

After Visit Summary: Not an Afterthought

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The After Visit Summary (AVS) is provided to patients after clinical visits to summarize what happened during the visit and guide future care. Despite its potential to improve shared decision-making, self-management, and communication, the design of the typical AVS is not optimized to communicate useful information in an understandable way. The AVS usability challenge is magnified in vulnerable patient populations such as those served by community health centers (CHCs). The purpose of this research was to evaluate and refine a redesigned AVS intended to better communicate information to CHC patients.

INTRODUCTION

The After Visit Summary (AVS) is provided to patients after clinical visits to summarize what happened during the visit and guide future care. If designed as a communication tool between care teams and patients, an AVS can achieve other goals beyond documenting a single visit. It can promote patient activation and empowerment, increase patient knowledge, guide patient self-management, and make important information easier to find, understand, and remember (Snyder, et al., 2011).

The AVS can improve care and health outcomes for adult and pediatric patients and their families or other informal caregivers. (Snyder, et al, 2011; Neuberger, et al., 2014) For adult patients, the AVS can serve as the basis for longitudinal, shared treatment decisions for acute and chronic conditions. Pediatric patients and families can use the AVS to track growth, development, preventive services such as immunizations, and diagnosis-specific instructions from their providers. Both groups of patients can use the AVS as a hand-over tool to guide self-care in non-clinical settings, planning future care visits, and share with other clinicians or informal caregivers.

Despite its potential to improve shared decision-making, self-management, and communication, the design of the typical AVS is not optimized to communicate salient or useful information in an understandable way (Neuberger, et al, 2014). The AVS suffers from usability problems in large part because it is often generated from electronic health record (EHR) fields that use abbreviations and medical jargon and formats (e.g., alphabetical rather than chronological ordering) designed for clinicians by technologists, not patients and their families by human factors experts (Neuberger, et al, 2014).

The AVS usability challenge is magnified in vulnerable patient populations such as those served by community health centers (CHCs). CHCs offer comprehensive, culturally competent care to nearly 27 million Americans in the United States (HRSA Health Center Program 2018). They serve individuals with low health literacy, language barriers, and who disproportionately experience chronic and complex medical conditions.

These disadvantaged individuals are likely to have less benefit from informatics interventions in general. (Veinot, Mitchell & Ancker, 2018) These disadvantaged individuals face barriers of low literacy, poor education, and low health

literacy. (Veinot, et al, 2018) These can negatively influence the effectiveness of AVSs, which rely on written communication to provide the patient care related information.

The purpose of this research was to evaluate and refine a redesigned AVS intended to better communicate information to CHC patients. We used usability tests and semi-structured interviews to evaluate the effectiveness, efficiency, and satisfaction of a redesigned AVS, with patients and their families at a CHC.

METHODS

To see how plain language and clear layout can improve the effectiveness, efficiency, and satisfaction of an AVS, AllianceChicago designed a new AVS to compare against the current AVS used by the CHCs within the AllianceChicago network. The new AVS was tested through usability tests and semi-structured interviews, with patients and their families.

As the AVS was close to complete development, a usability test emphasizing task completion was selected as the method of inquiry. Task-based usability tests are ideal for discovering barriers to productive use of informatics tools. (Kaufman, et al., 2003). This study also used semi-structured interviews to follow up on the results of the usability tests. Semi-structured interviews were used because the method is well suited to explore people's perceptions and opinions (Barriball & While, 1994).

The usability tests and semi-structured interviews were conducted with patients and their families. These interviews were used to evaluate the AVS. The AVS was evaluated across the three standard usability domains of: 1) Effectiveness, 2) Efficiency, and 3) Satisfaction.

Along with the usability test and interviews, a survey was also used. The survey asked patients and caregivers to rate their agreement or disagreement with statements related to effectiveness, efficiency, and satisfaction. The survey is not reported in this paper.

The study was conducted as part of AllianceChicago's continual effort to improve the effectiveness of its communication tools. As the research was to improve communication tools, the work was deemed quality improvement and not human subject research. The study was performed in September 2018.

Study setting

The study took place in two clinics that were part of the AllianceChicago CHC network. AllianceChicago is one of the largest CHC networks in the United States, comprised of over 45 safety-net primary care organizations in 19 states, all sharing a common Health Information Technology (HIT) infrastructure. The vulnerable communities served by this CHC network include 2.8 million lives representing urban and rural, low-income and uninsured individuals, racial and ethnic minorities, the LGBTQ community, and refugee and homeless populations. Core to AllianceChicago's work is the design and implementation of technologies that meet end-user needs and support CHCs in delivering high quality evidence-based care.

AllianceChicago partnered with a human factors expert and user experience (UX) staff from the Indiana University (IU) Center for Health Innovation and Implementation Science (CHIIS). AllianceChicago and CHIIS collaboratively developed and executed the study protocol.

The redesigned AVS

Across AllianceChicago the typical AVS format was a single column plain text document mocked up in Figure 1.

Name of practice Address phone number of practice
Patient Information Patient Name & date of birth: Patient Name, MM/DD/YYYY
Clinical Visit Summary English Blood Pressure: 120/80 Pulse Rate: 120 Respirations: 16/min Temperature: 98 F oral Height: 70.99 in Weight: 180lb Body Mass Index: 32.66
<u>YOUR CURRENT PROBLEMS</u> Asthma
<u>YOUR MEDICATION LIST</u> Medication name 40MG/0.6ML ORAL SUSPENSION
<u>YOUR CURRENT ALLERGY LIST</u> No known allergies
<u>TEST RESULTS FROM PAST 3 DAYS</u> None

Fig 1: original AVS printed

AllianceChicago created the redesigned AVS mocked up in Figure 2. The redesigned AVS was developed by examining existing AVS output and applying user-centered design principles within the technical constraints of the CHC network's EHR.

About My Visit		Today's Date: January 27, 2018
Patient: Christina Test DOB: July 1, 2016 Doctor: Sue Jones		
My health issues are:	Asthma Eczema Allergic Rhinitis	
I came in today for:	Skin Rash	
Today I was seen by:	Ashley Jones, NP	
My important numbers:	Vital Signs	
Today we accomplished:	Physical Exam Allergy Referral	
My instructions & care plan	Thick Moisturizers Avoid Fragranced Products Apply Hydrocortisone 2.5%	
My medications are:	Flovent 44 mcg 2 puffs twice daily Fluticasone 1 spray in each nostril twice daily	
I am waiting for:	Allergy Referral	
I should schedule my next follow up:	in 1 month	
My goals are	Avoiding second hand smoke Using my controller inhaler every day	

Fig 2: redesigned AVS

The redesigned AVS (Fig 2) used a tabular format instead of the original block text display. The redesigned AVS modified clinical content headings and labels to replace medical jargon. One instance was used a title of "My Important Numbers" instead of individually listing vital signs under "Clinical Visit Summary". The Redesigned AVS also added more information including who their physician was and the patient's health goals.

Patient and family usability tests

Participants completed scripted tasks with the redesigned AVS (fig 2), followed by semi-structured interviews.

For task-based testing, participants were given an AVS for their visit. The AVS was printed out in the new format (fig 2). The tests were conducted after patients completed a clinic visit. After the visit, patients received the AVS from their primary care provider. Using their AVS, patients were instructed to complete tasks, in sequence, such as find "My goals are" and "My medications are". The participants were instructed to state any thoughts they had while completing the tasks. To confirm if a task was completed, participants were asked to point to the item once they completed tasks. Task performance was documented as completion or non-completion, with notes on the speed of



Effectiveness



Efficiency

Relevance	Understandability	Readability	Discoverability
Blank Space	Acronyms and Abbreviations	Poor Hierarchy	Layout
Pharmacy Information	Medical Terminology	Acronyms and Abbreviations	Familiar Language
	Simple Language		
	Familiar Language		

Fig 3: categorizations of findings based on domains of usability.

completion and other observable behaviors (e.g., hesitation), but task performance was not timed.

The test facilitator(s) then asked a series of scripted and unscripted follow-up questions regarding AVS efficiency and effectiveness, namely:

- Difficulty finding information (discoverability)
- Difficulty reading information (readability)
- Difficulty understanding information (understandability)
- Relevance of the information (relevance)

To conclude the interviews, researchers asked what would patients change or add to the AVS.

At the conclusion of the interviews, some of the patients and their families were asked to complete a short survey. The survey measured aspects of usability and captured additional task information based on the patient use of the After Visit Summary.

Data collection was performed in private, in an examination room or conference room in the clinic. Participants received a \$25 gift card. Patients kept their AVS after the test.

Analysis

To measure effectiveness, researchers used understandability and relevance of information presented on the AVS. Efficiency was judged by readability and discoverability of information. Effectiveness looked at if the AVS was able to inform patients about care needs and if patients understood the information on the AVS. Efficiency looked at how patients were able to read and find information.

The usability tests and interview generated written and typed documentation by researchers. This documentation took the form of transcripts and detailed field notes. The notes

created, were consolidated into one document consisting of 21 pages of raw transcript and field notes. The data in this document was organized by day of observation and by participant number. The data analysis process identified the causes of task failure from the usability test, correlated observations to usability tests, and linked patient response from the interviews to findings of observations and usability tests. The causes of task failure were then categorized as a problem of discoverability, readability, understandability, or relevance (fig 3). The causes of task failure were color-coded and grouped based on its categorization. These problems were then attributed to either visual design, visual impairments, coded language, or patient's language ability.

RESULTS

Fifteen patients participated in usability testing over two days. The participants of the usability study varied in age, race, and gender. Included in the group were individuals of Hispanic descent who spoke Spanish as a first language, individuals from the Asian-American community, members of the LGBTQ community, juveniles, and senior citizens. Four patients spoke Spanish as their primary language.

Semi-structured interviews revealed that patients preferred the new version of the AVS to the current EHR generated AVS. In the domain of effectiveness, patients perceived the AVS to have importance and valued it as a tool to promote recall. Specific items of importance included medication lists, vitals, and follow up instructions. Gaps identified in the AVS included pharmacy information and indications for medications, particularly among patients with multiple medications. Patient with multiple medications indicated that it was difficult for them to remember the purpose of the medication. In one case, an older respondent

stated that sometimes it is difficult to remember why they were taking a particular medication.

Another issue in effectiveness was the use of acronyms. The acronyms imported from the EHR were difficult for some patients to interpret. Interviews revealed some patients were not familiar with acronyms. Specifically, the acronyms of WCC and ASQ were not understood. Similarly, patients preferred clearly labeled information. For example, some patients preferred the term “Vital Signs,” which had been replaced in the redesigned AVS with the more generic label “My Important Numbers.”

For relevancy, there were several findings. One was the need to include blank space within the document. Patients wanted to be able to write information in the blank spaces of the document. Writing in the blank space helped to remember follow up visits and care plan instructions. A surprising finding was from a member of the LGBTQ community. This individual was currently in transition. In the interview, they stated a negative perception of the gender listed on the AVS. When prompted, the participant did not think the gender on the AVS was representative of them. The patient also stated that they destroy the AVS and do not save it, so they can protect themselves.

In the domain of efficiency, most patients proficient in English were able to find and subsequently read information on the AVS when prompted. Some individuals experienced difficulty finding and reading information. Due to language barriers, some patient were not able to utilize the AVS without assistance.

About My Visit

My Important Numbers (Vitals) Height: Weight: BMI: Blood Pressure: Pulse rate: Respirations: Temperature:	My Medications <table><tr><td>Medication Name (Condition) Dosage Instructions on use Pharmacy and Location medication is available</td><td>Medication Name (Condition) Dosage Instructions on use Pharmacy and Location medication is available</td></tr><tr><td>Medication Name (Condition) Dosage Instructions on use Pharmacy and Location medication is available</td><td>Medication Name (Condition) Dosage Instructions on use Pharmacy and Location medication is available</td></tr><tr><td>Medication Name (Condition) Dosage Instructions on use Pharmacy and Location medication is available</td><td>Medication Name (Condition) Dosage Instructions on use Pharmacy and Location medication is available</td></tr></table>		Medication Name (Condition) Dosage Instructions on use Pharmacy and Location medication is available	Medication Name (Condition) Dosage Instructions on use Pharmacy and Location medication is available	Medication Name (Condition) Dosage Instructions on use Pharmacy and Location medication is available	Medication Name (Condition) Dosage Instructions on use Pharmacy and Location medication is available	Medication Name (Condition) Dosage Instructions on use Pharmacy and Location medication is available	Medication Name (Condition) Dosage Instructions on use Pharmacy and Location medication is available
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I Should Schedule My Follow Up In 30 days								
Today We Accomplished (Services) Here would be a description of services provided								
I Am Waiting For Lab Results	Care plan and Instruction Get plenty of bed rest							
I Came In For	My Health Issues are (Problem List)							

Fig 4: third version of the AVS

Third AVS Design

Based on the findings a third version of the after visit summary was developed (fig 4). This included the use of a multicolumn grid with visit information set to the left and care information set to the right. At the top left is the vital sights of the patient. The vital signs were placed at the top left as

patients indicated vitals as important information. To the right is the medication information organized into two columns. The medication information includes pharmacy information and indication. Blank space was added in the care plan section and and in the follow up visit section.

CONCLUSIONS

Based on the outcomes of this study, usability tests allowed for quick assessment of effectiveness and efficiently, and provided an opportunity to qualitatively explore perceptions of users. These assessments were possible because of the nature of usability tests.

Usability test in this study produced binary results. Users either completed or did not complete the tasks. If users did not complete the tasks, the results were immediately seen. This immediate feedback provided an opportunity for follow up inquiry in the same session, while the experience was still fresh within the users mind. The usability test also provided a platform for Semi-structured interviews. The scaffolding of usability test and the semi-structured interviews offered patients the opportunity to voice their thoughts.

In this study, some of the most valuable findings came from the thoughts patients expressed during the semi-structured interviews. During these interview patients talked about what information was relevant, why information was relevant, and the difficulties they had using the AVS. The responses of these patients also touched on deeply personal aspects of medical information. One patient even shared a negative perception of the gender identity on the AVS. The patient was a member of the LGBTQ community and they were in transition. They felt the gender listed on the AVS was not representative of them. The patient even stated they destroy their AVS because they did not want others to see it.

The personal nature of the AVS is why vulnerable people should be involved in informatics tools made for them. It is a moral imperative, because it provides them equity, agency and empowerment (Castro, Regenmortel, Vanhaecht, Sermeus, & Hecke, 2016). By including these individuals into the creation of informatics tools, patients can achieve other goals beyond documenting a single visit. The co-designed tools can address concerns of security, increase patient knowledge, guide patient self-management, and help make important information easier to find, understand, and remember. (Institute of Medicine (US) Committee on Health Research and the Privacy of Health Information: The HIPAA Privacy Rule, 2009; Snyder, et al, 2011)

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