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Introduction

With more electronic devices in the hospital, the incidence of audible alarms is increasing, promoting alarm fatigue and distressing patients.^{1,2} Empowering patients to reverse caution/impending alarm conditions before they develop into audible alarms may reduce alarm incidence and spare the attendant time and effort of clinicians. We applied the concept of active patient participation to intravenous (IV) line occlusions that cause approximately 40% of IV pump alarms.³

Methods

A verbal prompt was retrofitted to the IV pump to instruct patients to "straighten your arm" when a caution condition occurs.

A catheter (supplied with normal saline) was taped to the antecubital surface of 11 consenting, blinded lay volunteers. Subjects were instructed to fold the arm with the IV catheter across their chest (creating the occlusion) and, if needed, to press a provided nurse call button.

In the initial control stage, the verbal prompt was disabled. If volunteers did not spontaneously straighten their arm, the occlusion caused a yellow caution light to blink for 15 seconds; the subsequent alarm was allowed to sound for 105 seconds.

In the intervention stage, upon detection of a caution condition, a verbal prompt to "straighten your arm" was triggered. If the caution condition was not reversed within 6 seconds, a more assertive prompt "straighten your arm now" was issued; if the caution was not reversed within 15 seconds, the alarm sounded. The subjects' use of the nurse button was recorded.





Empowering Patients to Reduce IV Infusion Pump Alarm Incidence Amelia Fiastro, MD; Gregory Goldenhersh, MD; David Lizdas, BS; Nikolaus Gravenstein, MD; Samsun Lampotang, PhD Department of Anesthesiology, University of Florida College of Medicine, Gainesville, FL

Results

With the verbal prompt disabled, no sub prevented the alarm. With the verbal prov enabled, 10 of 11 subjects corrected the caut within 6 seconds. One subject required a sec verbal prompt. All subjects reversed occlusion, prevented the alarm, and resumed infusion (P < 0.001). Overall, the volunte reacted positively to a talking pump and usefulness.

	Control Stage				Intervention Stage								
Participant #	Straightens arm on his/her own? Y/N When (sec from alarm)	Alarm goes away? Y/N When (sec from alarm)	Time to alarm stop (≤120s)	Pushes nurse-call button? Y/N (# of times)	Straightens arm on first prompt? Y/N (sec from alarm)	Alarm goes away after straightening arm at first prompt? Y/N (sec from alarm)	Straightens arm on second prompt? Y/N (sec from alarm)	Alarm goes away after straightening arm at second prompt? Y/N (sec from alarm)	Time to alarm stop (≤120s)	Pushes nurse-call button? Y/N (sec from alarm)			
1	Ν	N	120	Y (1)	Y	2	NA	NA	2	Ν			
2	Ν	N	120	Ν	Y	2	NA	NA	2	Ν			
3	Ν	N	120	Y (1)	Y	2	NA	NA	2	Ν			
4	Ν	N	120	Ν	Y	2	NA	NA	2	Ν			
5	Ν	N	120	Y (1)	Ν	Ν	Y	11	11	Ν			
6	Ν	N	120	Y (3)	Y	2	NA	NA	2	Ν			
7	80	N	120	Y (2)	Y	3	NA	NA	3	Ν			
8	Ν	Ν	120	Ν	Y	2	NA	NA	2	Ν			
9	Ν	Ν	120	Y (2)	Y	4	NA	NA	4	Ν			
10	Ν	Ν	120	Ν	Y	2	NA	NA	2	Ν			
11	Ν	N	120	Y (2)	Y	2	NA	NA	2	Ν			

Discussion

An IV pump occlusion may lend itself to being corrected without clinician intervention by empowering patients. With the increasing concern for alarm fatigue and the time and effort spent correcting alarm conditions and reducing noise in the hospital, patient-empowering devices may offer a novel opportunity to decrease alarm incidence.

	Questions	Volunteer #1	Volunteer #2	Volunteer #3	Volunteer #4	Volunteer #5	Volunteer #6	Volunteer #7	Volunteer #8	Volunteer #9	Volunteer #10	Volunteer #11
oject mot	Do you trust software to diagnose alarms?	Yes	Unsure	Yes	Yes	Yes						
tion ond	Would you follow automated instructions if you were a patient?	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
the	Did you feel empowered by this approach?	Yes	No	Yes	No	NA	Yes	Yes	No	Unsure	NA	Yes
the eers	How concerned were you (0 no concern-10 panic) when the alarm sounded?	2	1	3	0	3	8	1	1	3	0 (irritated)	5
its	Did you utilize the nurse call button?	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes
	Would you prefer a female (F) or male (M) voice instruction?	M/F	M/F	M/F	M/F	F	M/F	F	M/F	M/F	M/F	M/F

References

1) Association for the Advancement of Medical Instrumentation. AAMI Clinical Alarms: 2011 Summit. 2) Medical device alarm safety in hospitals. The Joint Commission: Sentinel Event Alert 8 Apr. 2013: 1-3. Issue 50. 3) Monitoring consciousness via pulse oximeter motion artifact. American Society of Anesthesiologists. 2012 abstract.

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