Research and Applications

Patient and clinician perspectives on the outpatient after-visit summary: a qualitative study to inform improvements in visit summary design

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ABSTRACT

Objective: We explored patients' and clinicians' perspectives on electronic health record (EHR)–generated outpatient after-visit summaries (AVSs) to inform efforts to maximize the document's utility.

Materials and Methods: This qualitative study involved focus groups and semistructured interviews with patients ($n = 39$) and clinicians ($n = 56$) in adult primary care practices serving socioeconomically diverse communities in New York City; Long Island, New York; and Chicago, Illinois. Focus group and interview transcripts were coded and analyzed following standard qualitative methods.

Results: Core themes included the use and purpose of the AVS, content modification and prioritization, formatting improvements, customization, privacy and accuracy concerns, and clinician workflow concerns. While most patients valued the document as a visit summary, others considered it a general summary of their health and health care issues, useful for sharing with family or clinicians even if they had access to their health records via web portals. Patients expressed a preference for the order of content items, and many wanted the reasons for medications and referrals stated. Additionally, some patients were confused by multiple medication lists indicating started, stopped, and modified medications, and a single "current" medication list was preferred by both patients and doctors. Concerns were raised about the risk of violating patient privacy and challenges to clinician workflow.

Discussion: The AVS is valued by patients and clinicians. Both groups have identified numerous ways it can be improved, but also several obstacles to improvement and effective use.

Conclusion: EHR vendors should work with stakeholder groups to improve the AVS to ensure that this important communication device achieves its patient-centered potential.

INTRODUCTION

Patient-centered care improves quality and outcomes for patients,[1–8] and governmental and nongovernmental agencies such as the National Committee for Quality Assurance are aggressively promoting it.[9–13] Central to this approach is the provision of personal health information[14] with an emphasis on enhanced

Table 1. Description of recruitment sites

Site	Location	Practice type	Predominant insurance	EHR	Data collection format
1	Manhattan	Tertiary hospital, teaching clinic	Medicaid, Medicare	Epic	Patient focus groups (2) Physician focus group (2) Patient individual interview (1)
2	Manhattan	Tertiary hospital, faculty practice	Private, Medicare	Epic	Patient individual interviews (6) Physician focus group (1)
3	Manhattan	Community hospital, faculty practice	Private, Medicare	Epic	Physician focus groups (3)
4	Manhattan	Federally qualified health center	Medicaid, uninsured	Epic[a]	Physician focus group (1)
5	Nassau County	Community-based faculty practice	Private, Medicaid	Cerner	Patient individual interviews (14)
6	Chicago	Tertiary hospital, faculty practice	Private, Medicare	Epic	Patient focus groups (2) Physician focus group (1)

[a]Switched from eClinical Works 6 months prior to focus group.

patient-provider communication.[15,16] But communication between patients and providers is often poor,[1,17–24] impeding improvements in patient self-management behaviors and health outcomes.[25,26]

Health systems often look to information technology to help close the communication divide between patients and physicians. The electronic health record (EHR) provides outlets for clinician-patient information sharing, such as secure messaging and personal health records, but these strategies have limitations, especially for elderly, low-income, and minority patients, who are less likely to use EHR portals and other technologies to engage in their health care and are more likely to have low levels of health literacy.[27–30]

A promising alternative is the clinical after-visit summary (AVS). The AVS is a paper or electronic document intended to inform patients about their health and health care issues. It can be used to reinforce important self-management tasks, clarify health information, and provide education. Recognizing this potential, meaningful use (MU) standards until recently required practices to offer an AVS to patients, and delimited 20 elements it must contain.[31] Practices have also been eligible to receive financial incentives by achieving National Committee for Quality Assurance level III patient-centered medical home accreditation, which includes providing an AVS.[13,32]

While MU has dictated much of the content of the AVS, little is known about patients' and clinicians' perspectives on AVS design. We performed a qualitative assessment of these stakeholders' views to inform optimization of the AVS for electronic health records and further the reach of patient-centered care.

METHODS

Practice settings

We conducted qualitative assessments of patients' and clinicians' perspectives on the AVS through focus groups and individual semi-structured interviews in hospital- and community-based adult primary care practices in New York City; Long Island, New York; and Chicago, Illinois. The New York City sites were an internal medicine clinic (Site 1) and the faculty practice of a large academic tertiary medical center (Site 2; see Table 1). Site 1 serves 15 000 inner-city patients who are predominantly low-income Latinos and African-Americans, and Site 2 serves approximately 10 000 privately insured patients. Clinician focus groups were also conducted at the faculty practice of a community hospital in upper Manhattan (Site 3), which serves a population of privately and publicly insured patients of mixed race and ethnicity, as well as a federally qualified

health center that serves low-income Medicaid and uninsured patients (Site 4).

In Nassau County, Long Island, we recruited patients in a large adult group practice (Site 5). Patients in this setting were mostly privately and Medicaid insured. Finally, we conducted 1 clinician and 2 patient focus groups at a large academic medical center in Chicago (Site 6). The physicians were generalists and the practices served privately and Medicare-insured adults. Site 5 employed the Cerner EHR (Cerner Corp, Kansas City, Kan.) and all other practices used the Epic EHR (Epic Corporation, Madison, Wisc.). Site 3 had recently transitioned to Epic from the eClinicalWorks EHR (eClinicalWorks, Westborough, Mass.).

Recruitment

For focus groups, a research assistant (RA) conducted convenience sampling of patients who had previously given consent to be approached for future research studies. The RA called the patients, described the study, obtained verbal consent, and scheduled them for a 40- to 60-minute focus group. Signed informed consent was obtained at the time of the focus group. We also conducted individual patient interviews immediately following clinician visits when clinical directors expressed concern about the feasibility of having patients return for a scheduled focus group. RAs approached patients at the conclusion of their visit, introduced the study, and obtained consent to immediately conduct a 10- to 20-minute semi-structured interview. All patients received $20 for their participation.

Clinicians in primary care practice were invited to participate in focus groups. Signed informed consent was obtained and a meal and $20 payment were provided. All procedures were approved by the Icahn School of Medicine at Mount Sinai and Feinberg School of Medicine at Northwestern University institutional review boards.

Data collection and analysis

Focus groups and interviews were conducted by the study team following structured guides. All data collection included audio recording and note taking. Audio recordings were transcribed. Two or 3 members of the study team independently reviewed and coded each transcript and met weekly to establish the coding scheme. The team met monthly to review progress toward thematic saturation, and when saturation was achieved no further focus groups or interviews were scheduled. Coding was analyzed using NVivo software version 10 (QSR International, Burlington, Mass.).

Table 2. Patient characteristics

Variable		Site[a]			
	Total	1	2	5	6
N	39	16	6	7	10
Age, mean years (SD)	60 (14)	57 (12)	57 (16)	53 (14)	73 (9)
Gender					
Female	28	13	3	5	7
Male	11	3	3	2	3
Race					
Black, non-Hispanic	15	10	1	0	4
White, non-Hispanic	11	0	1	5	5
Hispanic	9	6	3	0	0
Other	4	0	1	2	1
Preferred language					
English	37	15	6	6	10
Spanish	1	1	0	0	0
Other	1	0	0	1	0
Educational attainment					
≤Eighth grade	1	0	1	0	0
Some high school	5	4	1	0	0
High school graduate	9	3	2	2	2
Some college	13	6	0	4	3
College graduate or higher	11	3	2	1	5
Frequency of visits					
Once a year	3	0	0	2	1
2–3 per year	10	1	2	4	3
4–6 per year	17	10	3	1	3
≥7 per year	9	5	1	0	3

[a]No interviews or focus groups were conducted with patients at Sites 3 and 4.

RESULTS

Patient focus groups and interviews

We conducted 5 focus groups and 14 individual interviews with a total of 39 patients (Table 1). The median age was 60 years (range 30–90); 72% were female, 39% black non-Hispanic, and 23% Hispanic (Table 2). All patients had received AVSs at clinical encounters. Transcript analysis revealed 5 major themes with multiple domains and subdomains (Table 3). The themes were related to AVS use and applications, preferred AVS content and formatting preferences, accuracy of information in the AVS, and privacy concerns.

AVS use and applications

All patients had previously received an AVS, and use of the AVS was mixed. Most reported disposing of it, while others said they filed it in a safe place at home.

AVS use and applications consisted of 8 domains. Notably, 2 emerged regarding patients' thoughts about the purpose and value of the AVS. The majority viewed the AVS as a summary of their medical encounter; issues discussed, care received, medications, and other aspects of the visit. A smaller group saw greater value of the AVS in its summary of general health and health care issues rather than visit-specific issues. Such patients used EHR web portals to access their personal health records and said that the visit-specific information could be accessed at any time. Instead, they wanted information on hand to present to others when needed. One woman said, "... if you're going to the hospital okay, and they start asking you all these questions, well, I mean I have my own history typed up

Table 3: Themes and domains of the after-visit summary, patient perspectives

Theme	Domain
AVS use and applications	Summary of the visit
	Summary of general health and health care
	Quick reference for specific aspects of health care
	Reminder of health-specific tasks to complete
	Review with physician to clarify health and health care issues
	Share health information with family
	Share health information with other clinicians (eg, emergency department), pharmacists
	AVS disposition: disposed immediately, retained in a viewable area (eg, on refrigerator door), filed, carried with person (eg, purse, wallet)
Preferred AVS content	General features of content
	Too much information; amount of content should be limited
	AVS should be customizable for each patient
	Specific content elements, visit summaries
	Primary care physician contact information
	Primary care follow-up appointment date and time
	Appointment dates and times for specialty referrals and testing, and reasons for referrals
	Specific instructions made by the clinician, including treatment plan
	Goals of care
	Vital signs from the current visit
	Medication list including the purpose of medications, excludes separate lists of discontinued or newly started medications
	Specific content elements, health summaries
	Test results
	Immunization history
	Allergies (medication and other)
	Medical history
	Problem list
	Challenges to patient care (eg, language barriers, inability to swallow large pills)
Preferred AVS formatting	Use of lay language
	Larger font size
	Reduced density of information, sufficient white space
	Order of information: contact information, specific instructions, medications
Information on AVS is often inaccurate	Medication list
	Problem list
	Referral contact information
Privacy concerns	Concern about exposure of personal information, eg, history or diagnosis of depression, sexually transmitted diseases

okay? ... I mean, I'm older, and I'm not going to remember all that" (female patient, academic medical center faculty practice). Patients with such views said they often carried the AVS with them in a wallet or purse and showed it to clinicians when seeking medical care while traveling, at emergency department visits, or when speaking with pharmacists about their medications.

Patients also valued the AVS for clarifying their health and health care issues with their physician, to remind them of tasks like keeping appointments, and for sharing their health information with family members or other care providers. Many said they identified

wrong or unfamiliar diagnoses or medications in their AVS, sparking conversations with their physicians. "I like the part about the medication because if it's something there that's old or I no longer use it or it was like a one-shot deal I can ask them to take it off and they take it off, at least" (male patient, academic medical center faculty practice).

AVS content

Patients consistently stressed the importance of having the names and contact numbers of their primary care physician (PCP) and/or the practice, as well as the physician or nurse practitioner they saw during the encounter if different from their PCP. Other important data elements they identified included the reason(s) for the visit, vital signs, specific self-care instructions from their clinician, referral and PCP follow-up information, and medication list. Many patients also wanted goals of care in the AVS. Most, however, felt it was superfluous to include their own contact information and other personal, nonhealth information like age and race. There was less agreement regarding tests ordered and results, immunization history, medication allergies, medical history, and problem list. One patient noted, "Test results, I don't think that should be on that piece of paper. What I have done is I have done MyChart [the Epic patient portal] on the computer and so whenever I take a test I always get a notification that the results are there...." (female patient, privately insured, community-based practice). Alternatively, another patient appreciated the quick access to results and the opportunity to discuss them with the doctor: "And if I had a test done and she's telling me, you know, explaining to me what the test was all about, if that's on there well that's great, I want to know that too so I don't have to go on the portal and look it up all the time" (female patient, privately insured, urban hospital practice).

Preferences for AVS content tended to differ between patients who viewed it as a visit summary and wanted to see diagnoses or problems addressed, upcoming appointments, and referrals, and those who viewed it as a general health summary, placing greater emphasis on medical history, problem list, immunization history, and care team.

Many patients focused on the medication list. While most greatly appreciated having a printed list of their medications, there was also agreement that the list could be improved by eliminating medications they were no longer taking and indicating the reasons for prescribed medications (similarly, they wanted reasons for referrals included in the AVS). Many patients preferred a single "current" list of medications over multiple lists of medications to stop, start, or modify.

When differing opinions arose about AVS content, the conversation often turned to the need for AVS customization. "I mean, maybe it could be personalized by person potentially during an office visit.... And it could be something that, you know, the person can kind of tick off, and then when the doctor is done, that's what they get. So, there's that choice" (female patient, privately insured, urban hospital faculty practice).

AVS formatting

The most common recommendations for formatting changes were greater use of lay terms, larger font, shorter documents (under 3 pages), and specific ordering of content. Regarding the latter, most thought the first page should include the doctor's contact information and the patient's vital signs, reason for visit, follow-up appointments and referrals, goals, and special instructions. Fewer patients

wanted medical history there, including problem list, immunization history, blood type, past procedures, and drug and food allergies.

Accuracy of information in the AVS

Concerns about the accuracy of medication and problem lists and referral contact information on the AVS were repeatedly noted. On the issue of medications, one patient said, "It's not updated like it should be. I have a list and if they bring it up it's about 20 medications that they have me taking. I take six of the medications" (female patient, publicly insured, urban hospital clinic). Patients often reported confusion about their medications as a result of inaccuracies. In the case of the patient quoted above, it also caused fear: "God forbid something happened and they pump all the medicine in me and I ain't taking none of them." Regarding problem lists, one patient remarked, "One time when my mother had passed away I came here so sad, so depressed and everything. ... But when I came back it [depression] was on there and I'm like, 'Why is this here?' He said, 'Well one time you came ...' I'm like, 'That was so long ago. ... That was a one-shot thing'" (female patient, publicly insured, urban hospital clinic).

Privacy concerns

Concerns about unintended privacy breaches involving the AVS were cited by several patients. Typically, such concerns arose when sensitive information was involved, such as mental health disorders or sexually transmitted diseases. "I mean what if I had something personal, like I had [an] STD or something like that, and then everybody would know it?" (female patient, privately insured, seen at a suburban private practice).

Physician focus groups

We conducted 8 clinician focus groups in Manhattan and Chicago, which included 56 individuals (38 physicians and 18 nurse practitioners), of whom 66% were female; the mean years in practice was 10 (Table 4).

Clinicians' views on content and formatting and concerns about the AVS

In general, clinicians viewed the AVS as a potentially important document for patients. "Patients do value getting something, like even if it's just got like their blood pressure on there and their weight and the fact that they came to a visit is so much more than they used to get. So increasingly, patients ask for it.... So I think we should recognize that, that that is a tool" (male physician, urban academic medical center). Yet there was doubt that the AVS effectively communicates key information to patients in its current form. One physician's comments summarized the views of many: "[The information] gets buried on the page, and I don't know if people even look at it. Like as a health care provider, I look at this, and even to me as a health care provider, it looks fairly inaccessible, and I can't even imagine what this would look like to somebody with limited health literacy or low levels of formal education" (male physician, urban academic medical center faculty practice).

Clinicians shared similar views of the AVS with patients (Table 5). They saw value in the AVS as a tool for reviewing information about the care patients receive and the tasks required to maintain or improve their health. They made suggestions for improvement similar to those of patients; eg, including the reasons for medications and referrals. One physician remarked: "I think categorizing medications would actually be very useful because I find

Table 4. Clinician characteristics

Clinician characteristics		Site				
	Total	1	2	3	4	6
N	57	11	3	28	11	4
Clinician type						
Attending	34	7	3	13	8	3
Resident	4	4	0	0	0	0
Other	18	0	0	15	3	0
Gender						
Female	38	5	1	22	9	1
Male	19	6	2	6	2	3
Number of years in practice, mean (SD)	10 (7)	6 (6)	9 (7)	14 (8)	18 (10)	7 (5)
Primary work activity						
Clinical care	25	5	2	15	2	1
Education	14	2	1	3	8	0
Research	4	1	0	0	0	3
Administration	14	3	0	4	1	0
Number of care sessions per week median (range)	4 (0–9)	2 (1–6)	9 (6–9)	5 (0–9)	5 (1–8)	2 (1–3)

No interviews or focus groups were conducted with physicians at Site 5.

many patients don't know why they take what medications and for what reason. If they don't take it and their blood pressure is high, they're not realizing that they're not taking it and that's the direct result" (male physician, academic medical center clinic).

There were mixed reactions to including lists of medications started, changed, or discontinued. Some believed these lists were important, while others thought they confused patients. One clinician remarked, "I don't know if it was discussed, the idea that it shows any medications that you may have changed the dose, it says discontinue and then start, and I know that's been confusing to patients" (female physician, urban community hospital). Another said, "But I actually find a reasonable number of my patients coming back in, when I ask them what their medications are and what they're taking, they'll pull out sort of a cut-out piece of their AVS that has their medication list on it, and it sort of highlights how important the accuracy of that piece of information, of that piece that the AVS probably would be" (male physician, urban academic medical center).

As a result, many preferred a single list of "current" medications in the AVS rather than lists of medications changed or discontinued. Another physician noted that some patients' desire to discuss and rectify inaccurate information in the problem list limits the amount of time spent discussing the health issue(s) relevant to the visit: "If I'm dealing with their diabetes and high blood pressure today they don't necessarily need at that visit to come in and ask me, 'Why does it have the psychiatric diagnosis that my psychiatrist put in three years ago when my mother passed away and I was depressed? And it says adjustment disorder with depressed mood? Why is that still there?' That was something three years ago. It's resolved."

The clinicians often said that the AVS could be improved with formatting changes that include larger font sizes, more white space, and more explicit section headings that use bold typeface or larger font than the text. Some also wanted the ability to alter the text of areas they felt were important to highlight for patients. There was

concern about the length of the AVS. "Some people have 25 diagnoses on their list. You shouldn't have that on every time they get a visit summary. … If the doctor touched on the follow-up of a chronic condition then that should be on the AVS. It shouldn't be everything on that list is on there, the patient sees it, they get overwhelmed and they throw out the paper. They're not going to look at that. They'll be like, I have no idea what this is" (male physician, urban community hospital). Finally, many physicians also lamented the lack of availability of Spanish and other language options.

Workflow issues and the EHR interface

Three problems with integrating the AVS into clinical workflow were commonly discussed by clinicians. Several noted that they had insufficient time during the visit to populate the AVS with information useful to patients, such as specific instructions or goals of care. They reported that doing so typically requires additional typing. They also described inadequate time to review the AVS with patients, further complicated for some by having to retrieve the document from a centrally located printer. For one group, the printer was at the registration desk and the AVS was given to patients by a clerk. Notably, these clinicians saw much less value in providing an AVS to patients than did physicians who provided it directly to patients. A physician remarked, "They ask the front desk. The front desk really is not clinical. They cannot sit here and explain everything that's on that list. The patient gets frustrated. You know what happens with that visit summary: it's going to get thrown out" (male physician, urban community hospital).

For clinicians who retrieved the AVS from a centralized printer, reviewing the document with a patient meant returning to the exam room or using a common area. For the latter, they acknowledged the risk of Health Information Portability and Accountability Act (HIPAA) violations. Some tried to circumvent the problem by speaking quietly or selecting their words carefully and pointing: "… sometimes you go out, everybody's trafficking in and out. You're trying to tell the patient, 'You have to take this medication. Remember to do this. This is your goal.' It seems like a little bit like not private. Even if you're not saying what their goal is and what their medication is, it's kind of like out there" (male physician, urban academic hospital-based clinic). Clinicians offered solutions to these problems, including menus of text to replace free-text for common issues, printers in exam rooms, and review of the AVS with patients by nurses or medical assistants.

DISCUSSION

In this qualitative study, both patients and clinicians viewed the AVS as a valuable tool for communicating health care information, guiding self-management, and relaying information about specific health care–related tasks to complete. Yet they emphasized the need for improvement and identified opportunities to accomplish that.

The literature on after-visit summaries might be considered nascent, but findings from the few studies in this field are consistent with our findings, including dissatisfaction with them in their current form,[33,34] as well as recommendations for improving them.[35] While there was dissatisfaction with the EHR-generated AVS, patients valued them for their various uses. Some valued the AVS as a summary of their visit and the tasks they needed to complete for self-management, while a significant minority of patients viewed it principally as a summary of their overall health and health care issues and a mode for communicating critical medical information if

Table 5. Themes and domains of the after-visit summary, physician perspectives

Theme	Domain

AVS use and applications	Physician use
	  Review information with patient to reinforce issues addressed during visit
	  Clarify health information; generate AVS selectively for patients depending on their need
	Patient use
	  Reference tool
	  Share information with other clinicians
	  Prompt physician to clarify information; correct old or misleading information

Preferred AVS content	Follow-up appointment information, including day of the week Specialty referral appointment information and reasons for referrals Specific goals of care Tasks assigned to patient to complete before next visit Reason for visit Listing of issues addressed during the visit Care plan, including treatments and instructions List of members of the care team Immunization history Pharmacy where patient should obtain medications Problem list Vital signs Exclude certain items, including lab tests that were ordered, race and ethnicity Customization of content Up-to-date medication list, without separate lists of started or discontinued medications
Preferred AVS formatting	Brief AVS Simplified information for improved patient comprehension Use of larger font sizes, especially for older adults More white space More explicit section headings, including use of larger fonts and bold typeface Ability to easily highlight key text, using larger font or bold typeface First page should include items pertinent to current visit (eg, reason for visit, care plan, goals of care, recent vital signs, provider's name and contact information, follow-up appointment information, list of current medications, pharmacy to which prescriptions were sent)
Accuracy and other problems of AVS content	Inaccurate medication and problem lists Removing noncurrent medications from list results in medications appearing in "stop taking" or "discontinue" lists, causing patient confusion Problem lists contain diagnosis names not intended for patients; lay language needed for diagnoses and problems Lack of availability of Spanish and other languages
Interface	Need for dropdown menus or other strategies that reduce free-text (eg, self-management tasks, diagnoses, or problems that are

(continued)

Table 5. Continued

Theme	Domain
	the reasons for medications and referrals, goals of care, referrals; easy access to patient education materials associated with diagnoses) Preview window to review AVS before it is printed
Workflow concerns	Inadequate time to review AVS with patients (potential solutions discussed, included placing the printer in the exam room or having a nurse review the AVS with the patient) Inadequate time to populate AVS with customized information, such as instructions or goals (potential solution discussed was engaging other team members, such as nurses or medical assistants, in the process along with the patient; eg, pre-review AVS to ensure accuracy of information about medications and diagnoses) Privacy concerns in practices that employ centralized printers (potential HIPAA violation if AVS content discussed in common areas) Some physicians unaware of AVS content because it is printed at the registration desk and given to patients by a clerk at check-out

they saw clinicians elsewhere. Notably, most patients who held the latter view also accessed their information online via patient portals, indicating that some information on paper remains valuable for patients in the digital age.

Regarding content and formatting, a clear pattern of preferences emerged that should be considered by EHR vendors and health care institutions planning to improve the AVS. Patients wanted to see their medication lists, specific instructions, follow-up and referral appointments, and clinician contact information up front. They wanted brief explanations of the care they received, specifically the reasons for medications and upcoming appointments. They wanted information written on the AVS in terms they could understand. They also expressed a desire to see information clearly displayed, with white space around each section, as well as a document that is under 3 pages in length. Fulfilling these demands would result in an AVS that is briefer than those typically seen in clinical practice. Finally, patients wanted information customized to their individual needs, similar to what was found by a small qualitative study of patients' preferences about information sharing at the end of outpatient visits.[36] Such customization would require considerable reconfiguring of the clinician-AVS interface with most EHR platforms.

A recent study that examined AVS review via patient portals had findings that veered somewhat from those of our study.[37]

A briefer and better-designed AVS could result in improved understanding of health information and adherence. An individual's ability to understand and apply information, whether written or verbal, depends on a complex set of cognitive abilities, of which a key component is working memory.[38] Working memory enables an individual to temporarily store, manipulate, and apply information that has been recently gathered. But working memory is affected by such factors as advanced age, existing cognitive deficits, and limited health literacy, which are among several fixed or relatively immutable factors that diminish working memory and hence the ability to absorb information presented via AVS or other modality.[38,39] Another major factor is cognitive load, which is essentially the

volume and complexity of information presented.[40,41] In contrast to other challenges to working memory, cognitive load is modifiable. In the case of the AVS, reducing cognitive load and enhancing comprehension would entail reducing the volume of information it contains, simplifying the cognitive demands the information places on the patient (eg, no guesswork), and appropriately structuring the information to enhance retention and comprehension. Indeed, the medical and behavioral health literature is replete with evidence-based methods for reducing demands on working memory[38,41–43] and improving outcomes[44] that could be applied to AVS design. Pavlik and colleagues[45] tested some of these hypotheses in a randomized trial of 4 versions of an AVS that differed by the amount of content. The maximum content version included all 20 MU-required elements. Overall content recall was greatest with the minimum version, though still quite low (recall 32% vs 14%, $P < .001$).

In light of patient preferences for a more focused AVS, it is noteworthy that MU stipulates 20 "relevant and actionable information and instructions," including demographic information and smoking status.[46] Although the AVS is no longer a meaningful use requirement, nearly all of more than 250 000 physicians participating in MU met the AVS core measure requirement in 2013,[47] suggesting that AVSs in practices around the country may have excessive content. The National Institute of Standards and Technology has promoted a reduction in AVS length by recommending a 1-page summary that closely approximates the amount of information suggested by patients and physicians in our study.[48] The institute arrived at its recommendations after discussions with physician subject matter experts.

Aside from wanting content and formatting changes in the AVS, clinicians were keenly interested in changes that would improve workflow. A printer located in a common area was a key workflow challenge, as it added time to the visit and introduced privacy concerns. While having printers in exam rooms could solve these problems, that could be prohibitive for some practices because of cost and maintenance needs. The time required to correct inaccurate information on the AVS could also reduce the time physicians have to discuss other health issues with patients.

In a recently published study, Emani and colleagues[37] provide a possible glimpse of the future of the AVS in their examination of beliefs about the document among patients who access their clinical information via web portals. Although the study was subject to considerable selection bias (survey response rate 23%), it reported that most patients who both access their records online and are aware of AVS availability there view it within 5 days of the office visit (55%). Patients expressed a strong belief that accessing their AVS via the portal would enable them to access their clinical information quickly and efficiently and reinforce their understanding of physicians' instructions. These findings are consistent with the high value that many patients placed on the AVS in our study.

Limitations

This study has limitations worth noting. First, the majority of patients and clinicians interviewed received or delivered care in settings that used the EpicCare Ambulatory EHR. Perspectives on the AVS and thoughts about content and formatting might differ among those at institutions using different EHR platforms. Nonetheless, the earlier meaningful use regulations about AVS content pertained to all EHRs. Moreover, in our evaluation, we did not orient patients to a specific AVS. Second, although we interviewed patients from varied clinical environments and socioeconomic backgrounds, and in

multiple cities, and achieved thematic saturation, we may not have captured the full range of perspectives regarding the AVS from patient and clinician stakeholders. A more generalizable and comprehensive understanding of patients' and clinicians' views of and experiences with the AVS could be achieved in future research through quantitative studies, guided by our study and others like it, and administered across diverse clinical and geographic settings. Third, this study focuses on the perspectives of patients and clinicians in primary care settings. The viewpoints and needs of these stakeholders with regard to the AVS could be different in specialty and surgical settings, and examination of this issue is warranted.

CONCLUSION

In conclusion, the after-visit summary is highly valued by patients and clinicians alike, but both sets of stakeholders have identified numerous ways to improve it to enhance patient-centered care while also safeguarding privacy, assuring accuracy of medical information, and facilitating outpatient workflow. The findings from this study will allow for incremental improvements in AVS content and formatting, but they also demonstrate that next steps in AVS advancement – per-patient customization, streamlined clinician workflow, and use of language, terms, and formats that patients understand – will require outside-the-box thinking by EHR vendors and fundamental programming and design changes. Such efforts would have the potential to improve patients' understanding of their health care and self-management responsibilities as well as their satisfaction with care.

COMPETING INTERESTS

The authors have no competing interests to declare.

CONTRIBUTORS

A.F., A.S., L.J., and J.K. were responsible for conception, analysis, and interpretation of data; A.F., A.S., and L.J. were responsible for acquisition of data. A.F. was responsible for drafting the article; all co-authors were responsible for revising the article. All authors are accountable for all aspects of the work. The authors wish to thank Noah Cohen for his assistance with transcript coding.

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