

Implementation of Virtual RSI Kits to Reduce Potential Medication Exposure and Decontamination During the COVID-19 Pandemic

Primary Investigator: Mary Beth Brinkman, PharmD, PhD, BCPS

Co-investigators: Mimi Garrett, Megan Behme, Samantha Kubichek, Priscilla Lee, Jennifer Ellison

OSF St. Francis Medical Center, Peoria, IL

Background

Standard medication boxes containing medications needed for Rapid Sequence Intubation (RSI) have been historically stocked on patient care units at our institution to allow for medications needed for RSI procedures to be removed together. The emergence of COVID-19 had potential to increase the number of kits needed to be stocked and the number of decontamination procedures performed on any kits exposed to rooms on respiratory precautions. Guidance released in March 2020 from the World Health Organization indicated measures to prevent the spread of infections in the workplace should be implemented even if COVID-19 had not arrived in the community. Given this, Automated Dispensing Machines (ADM) that allow for virtual kits potentially present a technology based solution that allow for users to remove a set of commonly-used medications together without the need for a physical container.

Purpose

The purpose of this study was to investigate whether implementation of virtual RSI kits could be accomplished at our institution during the time of the COVID-19 pandemic.

Methods

The Pharmacy department created an RSI procedure based virtual kit based on our existing physical RSI box that could be loaded in appropriate ADMs as needed. Interdepartmental feedback was used to create educational documents for nursing educators to support this process change. As COVID-19 units were created, pharmacy worked with nursing educators to ensure education was provided to the appropriate nursing staff regarding availability and function of the Virtual RSI Kits prior to loading them on the units and activating the process. Education was assigned to appropriate personnel via our institutions standard electronic workforce development platform and also presented by nurse educators as needed regarding the new kit process and accessing the kits. A dosing card similar to that available in the physical box was placed in every room available by the ADM and maintained by the unit nursing educators. The medications were refilled through the normal ADM refill process, thereby eliminating extra pharmacy personnel into/out of the COVID-19 units to replenish a physical RSI box.

Results

Figure 1. Example of Virtual RSI kit construction (A), Example of Virtual RSI access (B,C)



Table 1. Areas of Virtual RSI Implementation

Location	Station Name
Forest Park (General Medicine)	1700
	2700-1
	2700-2
MICU	3700-1
	3700-2
Emergency Services	4000-A
	4000-B
	EMER1
	EMER2
	EMER3
	TRAUMA-1
	TRAUMA-2

Figure 2. COVID-19 Virtual RSI Checklist

Rapid Sequence Intubation Drug Checklist

Charge Nurse checks Pyxis every 12 hours (with Crash Cart check) to identify drugs available in Pyxis

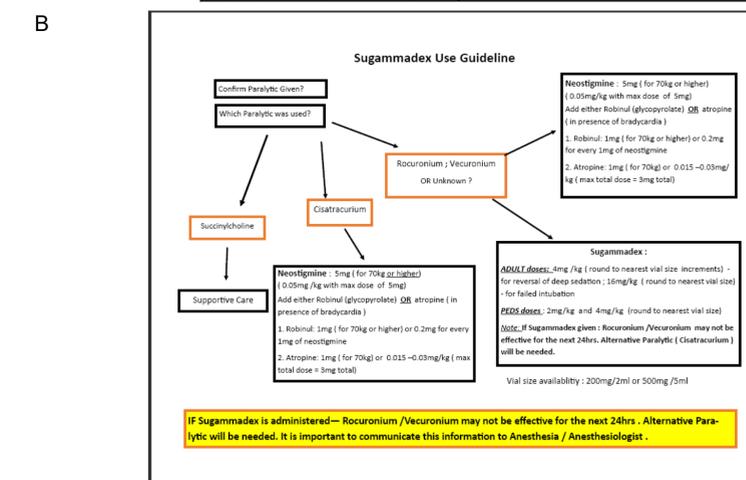
Check if Available in Pyxis	Rapid Sequence Intubation Drugs	Vials and Concentration	Anesth Order
<input type="checkbox"/>	Paralytics		
<input type="checkbox"/>	• Vecuronium (reconstitute)	1 x 10mg vial (reconstitute with 10ml Normal Saline)	<input type="checkbox"/>
<input type="checkbox"/>	• Rocuronium	2 x 50 mg/5 ml vial	<input type="checkbox"/>
<input type="checkbox"/>	• Succinylcholine	1 x 200mg/10 ml vial	<input type="checkbox"/>
<input type="checkbox"/>	Sedation		
<input type="checkbox"/>	• Propofol	2 x 100mg/10 ml vials	<input type="checkbox"/>
<input type="checkbox"/>	• Etomidate	1 x 40mg/20 ml vial	<input type="checkbox"/>
<input type="checkbox"/>	• Midazolam	1 x 5mg/5 ml vial	<input type="checkbox"/>
<input type="checkbox"/>	• Ketamine	1 x 500mg/10ml vial	<input type="checkbox"/>
<input type="checkbox"/>	• Fentanyl	2 x 100mcg/2ml vials	<input type="checkbox"/>
<input type="checkbox"/>	Vasopressor		
<input type="checkbox"/>	• Phenylephrine	1 x 100mcg prefilled syringe	<input type="checkbox"/>
<input type="checkbox"/>	Reversal Agent		
<input type="checkbox"/>	• Sugammadex	1 x 200 mg/2 mL vial	<input type="checkbox"/>
<input type="checkbox"/>	NOT IN PYXIS		
<input type="checkbox"/>	Syringe Packet	1 x 10ml Normal saline diluent vial 4 x 20ml syringes 3 x 10ml empty syringe 7 x vial access cannulas 5 x Pre-filled Saline Flush syringes 10 alcohol prep pads	<input type="checkbox"/>

Table 2. Recommended dosing for RSI medications (A), Recommended dosing for use of sugammadex (B)

OSF Healthcare RSI medication options and recommended doses

Note: Anesthesia and Providers familiar with this procedure will have their desired drug and dose in mind as well as the sequence that they want to administer. Below is a guide only if alternative medications are used and provider unfamiliar with drug and typical doses.

Sedatives	Dose 1 (weight based)	Dose 2	Comments
Propofol	0.5-2mg/kg	50-200mg	primary choice
Etomidate	0.1-0.3 mg/kg	10-20mg	primary choice
Ketamine	0.5-2mg/kg	50-200mg	alternative 1
Midazolam	0.01-0.1 mg/kg	1-3mg	alternative 2 (higher doses up to 0.2mg/kg has been used in induction)
Analgesic			
Fentanyl	3-5mcg/kg	50-200mcg	Analgesia alternative if needed but not typically part of RSI-Morphine may 0.1mg/kg slow IVP (~10mg)
Paralytics	(Use 1BW)		
Succinylcholine	1.5-2mg/kg	150mg-200mg (max for >100kg)	primary choice ; no reversal agent
Rocuronium	1mg/kg	100mg (max for >100kg)	alternative 1 : quick only - but due to prolonged effect fent/propofol post intubation is needed ; sugammadex needed (4-16mg/kg round to vial size) - see algorithm for reversal
Vecuronium (trauma/ ED doses)	0.1mg/kg	10mg (max for > 100kg)	undesirable due to longer onset of action and mod offset ; premed doses of 0.01mg premed may be needed - to prevent fasciculation - sugammadex needed(4-16mg/kg round to vial size) - see algorithm for reversal
Pressors			
Phenylephrine (neosynephrine)		100mcg IVP dose	IVP pressor - or Phenylephrine dwindle -
Reference	OSF Saint Francis Medical Center - Emergency Department UMKC.edu RSI Medications and Recommendations Vanderbilt University Anesthesia Department		



Results Cont.

Our institution created a new process for dispensing Virtual RSI Kits during the COVID-19 pandemic. Various ADMs were loaded with virtual RSI kits with up to fourteen kits successfully loaded and maintained during the height of the COVID-19 pandemic. When selected, the Virtual RSI Kit sequentially opened the cubies containing the kit components selected for removal. The virtual RSI Kit was loaded on the override list for the specific units as needed. Narcotics were used, monitored and recorded through the standard ADM workflow, which avoided the need for individual box narcotic use documentation. Additionally, medications were ordered, documented and charged in the electronic medical records through the standard override/linking process, avoiding the need for individual box reconciliation processes. Within 90 days, the virtual kits were used 36 times.

Conclusions

Virtual RSI kits are a viable option to dispense medications needed for RSI procedures in pandemic times. Initial review indicates implementation of virtual RSI kits resulted in fewer medication boxes created and maintained by pharmacy and fewer physical items potentially exposed to COVID-19 patient rooms. Additionally, use of a virtual kit allowed for rapid availability and removal of RSI medications as COVID-19 Units were opened and closed or patients were moved to COVID-19 overflow areas. Future studies are needed to quantify and assess impact of this technology on personnel time and potential for continuation or expansion of the virtual kit process after pandemic workflow concludes.

References

- de-Carvalho, Débora, et al. "Impact Assessment of an Automated Drug-Dispensing System in a Tertiary Hospital." *Clinics (Sao Paulo, Brazil)*, Hospital Das Clínicas Da Faculdade De Medicina Da Universidade De São Paulo, Oct. 2017. www.ncbi.nlm.nih.gov/pmc/articles/PMC5666447/.
- "Getting Your Workplace Ready for COVID-19." World Health Organization, 19 Mar. 2020.

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