Enhancing the Electronic Health Record: Clinical Decision Support via Risk Stratification at the Emergency Department Point of Care

Adina S. Rauchwerger¹; Uli K. Chettipally^{2,3}; Dustin Ballard^{1,2,4}; Mary E. Reed¹; Michelle Y. Liu⁵; David R. Vinson^{1,2,6} for the CREST Network

¹Kaiser Permanente Division of Research, Oakland, CA; ²The Permanente Medical Group, Oakland, CA; ³Kaiser Permanente South San Francisco Medical Center, South San Francisco, CA; ⁴Kaiser Permanente San Rafael Medical Center, San Rafael, CA; ⁵University of Rochester School of Medicine and Dentistry, Rochester, NY; ⁶Kaiser Permanente Roseville Medical Center, Roseville, CA

BACKGROUND

- Emergency departments (EDs) are a prime setting for technical innovation to improve evidence-based clinical decision making.
- Prediction rules are useful for risk stratifying patients to appropriate care pathways.
- A web-based application embedded within the electronic health record (EHR) offers a convenient opportunity to bring clinical decision support (CDS) to emergency physicians at the point of care.

OBJECTIVES

• To develop methods and best practices for bringing innovation to emergency medical care through a fast and user-friendly CDS embedded in the EHR .



Application launches from ED navigator

METHODS	RESU
 Developed RISTRA (RIsk STRAtification), a web 	• RIS
application embedded in an Epic-based EHR.	pat
 A validated evidence-based risk calculator—the 	tha
Pulmonary Embolism (PE) Severity Index—used as a	 RIS
proof of concept.	PE-
 The application extracted patient information from 	• ED
the EHR to predict the risk of 30-day all-cause	of
mortality in patients with PE.	DISCU
 Web services were used to import patient-specific 	• RIS
data into RISTRA to provide real-time guidance to the	Pei
treating physician.	• In t
	tha
	• Eng

👐 Hyperspace - SR	O-ED*** >HOSPITAL - WIT	5 - KTAZD2256 WITSGG2						
Epic - 🛅 🗉	D Manager 📕 Track Boar	d 🛂 In Basket What's New 🚑 ED Cha	art 眠 Pt L	.ists 🞝	Tel Enc 🔄 Chart 📑 ED Reports 👻 🚮 Schedule	e [💆 My Da	ishboards + 🧷 🄑 🗃 Print	t 👻 🧟 Log Out 👻
1 🛛 🏠	Xncggxactxiv,HI Ww	×						WITS
Xncggxact; DOB: 02/19/1973, J MRN: 1100146104	k iv, HI Ww Female, 41 Y 06, 🔁	Room/Bed Wt (kg) Allergies SROED, DH-04 None Not on File			Isolation Code LOS kp.org Att MD None Inactive 133 Inactive PCP: 1	: None None		
	RISTRA							(?) (Close X)
Review/SnapShot Results Review		RISTR	A				Aso]va
Synopsis								
Notes		Nomo:	VNCC	-VA	TVN/ HL 1000/ MENI-1100146104	ne.		
Orders		Name.	ANCG	JAAC	IAIV, HE VVVV IMRIN. I TOU 146 TO40	10		
Bushlam List								
History		PULMON		мво	LISM SEVERITY INDEX (PESI)	0		
Demographics								
Work/Activity Stat					Age: 45			
			Yes	No		Yes	No	
ED Navigator		Altered Mental Status:	0	0	Temperature <36° C:	0	c	
Procedure		Molo:	~	~	Despiratory Data >20/min:	~	0	
PIT		Male.	10		Respiratory Rate 230/min.	0	C.	
RISTRA		Cancer:	0	\odot	Heart Rate ≥110/min:	0	o	
		Heart Failure:	0	\odot	Systolic BP <100 mmHg:	0	c	
		Chronic Lung Disease:	©	0	O2 Satur <mark>Include pre-arriv</mark> ED) (30 points)	al vitals	(EMS, clinic, or transferring	
	< Back	DATA IMPORTED FROM KPI For a descrip	HC. PL ition of	EASE a vari	CHECK & EDIT AS NEEDED FO able, hover the cursor over the v	R RISK /ariable	CALCULATION.	>
More Activities								~

Patient variables imported automatically



This study was supported by a grant from the Kaiser Permanente Northern California Community Benefit Program.



LTS

STRA loaded in less than 3 seconds and calculated a atient-specific risk score in a few steps, taking less an a minute.

STRA successfully identified patients at low risk for -related complications for outpatient treatment. Ophysicians were satisfied with the design and ease use of the application.

USSION

STRA has since been rolled out to 21 Kaiser rmanente Northern California EDs.

the fast-paced ED environment, it was imperative at the CDS application be fast and simple. Ingaging stakeholders across the organization was

essential.

973, Fen 1610406,	7, HI WW tale, 41 Y 營	Room/Bed SROED, DH-04	Wt (kg) Allergies None Not on File	Isolation Code None Inactive	LOS kp.org Att MD: None 133 Inactive PCP: None	
RI	STRA					
Shot	CREST		RISTR	Α		Aso
			Name:	XNCGGXACTXIV,HL WW MR	N:110014610406	
s				PESI Score PESI	Class	
Stat		PESI Score	PESI Class	Approx 30-day Mortality	Initial Care	
		≤64	L	< 2%	Outpt management is often possible	
		65-85	Ш	< 2%	Outpt management is often possible	
		86-105	Ш	~ 5%	Inpatient care is often indicated	
		106-125	IV	~ 10%	Inpatient care is often indicated	
		≥126	V	~ 20%	Inpatient care is often indicated	

Risk score and recommendation