Usability Testing to Guide Development of a Clinical Decision Support System for Substance Use Screening and Interventions in Primary Care

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Background

- Tobacco, alcohol, and drug use are leading causes of preventable death in the US.
- Screening and brief intervention for alcohol use is guideline-recommended care (USPSTF, HEDIS).
- Alcohol and drug use information is not systematically collected in electronic health records.

Mokdad AH, et al. *JAMA* 2004
Moyer VA. *Ann Int Med* 2013
HEDIS 2018, Vol. 2
Saitz R, et al., *Am J Drug Alc Abuse* 1997

NIDA Common Data Elements

- Curated set of validated alcohol/drug screening tools
- Appropriate for use in medical settings
- Recommended for incorporation into electronic health records (EHRs)

https://cde.drugabuse.gov/

Study Phases

Phase 1 - Qualitative interviews to identify optimal workflow
- Build screening tools and CDSS prototype in the EHR

Phase 2 - Usability testing of screening and CDSS tools

Phase 3 - Implementation at Wave 1 Clinics
- Measure implementation outcomes

Phase 4 - Implementation at Wave 2 Clinics
- Measure impact at patient, provider, and systems level

Framework for CDSS development

Criteria for usable and effective clinical decision support:

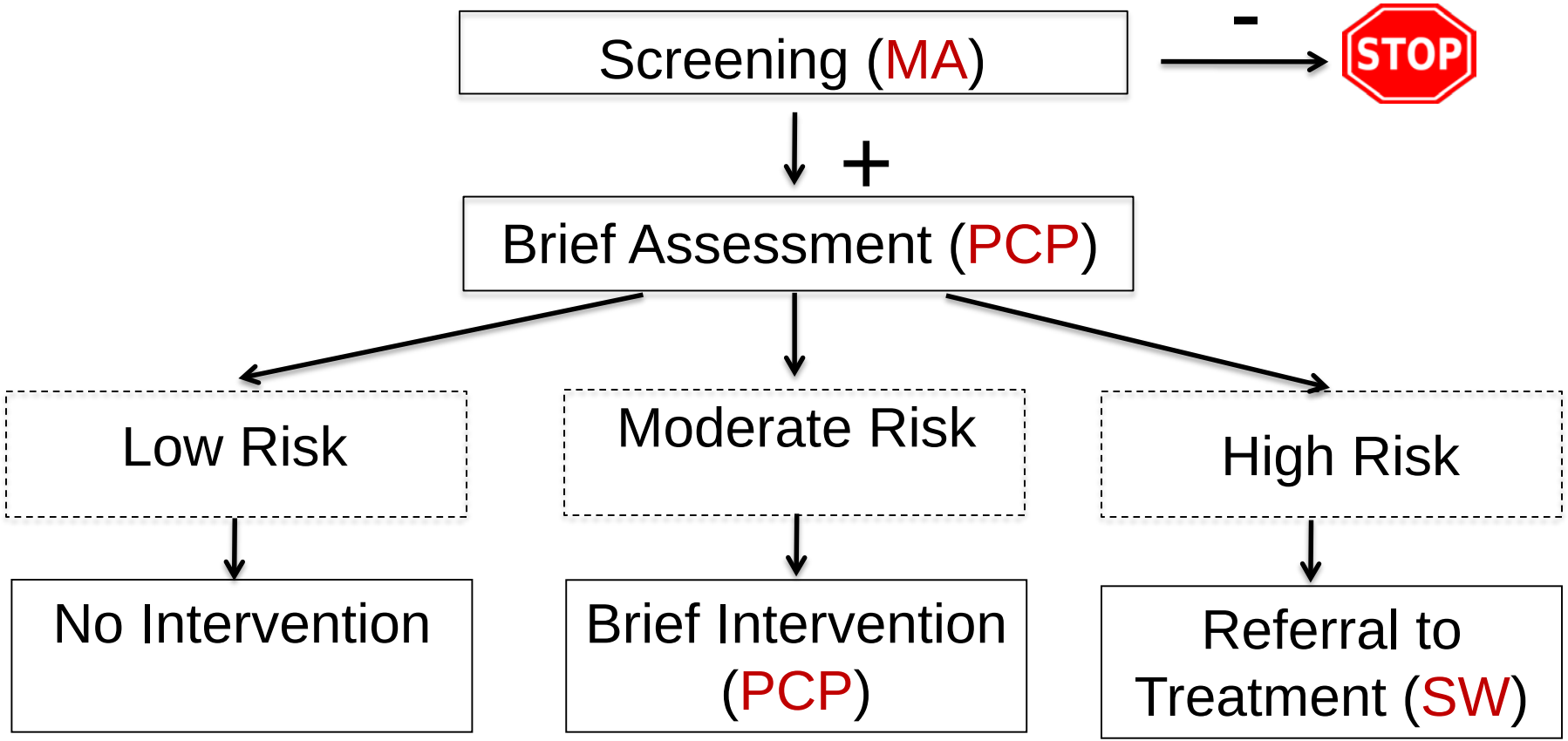
1. Actionable and Active
2. Multiple rounds of usability testing with iterative development
3. Numerous context sensitive triggers
4. Dedicated training and support for end users
5. Support from clinical and administrative leadership

Kannry J, et al. A Framework for Usable and Effective Clinical Decision Support: Experience from the iCPR Randomized Clinical Trial. EGEMS 2015;3(2):1150.

CDSS Development Process

Stakeholder Interviews	Beta version	U1	U2	U3
Fall 2015	Spring 2016	May 2016	July 2016	Aug 2016

Screening, Brief Intervention, and Referral to Treatment (SBIRT) Workflow



Usability Testing Study

Methods

Participants

- Primary Care Providers (PCPs) and Medical Assistants (MAs)
- Currently practicing in the lead clinic

Procedures

1. ‘Think aloud’ instructions and practice
2. Facilitator introduces the clinical scenario and plays simulated patient
3. Participant instructed to use EHR in a primary care visit w/ simulated patient

Data collection

- Screen recording (Camtasia™ software)
- Video and audio recording
- Written notes

Analysis

- Audio/video data reviewed and coded using deductive and inductive codes
- Characterized comments as positive/neutral/negative; assigned scores to each (+1/0/-1)
- Summarized frequency and total score for each issue identified.
- Problems classified as ‘human-computer interaction’ or ‘workflow’ findings.

Usability Testing Sessions

	Round 1 (N=13)	Round 2 (N=4)	Round 3 (N=10)
Participants (N)			
Faculty MD	6	2	6
Resident MD	4	2	4
Medical Asst	3	0	0
Repeat participants (N)	0	2	6

Participant Characteristics

	Faculty MD N=9	Resident MD N=6	Medical Assistant N=3
Age: Mean (SD)	40 (SD=6)	29 (SD=1)	56 (SD=3)
Range	31-50	28-31	52-58
Sex: Female	6 (67%)	2 (33%)	3 (100 %)
Race/Ethnicity N(%)			
White	7 (78%)	4 (67 %)	1 (33%)
Black	0	0	1 (33%)
Asian	2 (22 %)	2 (33%)	0
Hispanic	0	0	1 (33%)
Years in practice			
Mean, SD	11 (SD=7)	2 (SD=0.9)	30 (SD=6)
Range	1-24	1-3	24-36
Years using Epic EHR			
Mean (SD)	5.4 (SD=33)	2.6 (SD=1.4)	15 (SD=8.1)
Range	1-10	1-5	10-24

Summary of findings

Testing round	Problems identified
Round 1 (13 sessions)	1. Redundancy with standard Social History section
	2. Location of screening results
	3. Finding data entered by other medical staff
	4. Timing of practice alerts
Round 2 (4 sessions)	5. Some users prefer order sets (SmartSet) over text guidance.
Round 3 (10 sessions)	6. Difficult for MDs to remember the steps of brief intervention.

Round 1:
Redundancy w/ Social History

Problem: Epic™ Social History section includes alcohol and drugs, but does not capture the information needed for risk stratification and clinical intervention.

Response:

- Unable to make changes to the Alcohol/Drug History sections.
- Users are asked to complete both.
- Co-located screening information with the history sections in Rooming tabs

EPIC SCREENSHOT REMOVED

Round 1:
Finding data entered by other staff

Problem: Medical Assistants enter initial screening results; PCP follows up on only positive screens.

- PCPs could not easily see where MA had entered the data.

Response: PCPs receive a BPA if screen was positive; can click on ‘last filed’ to see results, and date completed

EPIC SCREENSHOT REMOVED

Round 1:
Timing of practice alerts

Problem: High risk screening results trigger a best practice alert, which prompts PCP to make a referral to social work.

• Screening happens at the beginning of the visit, but referrals are done at the end of the visit.

Response: Set the alert to fire when the PCP selects a diagnosis from the problem list, which is typically done at the end of the medical visit.

Round 2:
Preferences for text vs. order sets

Problem: Providers had strong preferences for text-based CDSS vs order sets.

• The clinical intervention for moderate-risk use is PCP-delivered brief motivational *counseling*. This does not lend itself to an order set.

• The clinical action for high-risk use is referral to social work.

Response:

• Developed text-based guidance for brief intervention counseling.

• Created order set triggered only for high-risk patients, which includes referral to behavioral health.

Round 3: Remembering the intervention

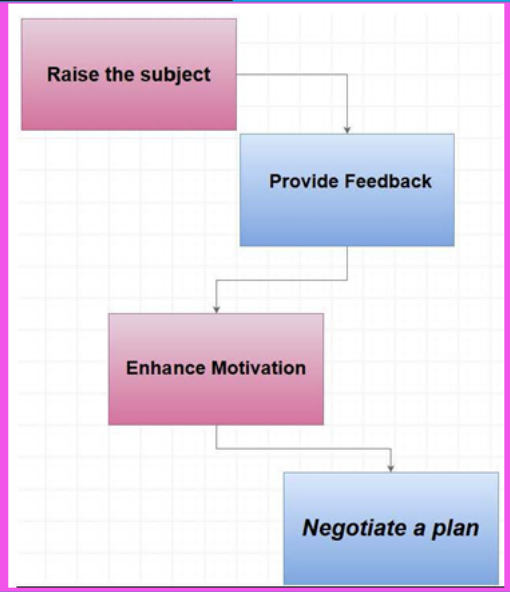
Problem: We provided text-based guidance to help PCPs deliver the 4 steps of brief intervention counseling.

- PCPs didn't know how to find it (dotphrase)
- PCPs were unfamiliar with the 4 steps of brief intervention

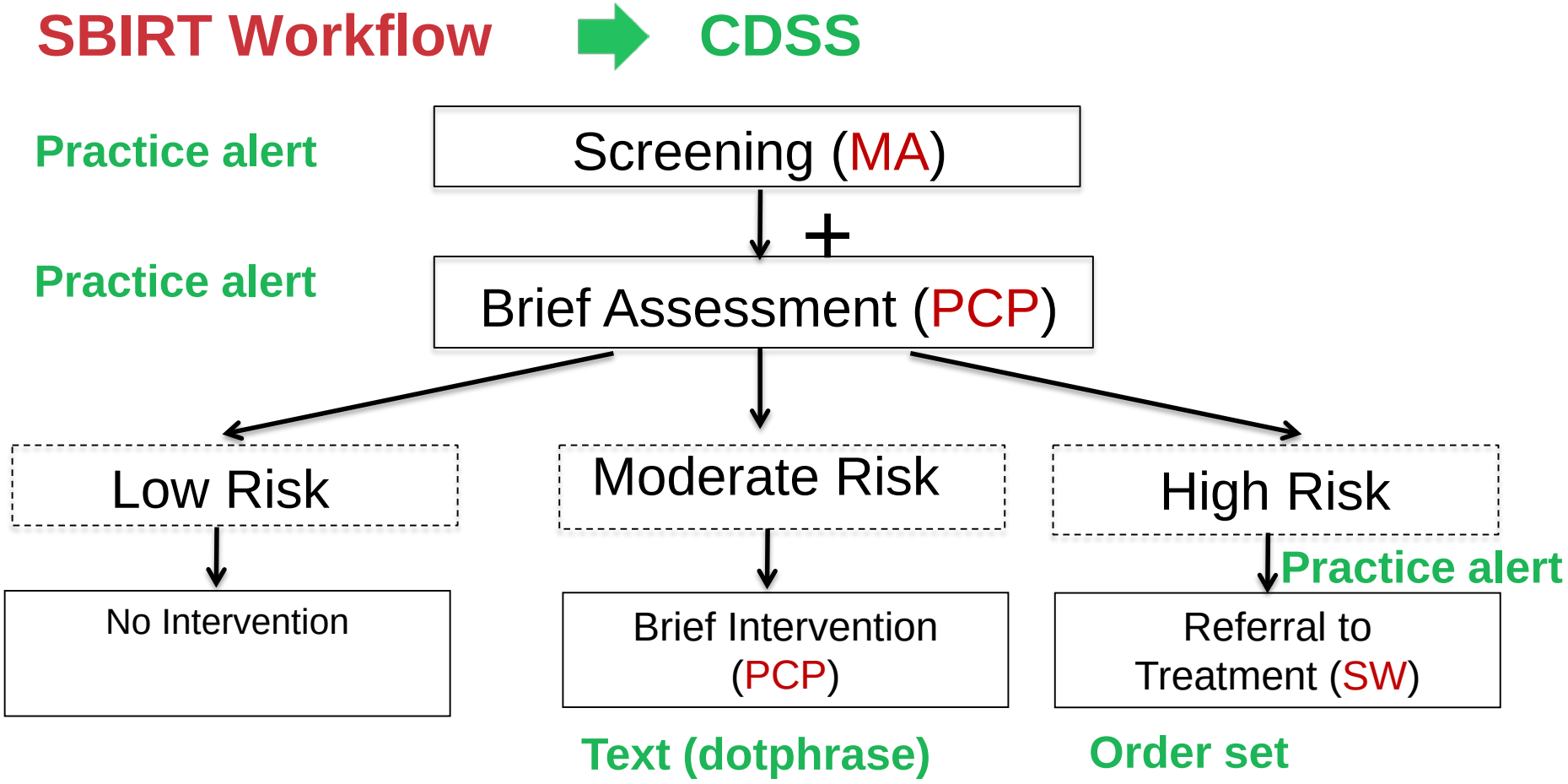
Response: Unable to solve this within the EHR.

- Provided pocket cards to providers as a memory aid.

Pocket Card

4 Elements of BI	Diagnosis
	Alcohol use, unspecified (F10.99) Other psychoactive substance use, (F19.90)

Dotphrase/Smarttext
. alcoholdrugintervention


SBIRT Workflow
CDSS
Practice alert
Practice alert
Screening (MA)
+
Brief Assessment (PCP)
Low Risk
Moderate Risk
High Risk
Practice alert
No Intervention
Brief Intervention (PCP)
Referral to Treatment (SW)
Text (dotphrase)
Order set

Discussion

- A variety of usability issues were uncovered in 3 rapid rounds of testing.
- Standard EHR functionality was inadequate for delivering guideline-recommended screening.
  - Our tools improve the quality of the data, but do not eliminate redundancy.
- Standard timing of practice alerts did not match provider workflow.
  - An elaborate work-around was required to trigger the alert later in the visit.
- The EHR did not facilitate team-based care.
  - Difficult to see if other staff are fulfilling their roles in the SBIRT workflow; practice alerts are suboptimal for this.

Limitations

- Inclusion of repeat participants in Round 2 and Round 3.
  - Gathered feedback on the responsiveness of our changes.
  - Reduced the total number of de novo testers.

- Member of the study team played the simulated patient.
  - Social desirability bias may have influenced provider feedback and interactions.

- Tested CDSS in a single commercial EHR.
  - Other EHRs may present different challenges.

Conclusions

- We successfully modified a commercial EHR to support a complex team-based behavioral intervention for substance use.
- An iterative approach to testing helped to optimize the technology before its release.
- Despite being constrained by a commercial product, we were able to improve the user interaction – though some issues could not be solved.
- Future study phases will examine adoption of the CDSS in multiple primary care clinical sites.

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Thank you!

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Example of coding scheme

Category	Name	Total frequency	Total positive	Total Neutral	Total Negative	Score
Deductive	Workflow issues	217	11	102	104	-93
Deductive	Relevance	96	25	23	48	-23
Deductive	Layout	93	11	18	64	-53
Deductive	Navigation	52	3	10	39	-36
Deductive	Consistency	41	8	11	22	-14
Deductive	Meaning of icons/terminology	30	8	7	15	-7
Deductive	Understanding instructions	25	3	1	21	-18
Deductive	Impact on work activities	15	0	4	11	-11
Deductive	Workaround	11	0	4	7	-7
Deductive	Colour	8	0	2	6	-6
Deductive	Accuracy/Correctness	7	0	3	4	-4
Deductive	Visibility of system status	3	1	1	1	0
Deductive	Applicability	3	1	0	2	-1
Deductive	Timeliness	3	1	2	0	1
Deductive	Font	2	1	0	1	0
Deductive	Mistake	2	0	0	2	-2
Deductive	Understanding error messages	1	0	0	1	-1
Deductive	Graphics	1	0	0	1	-1
Deductive	Speed/Response Time	1	0	0	1	-1
Deductive	Overall ease of use	1	0	1	0	0

Substance Use Screening CDSS