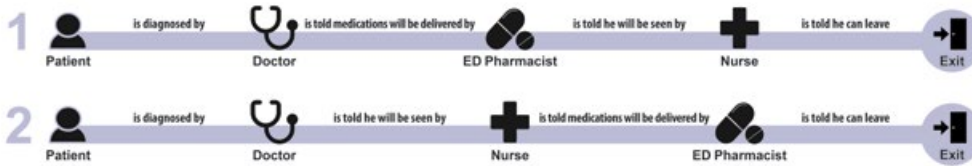
We launched the experience prototype by introducing the new discharge education tool into the ED and prompting clinicians to begin using it supported by the suite of materials described in the previous step. Despite planning and staff review of all aspects of the experience prototype, continual adaptations were required. We:

— Expanded 'launch day' to 'launch week' to reach relevant staff across shifts and days off.

— Revised workflow supports. For example, increasing the size of the 'cheat sheet' for attending physicians so that it stood out among other papers next to computer workstations.

— Adapted to clinician turnover. We oriented new staff to the project and identified a new site champion.
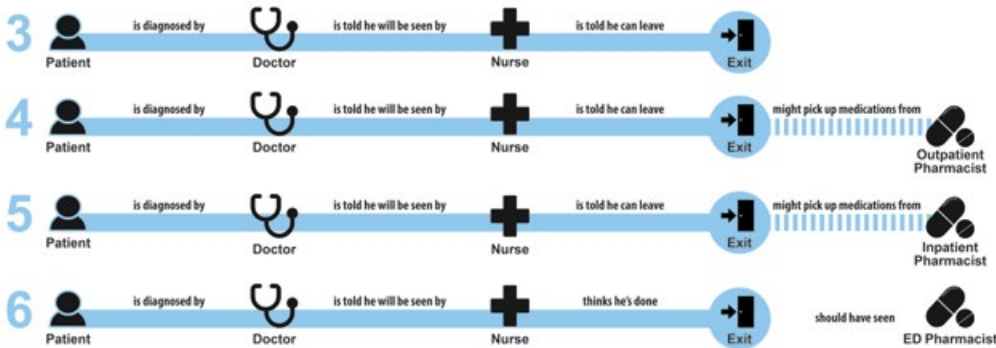
4 Cabana MD, Rand CS, Powe NR, et al. Why Don't Physicians Follow Clinical Practice Guidelines? A Framework for Improvement. JAMA. 1999; 282(15):1458–1465.

Discharge variations involving ED doctor, nurse and pharmacist

1 Patient — is diagnosed by — Doctor — is told medications will be delivered by — ED Pharmacist — is told he will be seen by — Nurse — is told he can leave — Exit

2 Patient — is diagnosed by — Doctor — is told he will be seen by — Nurse — is told medications will be delivered by — ED Pharmacist — is told he can leave — Exit

Discharge variations involving ED doctor and nurse

3 Patient — is diagnosed by — Doctor — is told he will be seen by — Nurse — is told he can leave — Exit

4 Patient — is diagnosed by — Doctor — is told he will be seen by — Nurse — is told he can leave — Exit — might pick up medications from — Outpatient Pharmacist

5 Patient — is diagnosed by — Doctor — is told he will be seen by — Nurse — is told he can leave — Exit — might pick up medications from — Inpatient Pharmacist

6 Patient — is diagnosed by — Doctor — is told he will be seen by — Nurse — thinks he's done — Exit — should have seen — ED Pharmacist

Discharge variations involving ED doctor and pharmacist

7 Patient — is diagnosed by — Doctor — is told medications will be delivered by — ED Pharmacist — thinks he's done — Exit — should have seen — Nurse

Discharge variations involving ED doctor only

8 Patient — is diagnosed + discharged by — Doctor — is told he can leave — Exit

Eight variations in discharge processes

— Visited the ED more frequently than originally planned. Our physical presence in the ED acted as a reminder of the project and seemed to correlate with ED clinicians using the new discharge tool more consistently.

Step 4: Assessing the results of the experience prototype

The goal of the experience prototype was to assess whether the experience of using the new discharge education tool in the context of care was acceptable, appropriate and feasible for staff, and if it improved the quality of discharge conversations between clinicians and patients. This was assessed using both quantitative and qualitative data.

Quantitative data suggested the rate at which ED clinicians were using the new discharge tool with eligible COPD patients. The number of patients who were eligible to receive the new discharge tool during the experience prototype timeframe was compared with the photocopies of discharge tools used with patients. Additionally, each tool was numbered, allowing us to track how many had been used, even if they were not photocopied. Photocopies indicated that the new discharge tool was used with about half of eligible patients. The discharge tool numbering indicated that several were unaccounted for and may have been used with an additional quarter of eligible patients, although not photocopied. These tracking efforts suggested that clinician use of the discharge tool steadily increased as the experience prototype progressed, with the number of photocopied tools peaking in Week 7. Photocopy numbers declined when the design team's presence in the ED slowed.

Qualitative data helped us understand how clinicians were using the new discharge education tool. This

included observing clinicians using it with patients and reviewing the photocopies of completed discharge tools. The photocopies captured clinician notes and hand-written modifications to the tool. This enabled us to assess whether the tool was being filled-out as intended. This review informed final revisions to the discharge education tool. Observing clinicians using the new discharge tool proved difficult, because there was not a way to predict when COPD patients would visit the ED. For the first three weeks of the experience prototype, we observed for an average of nine hours per week during high-volume times. We were able to witness a few COPD discharges using the new tool as a result. These observations suggested that the new discharge tool was promoting longer and more detailed explanations of medication usage and symptom management, compared to discharges we witnessed using the existing discharge paperwork alone.

Finally, we conducted a staff satisfaction survey building on the 'Getting To Outcomes' framework[5] to assess the perceived fit and benefits of the new discharge tool among ED doctors, nurses and pharmacists. Response to the survey was limited, but all respondents voted to keep the new discharge education tool available for use in the ED.

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5 Wandersman, A., Chien, V. H., & Katz, J. (2012). Toward an evidence-based system for innovation support for implementing innovations with quality: Tools, training, technical assistance, and quality assurance/quality improvement. American journal of community psychology, 50(3-4), 445–459.

Conclusion

Experience prototyping in hospitals and Emergency Departments can be daunting for service designers, yet it is essential for designing health services that are likely to succeed. We offer five takeaways for successfully deploying experience prototypes in complex care environments:

1. Build relationships with both leadership and front-line staff. Both perspectives are essential for gaining organisational cooperation and access to the right people and places. We could not have carried out this experience prototype without support from both groups.

2. Plan for direct observation of site processes to reveal what conversations may not. It is critical to design for the real-world context of care rather than official plans and protocols. This can help designers reduce burden to systems and clinicians, unintended consequences, and potential patient harm.

3. Provide supportive materials designed to mitigate three kinds of barriers to clinician engagement. These barriers are described earlier in this article.

4. Be attentive and ready to respond when things don't go according to plan. Maintaining a physical presence on site, careful monitoring and rapid adjustments to an experience prototype reduce friction and harm, build goodwill, and signal to the staff that designers can be counted on to prioritise patient care.

5. Reciprocate the time and attention your experience prototype requires. Even the most thoughtfully-designed experience prototype asks something from its users. Continually updating staff on experience prototype progress and recognising staff effort with treats, thank-yous, and humour shows consideration for their participation.

	1: Plan	2: Design	3: Launch and adapt	4: Assess
Goal	Understand user activities and setting Develop design requirements	Design the experience prototype	Deploy the intervention and collect data	Determine impact of the experience prototype
Activities	**Contextual inquiry** 65 observations of discharge from the Emergency Department and discharge process mapping **Weekly site visits** Build relationships and trust with staff	**Design workflows and process supports** Help staff integrate the experience prototype into routine care **Develop measures and data capture tools** **Identify site champions**	**Orient and train staff** **Install process supports into work environment** **Monitor usage and adapt experience prototype and supports**	**Collect and analyse data** Review photocopies of filled-out discharge tools Compare data of COPD patient volume to number of discharge tools used
Tools and supports	**Baseline data pull** Identify patient volume at times of day and week **Customised field tool** Capture discharge communication and interactions	**Workflow diagrams** **Process support tools** Cheat sheet for attending physicians; storage solution for tool; big signage for how to complete documentation, etc.	**Donuts for staff** **ED presence** 3x per week for first four weeks **Weekly emails** Update all core team members **Progress updates** Posted weekly in the ED	**Staff satisfaction survey** **Monthly data pulls** Regarding COPD patient volume

Phase 2: The four steps of launching the experience prototype in the ED