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Beyond Copy and Paste: Clinician Approaches to Meeting Information Needs During Note Writing

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Abstract. Clinicians need historical information that does not change over time, as well as other information from the notes of others to inform their documentation - to save time, they cut and paste since that is a feature in many conventional EHRs. Copy and paste is a solution to clinicians' needs that has associated downsides including errors. As part of a study of clinicians using an innovative system which gives them complete control over information selection and arrangement, two used the process of note splitting to meet needs that are sometimes solved through cut and paste; four others used text insertion (partial note sections) to address related needs. The purpose of this study is to enhance understanding of the note splitting and text insertion phenomena by describing the processes, the resulting creations, and the associated clinician rationales. Mixed methods included a thinkaloud protocol and analysis of user interface creations and time sequences.

Keywords. User-composable EHR, EHR, EMR, electronic health record, usability

Introduction

Clinicians using an electronic health record (EHR) are faced with the task of communicating the patient condition to self and colleagues, completely, succinctly and accurately and in limited time. One issue is that different pieces of the required information can have different characteristics, e.g. update frequency, ideal level of detail, or optimal place in the user's workflow. This can pose difficulties in forming a coherent usable communication. Clinicians need historical information that does not change over time, as well as other information from the notes of others to inform their note writing - to save time, they cut and paste since that is a feature in many conventional EHRs. However this solution to clinicians' needs can have disadvantages, such as errors induced by false assumption that the copied material is accurate and still relevant[1-3]. As part of a study that gave clinicians the ability to insert text blocks anywhere in the interface, using an innovative widget-based system[4-6], some users (6/12) used the process of note splitting and/or text insertion to meet needs that are sometimes solved through cut and paste. The purpose of this study is to enhance understanding of the note splitting and text insertion phenomena by describing the processes, the resulting creations, and the associated clinician rationales.

We previously described a novel EHR system, MedWISE, in which nonprogrammer clinician users can gather any desired elements such as laboratory test

results, clinical notes, X-ray reports, RSS feeds, or other information on the same screen by drag/drop[4-6]. This includes the ability to incorporate text blocks anywhere in the interface, via the 'stickynote' widget (see Figures 1 and 2). Clinicians can also create and share entire interfaces, which may be patient-specific or reflect specialty or individual preferences. One aim of giving clinician users control to design the EHR is that they may use this freedom to solve existing problems, leveraging their extensive domain and contextual knowledge to create technological solutions better fitting their needs. Here we examine note splitting and block text insertions as examples of such problem-solving. We have reported more complete descriptions of MedWISE and its use[4-6].

1. Methods

Thirteen clinicians (10 residents, 2 attending physicians, and one physician assistant (PA)) were recruited via a focus group announcement and email from the hospitalist and nephrology divisions of NYP. The protocol was approved by the Institutional Review Board of Columbia University. Clinicians gave informed consent before data collection and were each compensated $100 for a two-hour session.

Clinicians were given four real patient cases and asked to assume that they would be taking over care of the patients. They were asked to think aloud as they used MedWISE. To simulate a typical realistic care situation, clinicians were not given instructions regarding use of specific widgets or the order in which to view and organize information. For cases 1 and 2, they were instructed to use MedWISE in any way they wished, in order to familiarize themselves with the patient's condition and state their respective assessments, diagnoses, and plans. For case 3, they were also asked to prepare a screen layout that would be shared with colleagues. For patient case 4, they were told they had ten minutes to view information before summarizing.

Think-aloud protocols [7] from the thirteen users were transcribed and coded according to two coding schemata, which were also applied to the associated screen actions: 1) the schema of Hassebrock and Prietula[8] for diagnostic reasoning: data examination, data exploration, data explanation, hypothesis evaluation, discrepancy processing, meta-reasoning, and summarization; 2) an investigator-derived schema identifying elements pertaining to HCI; some elements were based upon literature pertaining to the intelligent use of space in workplaces[9]. These included behaviors and codes such as spat (spatial arrangement), creat (creation), rati (rationale for the action), split (note splitting), sugg (suggestions), note (note creation), region (assigning regions of the screen for particular purposes), and so on. Data were coded by one investigator (YS) and reviewed by a second (SB) to support the qualitative research criterion of auditability[10].

2. Results and discussion

We surveyed users about their computer skills. All but two users used social networks. One rated himself 'expert' in computer knowledge, seven rated themselves 'above average', and five rated themselves 'average'. Nine used EHRs from other locations, usually from home. Table 1 summarizes subject demographics and their use of EHRs.

Table 1. User demographics and EHR use.

Demographic	Average Time	Range
Service at NYP	2.5 yr	4 mo-6.5yr
Work in field	3.3 yr	4 mo-7 yr
WebCIS use	2.4yr	4 mo-6.5 yr
Eclipsys use	1.9 yr	4 mo-4.5 yr
Other EHR use –5.7	2.7 yr	0-6.5 yr
Hours/week		
WebCIS	26.6 hr	8 hr-80 hr
Eclipsys	25.8 hr	8 hr-80 hr

Users created a variety of interfaces, described in Senathirajah, Kaufman, Bakken, [11]. Six of twelve users (including the PA and one attending) made use of the stickynote, two using it to split notes into multiple sections (in six interfaces total), and four to insert text blocks (e.g., to-do lists, medications and problems) in different parts of the screen for particular purposes (in ten interfaces total). Common note parts were: a) orienting 2-4-line summaries (n=5), b) orienting problems and task lists (n=5), c) active issues/history/medications (n=5), d) problems, medications, plan/tasks (n=2).

Some users sought to address perceived limitations in current conventional systems, and had reflected on a logistical difficulty created by copy-paste, eloquently described by one user: "…for example you're not taking a social history or family history at every single visit but it'll show up in every single note, which … takes up a lot of room and makes the note way longer than it has to be. The problem is that you don't include it, if you want to see it you have to go clicking through note, note, note, and it takes forever. So… have a section of things that aren't necessarily going to be updated every single time, and if something updates it it's fine, but … my most recent progress note will be pretty tight."

This user split the usual clinical note into Background Information and Active Issues sticky notes placed in different columns (Figure 1). He stated that this would allow the less-frequently updated background to be available but separate, allowing a 'clean' active issues section. Another placed a brief 3-line patient summary in the top left-hand corner to orient readers 'as soon as you get to the page', the medication list with other action items, and a health care maintenance list with related labs (Figure 2). Likewise, another placed a problem list and task list in different parts of the screen to structure work processes. Orienting summaries in the upper left corner and to-do lists in the upper right were consistent with a general pattern of left-right progression from orienting information to action items, described in [11]. Another example of user creativity includes the use of the stickynote and column organization as a way to convey a task list. The user stacked lab panels to be monitored in one column with a stickynote saying 'labs to monitor' addressed to subsequent team members caring for the patient. This was faster than writing a list and,made the same widgets serve both display and task list purposes.

Some users gave reflective rationales for their actions. The flexible functionality allowed them to structure information display according to data characteristics and clinician needs, bringing to the surface that which is currently important while leaving other information available. Splitting notes lets the level of detail be suited to the function; thus a 3-line high-level summary served to orient the reader at the beginning of case review while a detailed task list placed at right gave appropriate information toward the session end. Information could be grouped with other EHR elements on the basis of common function. Wrenn et al. suggested modular note formats in which the

most recent note may link to other note sections as a strategy for reducing cut and paste; our users essentially did this[12].

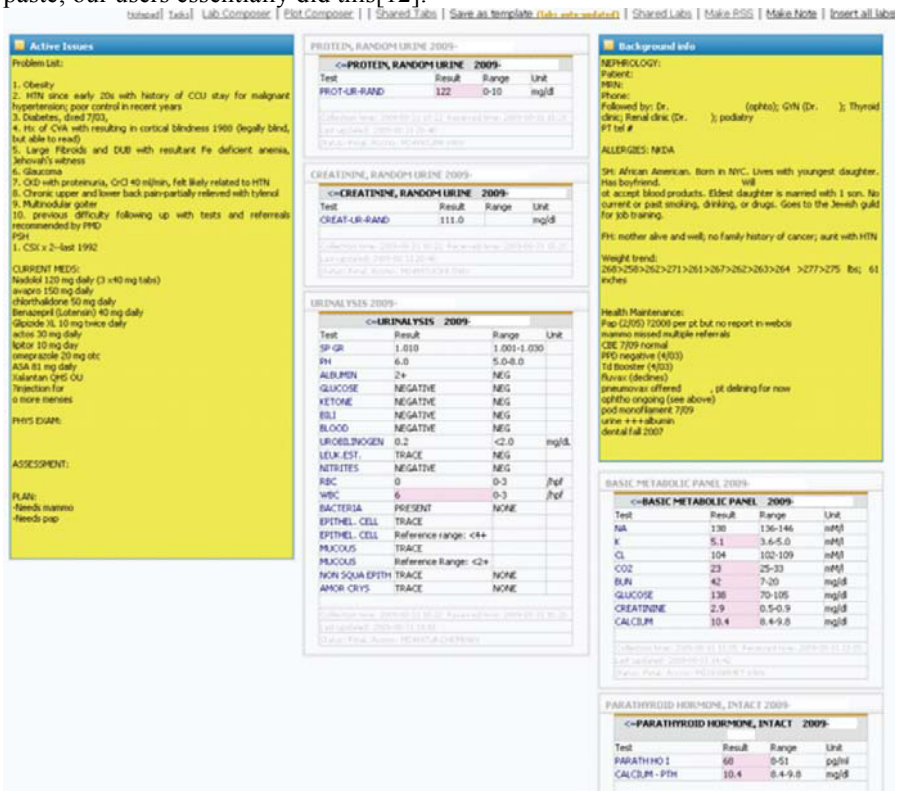

Figure 1. The user split the notes into background information and active issues; the latter is updated frequently while the former is easily available if needed.

Figure 2. The user created a 3-line summary at upper left, the first area viewed, to orient himself, and placed data with healthcare maintenance issues in the middle column, with custom lab panels to monitor and medications in the right column.

Though a simple example, note splitting allowed clinicians to avoid some consequences of note copying, and shows their ability to use new functionality creatively to solve a problem in their daily work.

Limitations of this work include the small number of subjects in the laboratory study and the study at one institution (though with data from two major medical centers) which limits generalizability. The laboratory tasks did not allow for real communication with colleagues. Most clinician subjects were in a training phase (residents). It is also possible that there was a self-selection bias since participation was voluntary. On the other hand, the use of real patient records and realistic tasks were strengths.

3. Conclusion

Clinician users given a flexible user-composable system found a different way to address the problem of efficient and usable note creation in EHR use. Larger studies with a greater range of users and use cases, will help clarify the extent to which this is a desirable approach. The possibility of clinician-directed problem-solving make such design and interaction approaches worthy of further exploration.

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