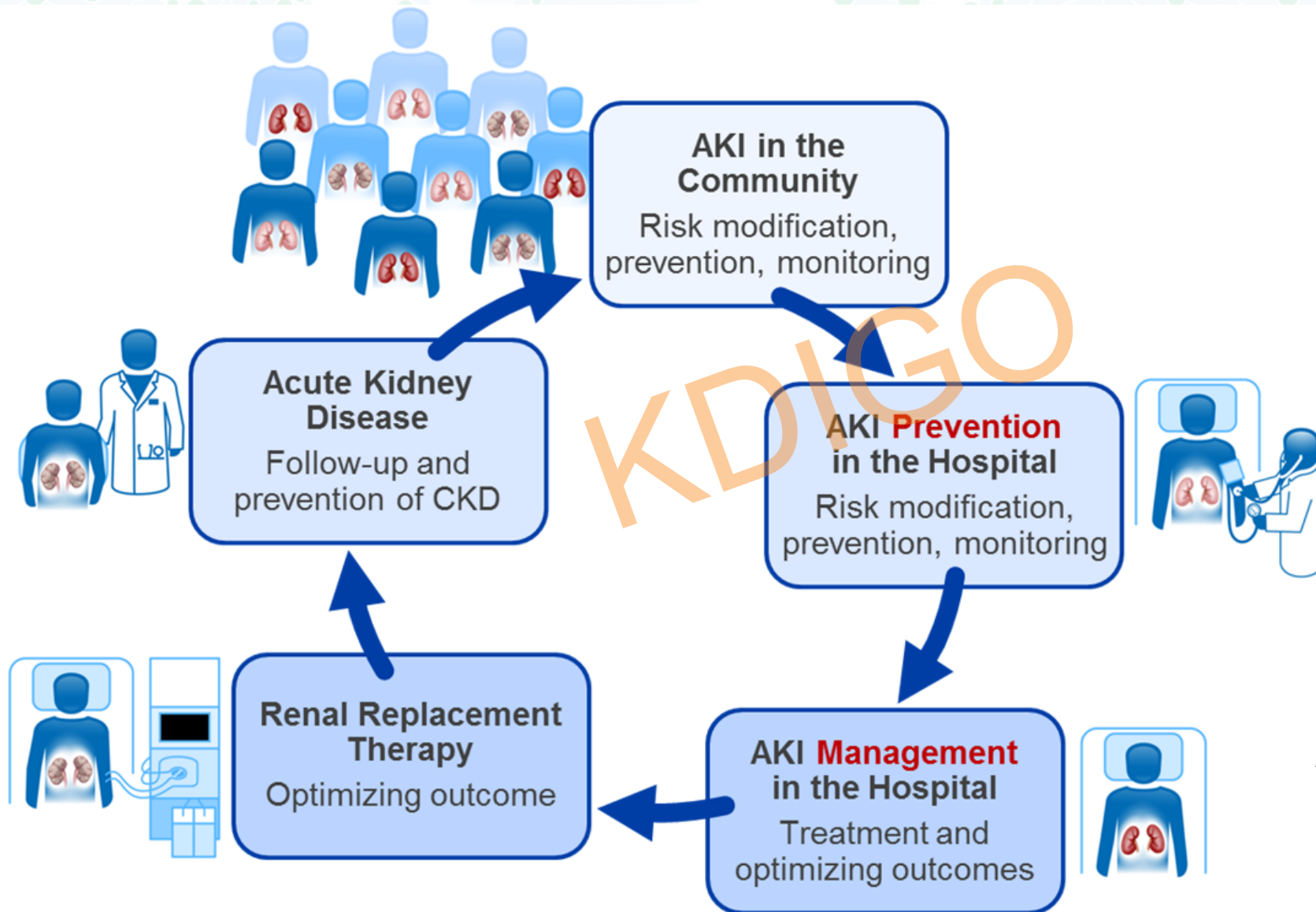




MULTIDISCIPLINARY CARE OF AKI PATIENTS CONFUSION MATRIX

Azra Bihorac

AKI CARE IS A CONTINUUM



From Kashani et al, ADQI XXii

MULTIDISCIPLINARY CARE

- When ***professionals*** from a ***range of disciplines*** work together to deliver ***comprehensive care*** that addresses as many of the ***patient's needs*** as possible.

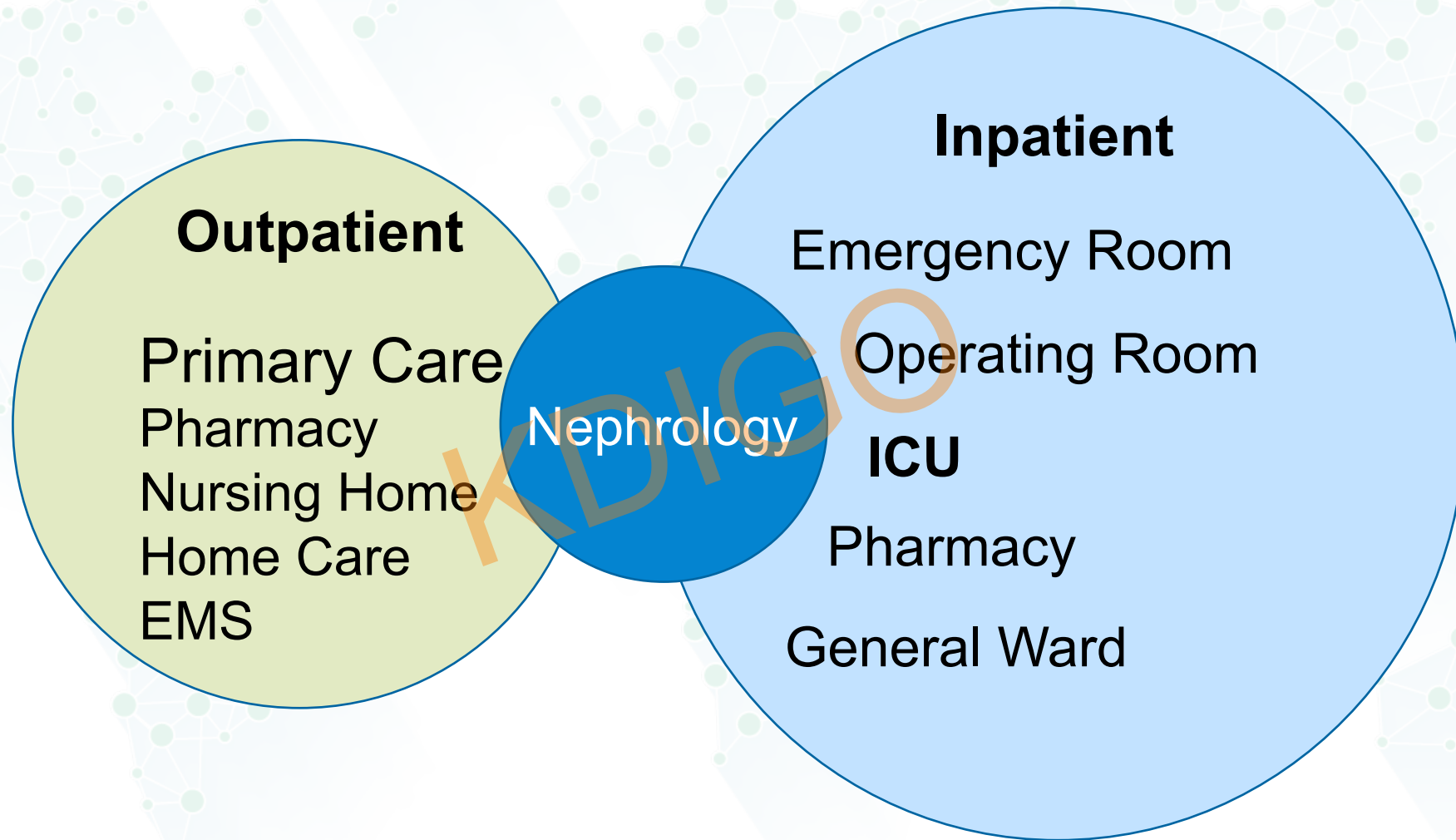
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PROFESSIONALS

- Physicians
- Advanced practitioners (NP and PA)
- Nurses
- Nurse assistants
- Pharmacists
- Dieticians
- Respiratory therapists
- Social workers/Case managers
- EMS
- Clergy

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RANGE OF DISCIPLINES



COMPREHENSIVE CARE

- Single Pathway-Primary disease?
- Joint pathway-Overlap with other diseases and processes
 - Complication or Side-effect?
 - Preventable or Avoidable?
 - Treatable or Curable?
- Context-Specific Goals, Components and Outcomes



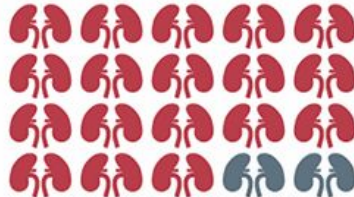
Clinical Decision Support for In-Hospital AKI

METHODS

Outcomes were measured pre- and post-implementation of a Clinical Decision Support System (CDSS) for AKI

Pre-CDSS (12 months):

181k patients
11.0% clinically diagnosed AKI



Implemented the CDSS

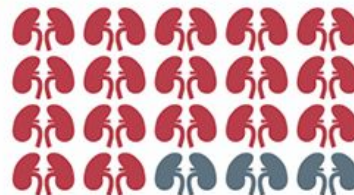
Clinical Decision Support System

- Derives reference serum creatinine from historical values in EMR
- Flags creatinine changes and KDIGO stage



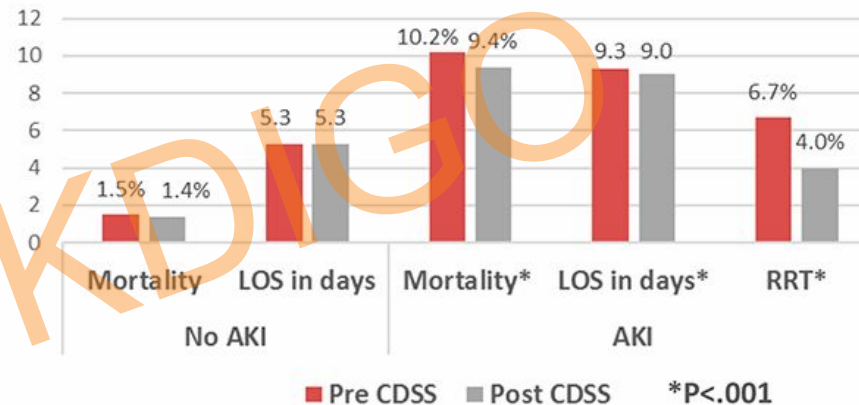
Post-CDSS (24 months):

346k patients
12.8% clinically diagnosed AKI



OUTCOMES

Outcomes Pre- and Post-CDSS implementation



CONCLUSION

Implementation of a CDSS for AKI resulted in a small but sustained decrease in hospital mortality, length of stay and use of dialysis.

USE OF NEPHROTOXIC DRUGS

Medication	AKI, n=15,229		
	Pre-CDSS, n=4655	Post-CDSS, n=10,574	P Value
ACEI/ARB	2.20±7.33	2.18±7.04	0.38
NSAID	4.55±9.52	4.83±10.13	0.01
Aminoglycoside	0.84±5.98	0.82±5.97	0.26
Contrast ^a	0.55±1.95	0.30±1.47	<0.001
Vancomycin	4.56±10.38	4.58±10.41	0.47

COMPUTER DECISION SUPPORT SYSTEM FOR DETECTION OF AKI



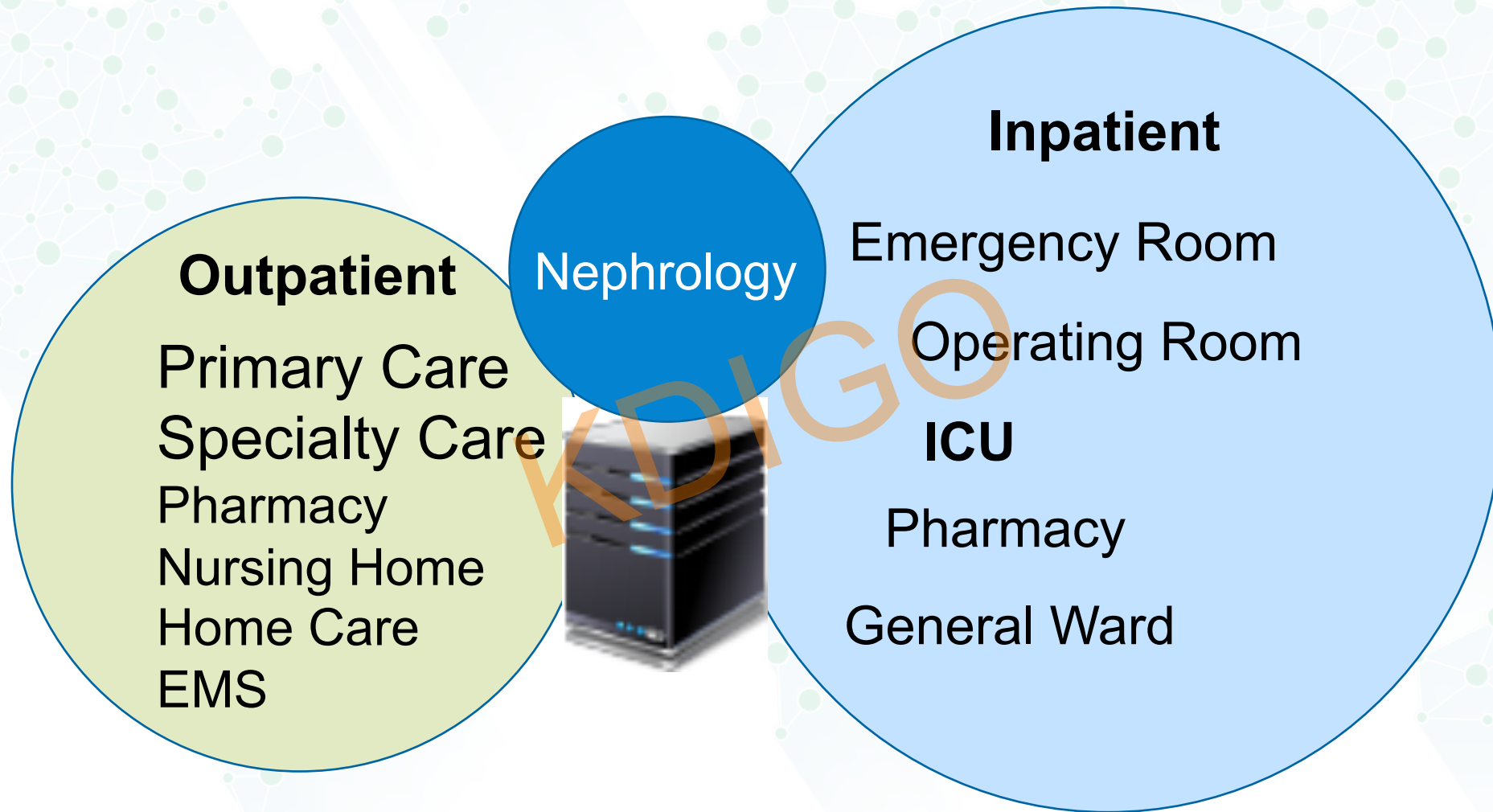
**No Increase in
consult rate for
Nephrology,
ICU and
Pharmacy**

EHR



Selby NM & Fluck RJ, JASN 2018;29:352-354

RANGE OF DISCIPLINES



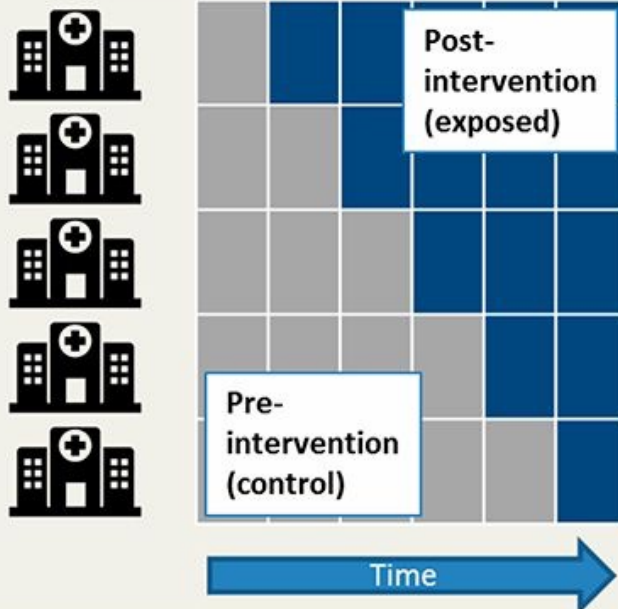
Tackling AKI Study: Organisational Level Interventions for Acute Kidney Injury

METHODS:

Multicentre stepped-wedge cluster randomised trial.

Intervention: hospital-wide AKI e-alerts, care bundle and education.

24,059 AKI episodes
5 hospitals



OUTCOMES:

- 30-day mortality
(Primary outcome)
- AKI progression
- Hospital length of stay
(in those with longer LoS)
- AKI incidence
(improved detection)
- Delivery of AKI care



CONCLUSION: A complex, hospital-wide intervention for AKI did not alter mortality but reduced hospital length of stay, whilst improving quality of care and AKI recognition.

Selby NM et al, JASN 2019;30:505

INTERVENTION

- **An AKI electronic detection and alerting system-UNIFORM** in UK, laboratory digital data
 - Stage of AKI with message advising a clinical response/review of the patient and sign posting of local AKI resources
 - Disruptive element-biochemist telephone to the clinical areas for AKI stage 2/3
- **An AKI care bundle**

Table 1. Core elements that were included in care bundles at each of the Tacking AKI study sites

Core Elements of the AKI Care Bundle Common across All Sites
--

Assess volume status and optimize BP

Treat sepsis

Review medications and stop those contributing to AKI

Perform urinalysis

Referral (to nephrology or critical care outreach) for AKI stage 3, AKI with complications

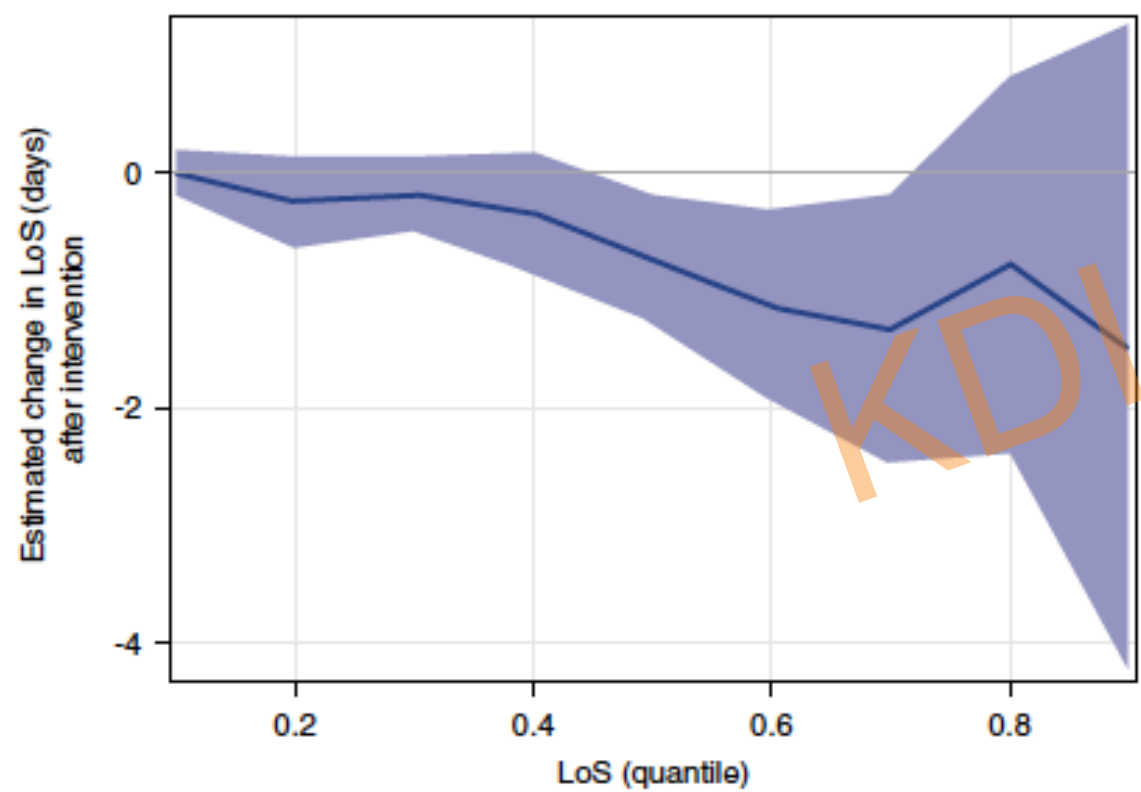
- **An educational program** to raise awareness and knowledge of AKI.

Selby NM et al, JASN 2019;30:505

INTERVENTION

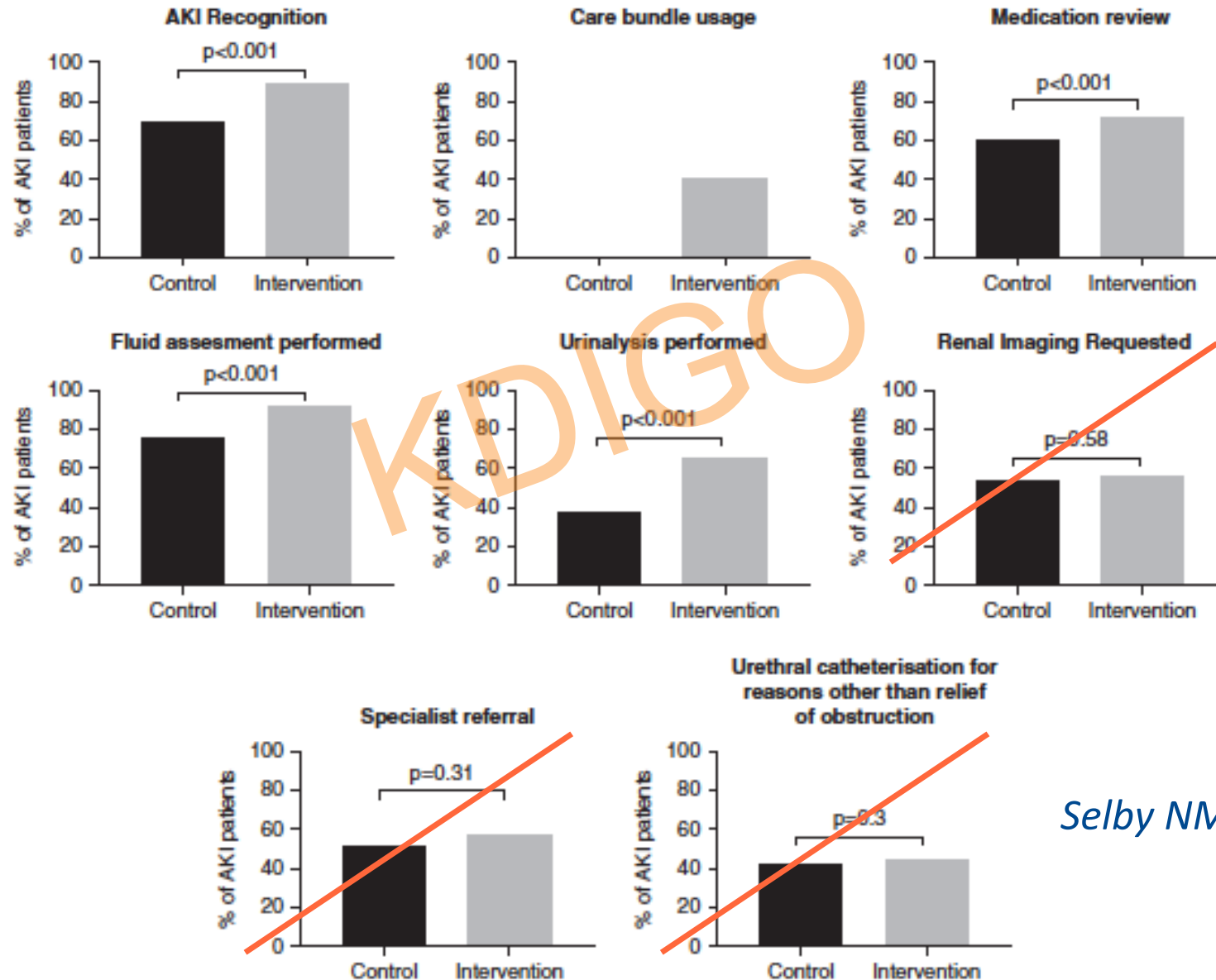
Type of Education Session	No. of Sessions per Center	Target Audience	Audience Size	Duration
Launch event	1	All members of staff welcome; hospital chief executive, medical director, chief nurse attended	30–50	1 h
Hospital grand rounds ^a	2	All grades of physicians, doctors in training and open to those in other specialties who wish to attend	40–80	1 h
Departmental educational or clinical governance meetings	3–8	Departmental teaching to a range of specialties (e.g., emergency medicine, acute medicine, surgery, urology, rheumatology, elderly care)	10–20	1 h
Postgraduate teaching for doctors in training ^a	3/yr (1 for each grade of doctor)	AKI teaching as part of curriculum (essential teaching) for doctors in training, attendance often mandatory	20–40	1–2 h
Induction teaching for new staff ^a	1–3	Shorter sessions, more focused on process rather than education <i>per se</i>	20–40	15 min
Nursing, pharmacy, and advanced practitioner teaching	2–3	Varied between centers from small group teaching to formal AKI study day for large groups	5–70	1 h to whole day
Ward-based teaching sessions	5–10	Formal teaching sessions at ward level	1–10	5–30 min
Ad hoc teaching sessions	20+	Informal teaching delivered by various members of the AKI team, included reminders of resources, patient-based teaching	1–3	Varied, usually only minutes

REDUCTION IN LENGTH OF STAY



Quantile	Change in LoS (95% CI)	p-value	LoS at quantile (in days)	
			control	intervention
0.1	0 (-0.2 - 0.2)	1	2	2
0.2	-0.3 (-0.6 - 0.1)	0.3	4	3
0.3	-0.2 (-0.5 - 0.1)	0.5	6	5
0.4	-0.3 (-0.9 - 0.2)	0.08	8	7
0.5	-0.7 (-1.3 - -0.2)	0.04	10	8
0.6	-1.1 (-1.9 - -0.3)	0.03	13	11
0.7	-1.3 (-2.5 - -0.2)	0.03	17	15
0.8	-0.8 (-2.4 - 0.8)	0.7	24	21
0.9	-1.5 (-4.3 - 1.3)	0.2	36	31

CHANGE IN PROCESSES OF CARE



Selby NM et al, JASN 2019;30:505

ORGANIZATIONAL LEVEL INTERVENTION FOR DETECTION OF AKI AND IMPLEMENTATION OF BEST PRACTICE SUPPORTIVE CARE



Digital data
Computable
Phenotype

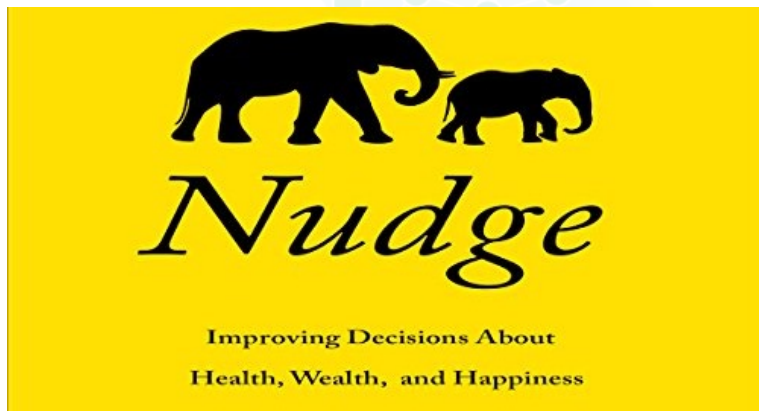


+/- Nephrology
PI-led education
and care bundle

Selby NM et al, JASN 2019;30:505

MANAGEMENT OF AKI

A NUDGE TO HACK NEW HABIT



New Habit
Care Bundle



PREVENTION OF AKI

- ICU patients
- Context-Specific Goals, Components and Outcomes





BIGPAK RCT

*Non-Cardiac **High Risk** Surgery*

237 tested

125 T2I7 + (53%)

Randomized:

63 intervention

62 control

Intervention:

1. Nephrology Consult
2. CVP guided IV fluid
3. Nephrotoxic drugs

High risk for AKI

Elective surgery > 4 hrs

AND

Age>75 or

ICU or

CKD or

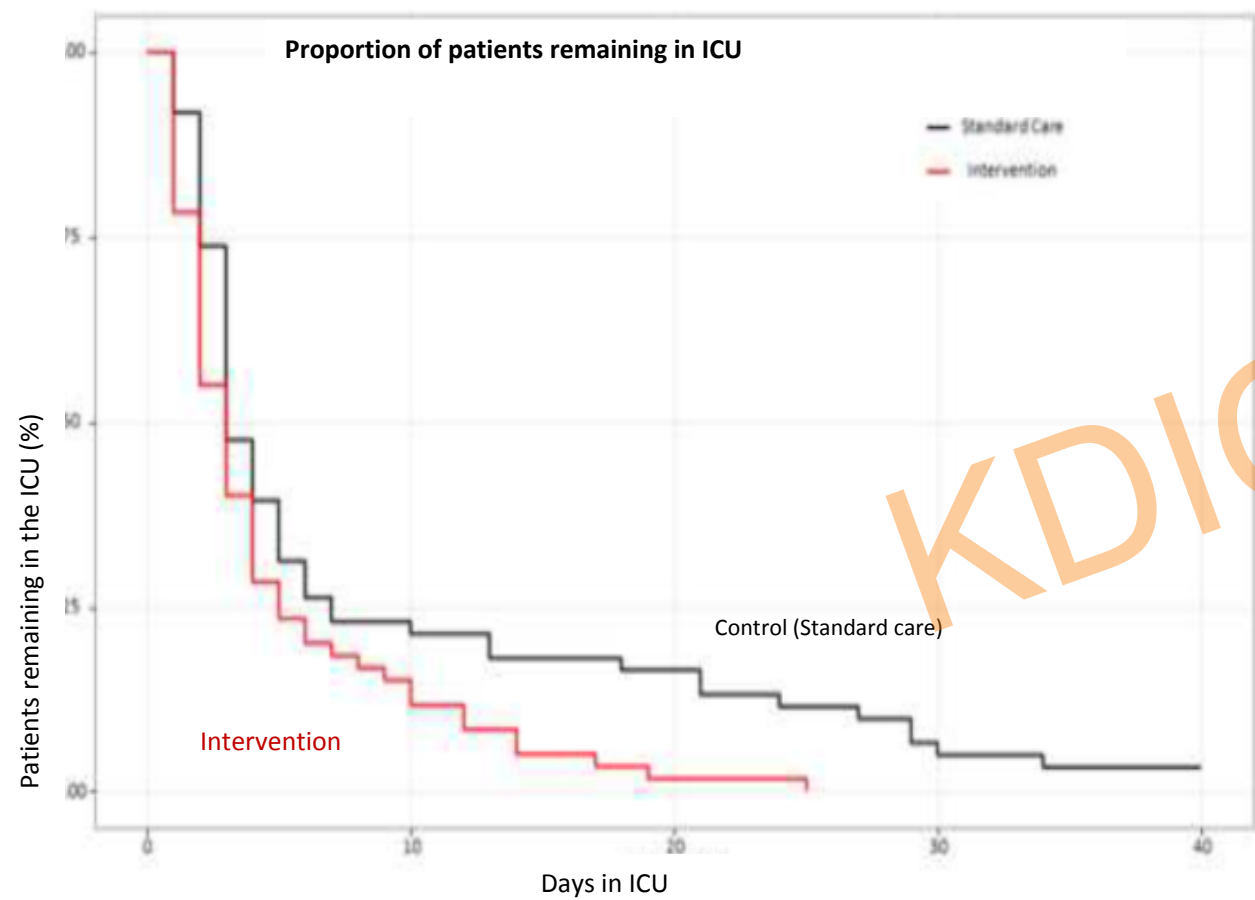
Contrast during surgery

Nephrology Recommendations

1. Nephrotoxic medications 35%.
2. Higher MAP target levels 10%.
3. Acid-base/albumin/electrolytes 53%

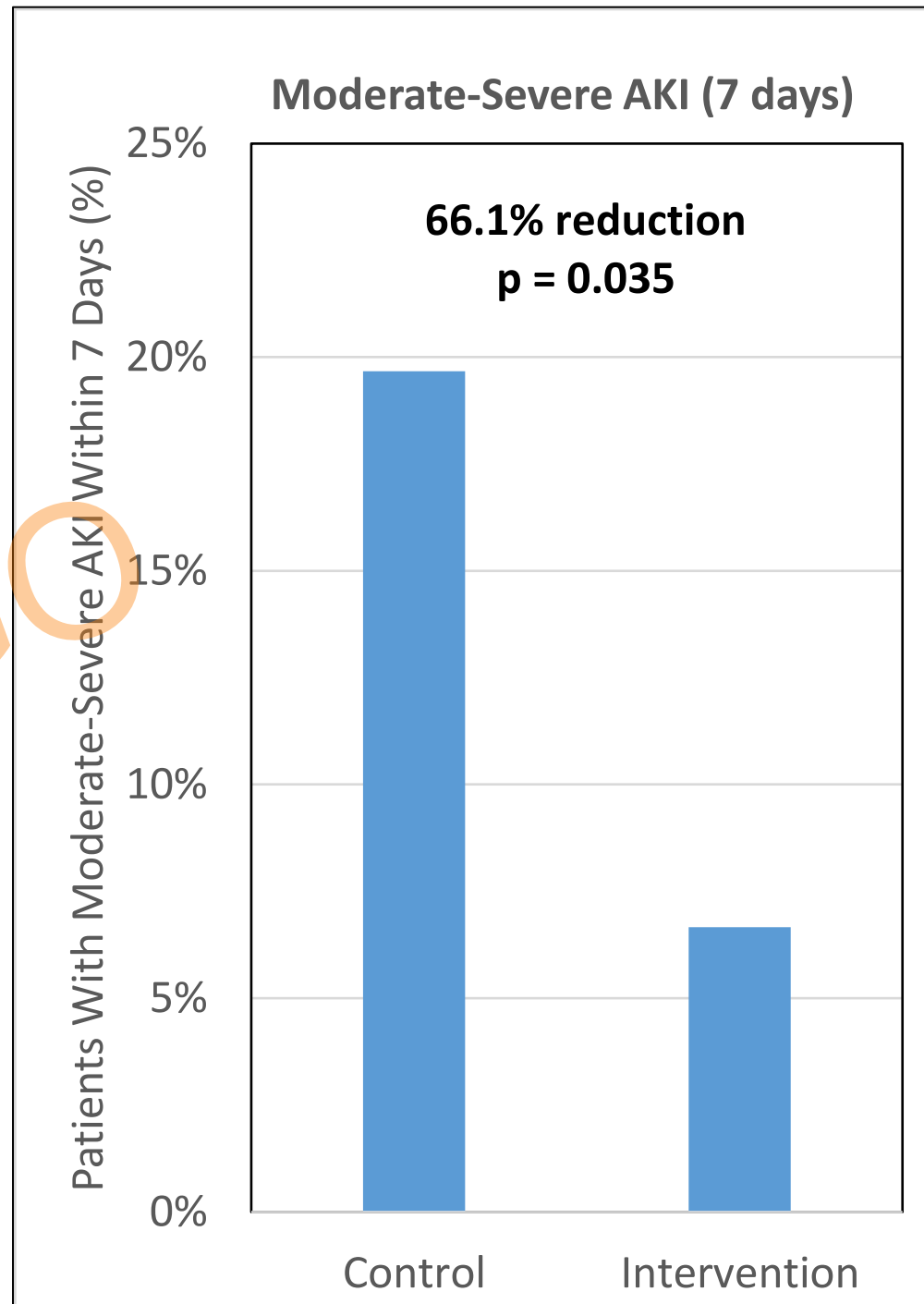


BIGPAK RCT



Cost savings of 2031 euros per patient getting 2 tests.

Gocze, Ann Surg 2018



DO BETTER? COMBINE TESTS!

“AND rule” Increase Specificity

Test is positive, if both are positive

Test is negative, if either test is negative

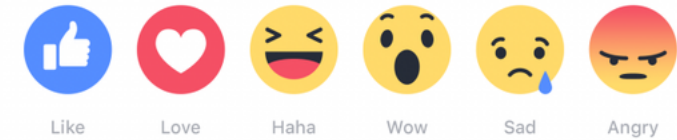
Test in series-
Cheaper!

$$\text{SpeC (Combo Test)} = \text{SpeC1} + \text{SpeC2} - \text{SpeC1} * \text{SpeC2} \uparrow$$

$$\text{SenS (Combo Test)} = \text{SenS1} * \text{SenS2} \downarrow$$

ORGANIZATIONAL LEVEL INTERVENTION FOR AKI PREVENTION

Nephrology led
education and
care bundle



Detect AKI
risk

Alert

Respond with
standardized
bundle

Reinforce



T2I7



Improving Decisions About
Health, Wealth, and Happiness

New Habit
Care Bundle



RESEARCH ARTICLE

Improved predictive models for acute kidney injury with IDEA: Intraoperative Data Embedded Analytics

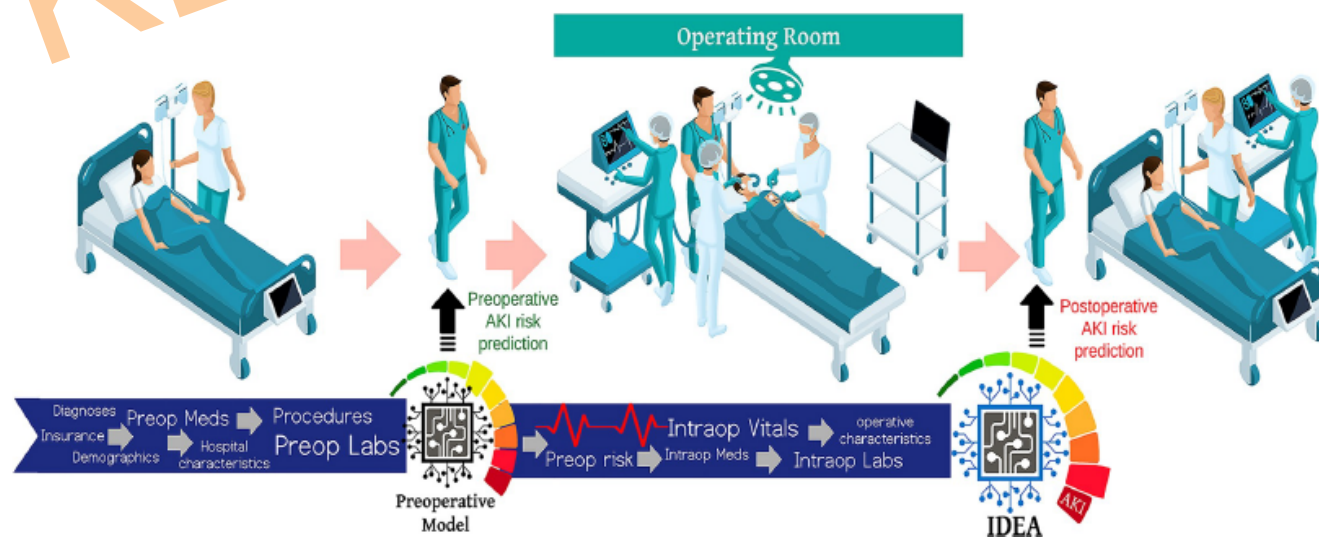
Lasith Adhikari^{1,2}, Tezcan Ozrazgat-Baslanti^{1,2}, Matthew Ruppert^{1,2}, R. W. M. A. Madushani^{1,2}, Srajan Paliwal^{1,2}, Haleh Hashemighouchani^{1,2}, Feng Zheng^{2,3}, Ming Tao^{1,2}, Juliano M. Lopes², Xiaolin Li^{2,3}, Parisa Rashidi^{2,4}, Azra Bihorac^{1,2*}

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SCIENTIFIC REPORTS

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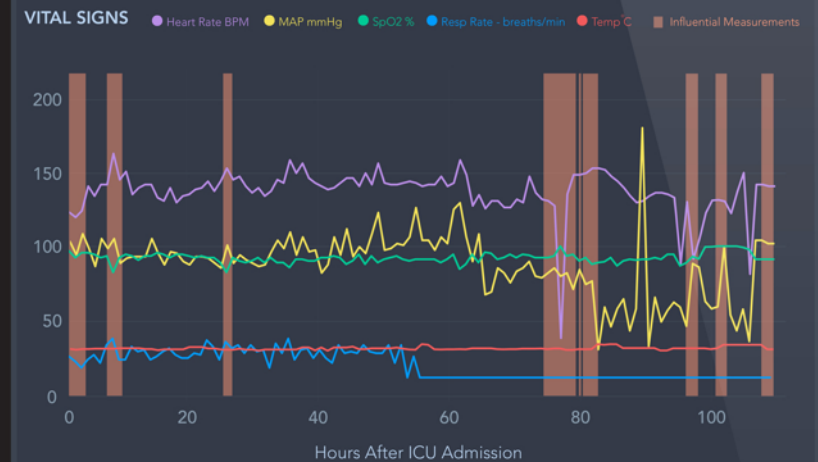
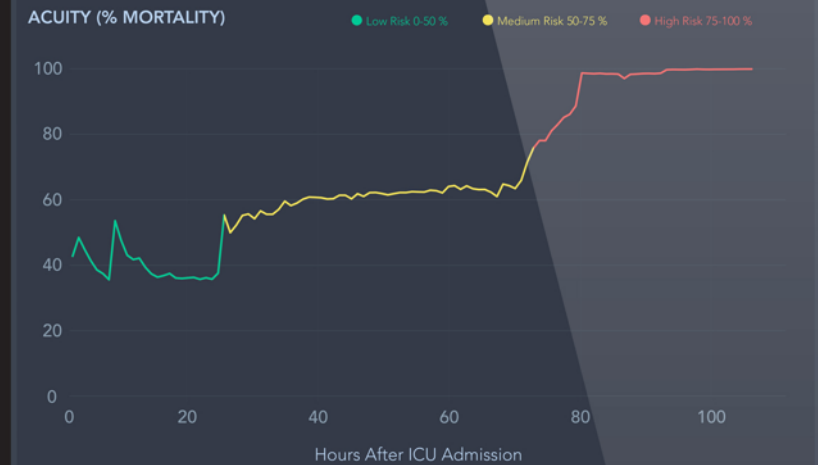
DeepSOFA: A Continuous Acuity Score for Critically Ill Patients using Clinically Interpretable Deep Learning

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RANGE OF DISCIPLINES

