Point of care creatinine testing for early identification of sepsis associated AKI in the community

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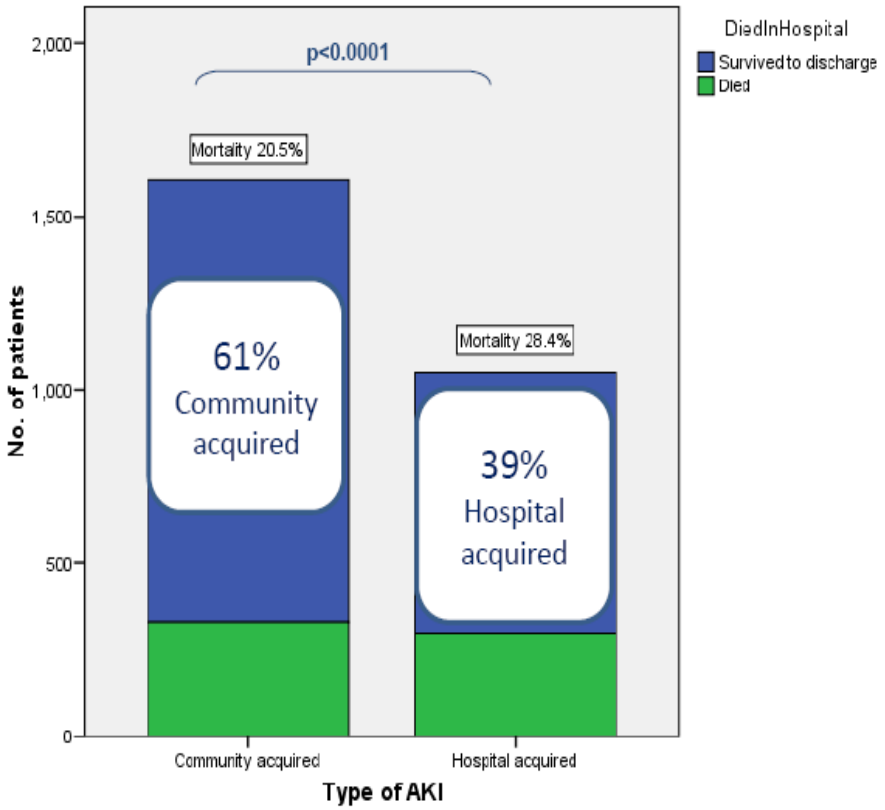
Outline

- Infection associated CA-AKI
- Brief update on new definition of sepsis and new guidance
- Need for convergence of different guidance to optimise management
- Pilot project using point of care (POC) creatinine testing in the evaluation of suspected infection in the community

Infection associated AKI

- CA-AKI accounts for 2/3 of cases
- Limited available data on aetiology
- Diagnosed with sepsis 38.5%[1]
- AKI associated with increased mortality in non-severe pneumonia[2]
- Local data: 53.7% of high risk CA-AKI had GP RW 1wk prior to admission

Selby N et al. CJASN 2012; 7(4): 533



1. Soto et al The risk of chronic kidney disease and mortality are increased after community-acquired acute kidney injury" Kidney Int. 2016 Nov;90(5):1090-1099.
2. Murugan et al "Acute kidney injury in non-severe pneumonia is associated with an increased immune response and lower survival" Kidney Int. 2010 Mar; 77(6): 527–535.

Sepsis- New definitions and guidance

- Sepsis should be defined by organ dysfunction caused by a dysregulated host response to infection
- Organ dysfunction can be represented by an increase in SOFA score
- > 2 points is associated with in hospital mortality of 10%

Table 1. Sequential [Sepsis-Related] Organ Failure Assessment Score[a]

	Score				
System	0	1	2	3	4
Respiration					
Pao_2/Fio_2, mm Hg (kPa)	≥400 (53.3)	<400 (53.3)	<300 (40)	<200 (26.7) with respiratory support	<100 (13.3) with respiratory support
Coagulation					
Platelets, $\times 10^3/\mu L$	≥150	<150	<100	<50	<20
Liver					
Bilirubin, mg/dL (μmol/L)	<1.2 (20)	1.2-1.9 (20-32)	2.0-5.9 (33-101)	6.0-11.9 (102-204)	>12.0 (204)
Cardiovascular	MAP ≥70 mm Hg	MAP <70 mm Hg	Dopamine <5 or dobutamine (any dose)[b]	Dopamine 5.1-15 or epinephrine ≤0.1 or norepinephrine ≤0.1[b]	Dopamine >15 or epinephrine >0.1 or norepinephrine >0.1[b]
Central nervous system					
Glasgow Coma Scale score[c]	15	13-14	10-12	6-9	<6
Renal					
Creatinine, mg/dL (μmol/L)	<1.2 (110)	1.2-1.9 (110-170)	2.0-3.4 (171-299)	3.5-4.9 (300-440)	>5.0 (440)
Urine output, mL/d				<500	<200

1. Singer et al "The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3)" JAMA. 2016 Feb 23;315(8):801-10

Sepsis and new guidance

- Over 70% of cases of sepsis are believed to arise in the community[1]
- Time matters-survival in sepsis-induced hypotension falls by 7% for each hour of delay
- NCEPOD
- ➢ delays in recognition and management in PC (1/3 no vital signs recorded) [1]
- ➢ need for improvement in communication between primary and secondary care (43% sent to hospital without referral letter) [1]
- NICE guidance recently published

1. “Just Say Sepsis! A review of the process of care received by patients with sepsis.” A report by the National Confidential Enquiry into Patient Outcome and Death (2015)

Managing suspected sepsis in adults and young people aged 18 years and over - in an acute hospital setting

Stratify risk of severe illness and death from sepsis using the risk criteria in the stratification tool for adults, children and young people aged 12 years and over

High risk criteria

- Objective evidence of new altered mental state
- Respiratory rate: 25 breaths per minute or more OR new need for oxygen (more than 40% FiO2) to maintain saturation more than 92% (or more than 88% in known chronic obstructive pulmonary disease)
- Heart rate: 130 beats per minute or above
- Systolic blood pressure 90 mmHg or less or systolic blood pressure more than 40 mmHg below normal
- Not passed urine in previous 18 hours, or for catheterised patients passed less than 0.5 ml/kg of urine per hour
- Mottled or ashen appearance
- Cyanosis of skin, lips or tongue
- Non-blanching rash of skin

1 high risk criterion

Arrange immediate review by senior clinical decision maker (person authorised to prescribe antibiotics, such as CT3/ST3 and above or advanced nurse practitioner).

Carry out venous blood test for the following:

- blood gas including glucose and lactate measurement
- blood culture
- full blood count
- C-reactive protein

Moderate to high risk criteria

- History from patient, friend or relative of new onset of altered behaviour or mental state
- History of acute deterioration of functional ability
- Impaired immune system (illness or drugs including oral steroids)
- Trauma, surgery or invasive procedures in the last 6 weeks
- Respiratory rate: 21-24 breaths per minute
- Heart rate: 91-130 bets per minute (for pregnant women 100-130 beats per minute) OR new onset arrhythmia
- Systolic blood pressure 91-100 mmHg
- Not passed urine in the past 12-18 hours, or for catheterised patients passed 0.5-1 ml/kg of urine per hour
- Tympanic temperature less than 36°C
- Signs of potential infection, including redness, swelling or discharge at surgical site or breakdown of wound

2 or more moderate to high risk criteria **OR** SBP: 91-100 mmHg

Clinician to review person's condition and venous lactate results within 1 hour

Carry out venous blood test for the following:

- blood gas including

Only 1 moderate to high risk criterion

Clinician review within 1 hour and perform blood tests if indicated

Low risk criteria

Suspected sepsis, but:
- Normal behaviour
- No high risk or moderate to high risk criteria met

Suspected sepsis and no high risk or high to moderate risk criteria met

Clinical

Managing suspected sepsis in adults and young people aged 18 years and over - outside an acute hospital setting

Stratify risk of severe illness and death from sepsis using the risk criteria in the stratification tool for adults, children and young people aged 12 years and over

High risk criteria

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Low risk criteria

- Normal behaviour
- No high risk or moderate to high risk criteria met

Provide information about symptoms to monitor and how to access medical care

Any high risk criteria met

Send patient urgently for emergency care (setting with resuscitation facilities)

Can definitive condition be diagnosed and treated in an out of hospital setting?

Yes

Treat definitive condition and/or provide information to safety net

No

Point of Care Creatinine Testing for early identification and management of sepsis associated AKI

- Need for convergence of different guidelines (AKI and sepsis) in the assessment of the unwell patient with infection
- Potential use of POC creatinine testing to identify AKI associated sepsis and assist clinical decision for further management
- FDA approved technology for POC creatinine testing exists[1]

1. Gbinigie O et al “Creatinine point-of-care testing for detection and monitoring of chronic kidney disease: primary care diagnostic technology update.” Br J Gen Pract 2015 Nov;65(640):608-9

Pilot

- Salford Care Homes (35 residential homes,1200 residents) and out of hours GP service at Salford
- 6 months
- Handheld POC Cr and custom designed app
- 8-10 GPs- specialist nurses involved
- Baseline data over 6 months

➢ 505 referred to SRFT

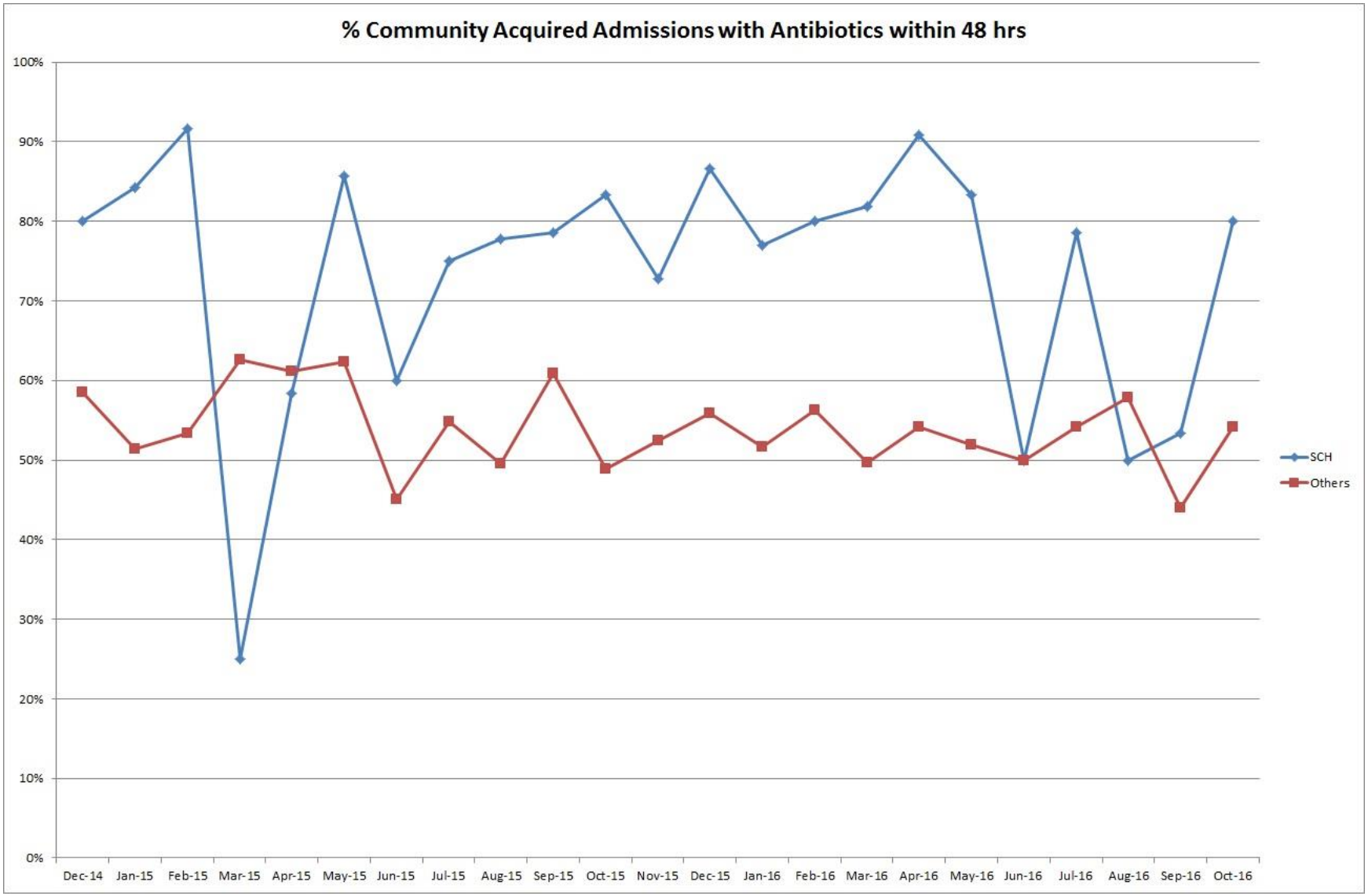
➢ 10% sent back from AE without admission after assessment

➢ 293 (excluding readmissions)

➢ 32.4% had AKI and sepsis was most common cause of AKI

➢ AKI on admission was associated with higher mortality.

➢ 53.7% of those with AKI had been reviewed by their GP within 7 days prior to admission


% Community Acquired Admissions with Antibiotics within 48 hrs
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Oct-15
Nov-15
Dec-15
Jan-16
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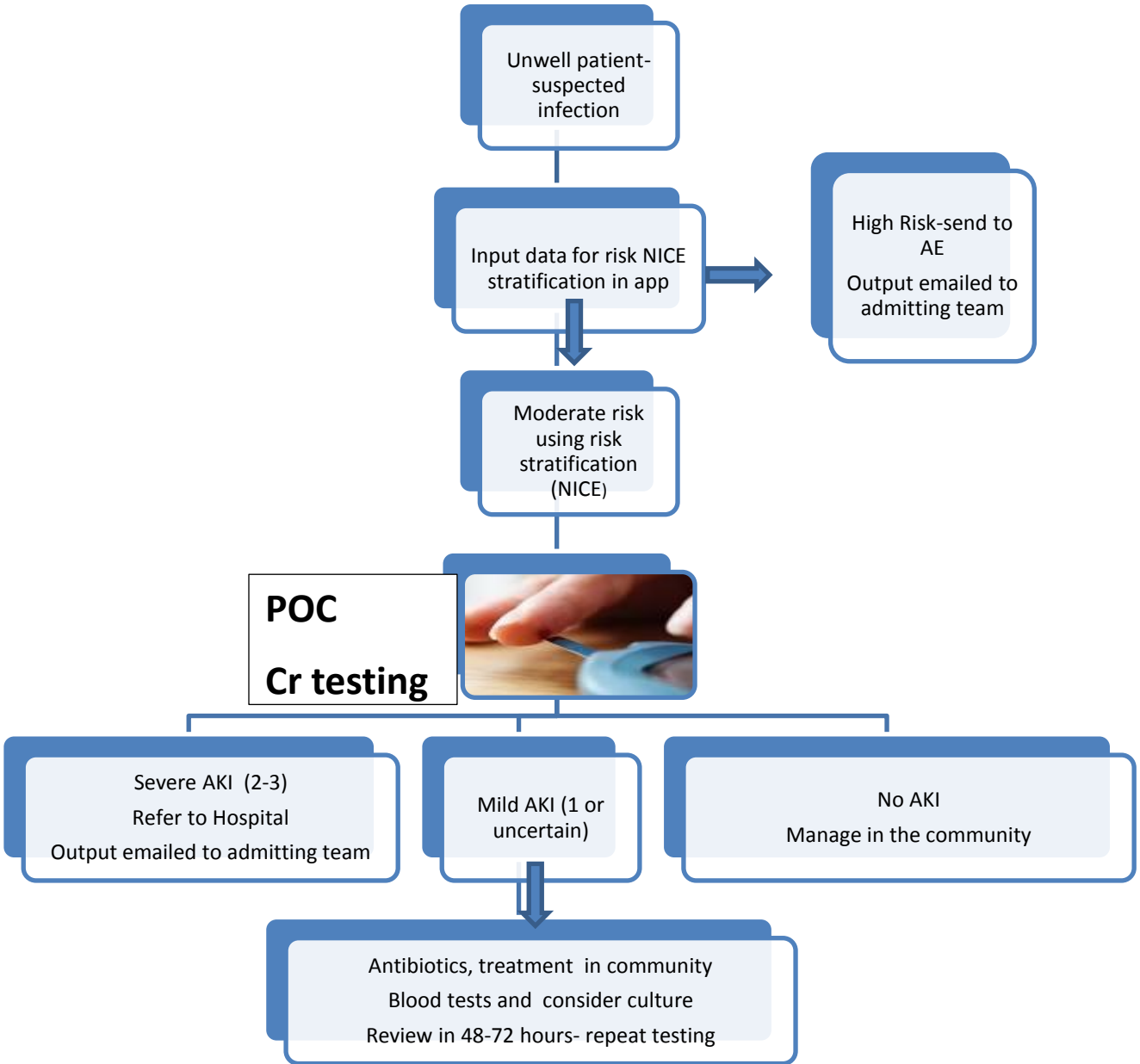
SCH
Others

Algorithm for pilot- work in progress



Assessment

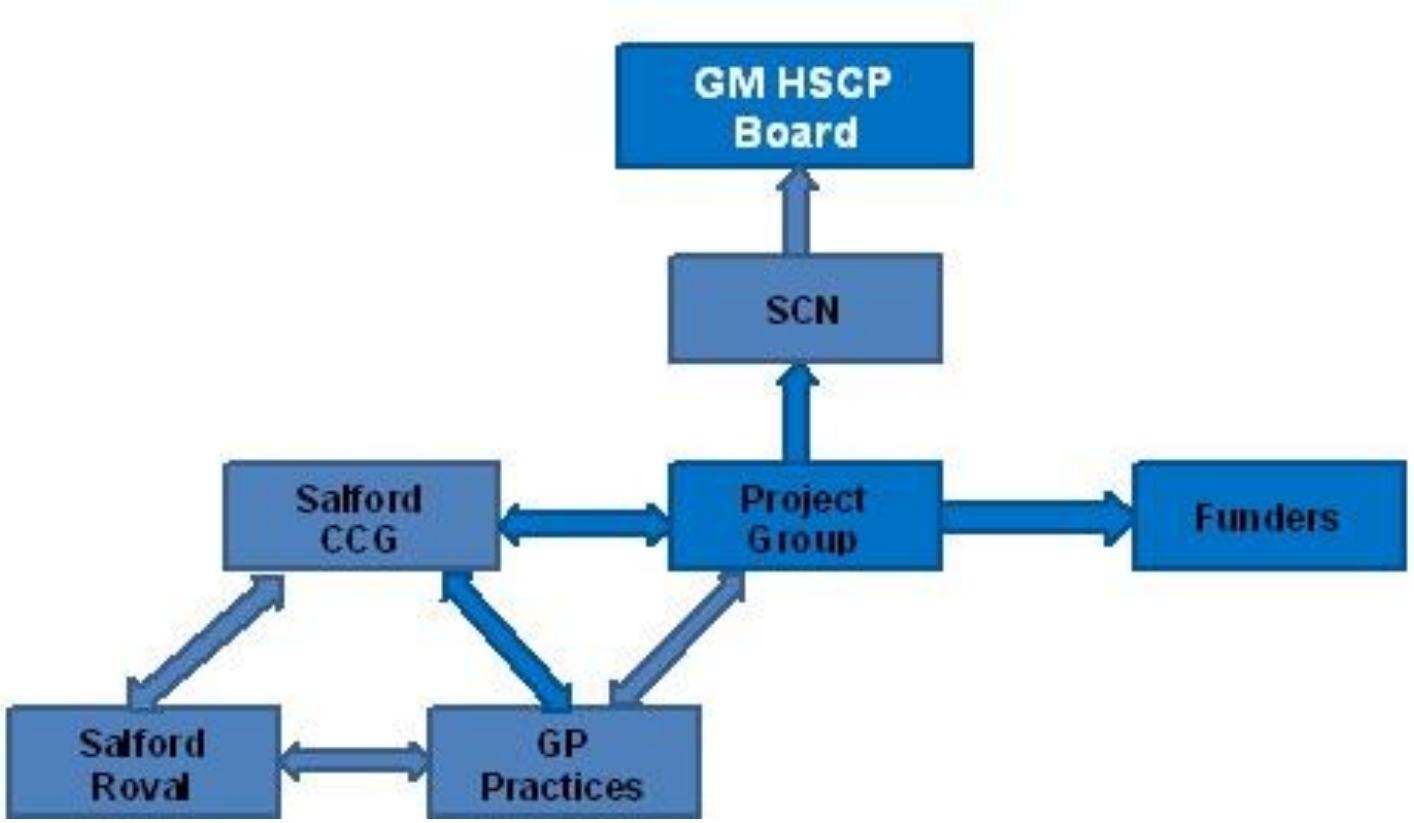
1. Quantitative

- Number of SA-AKI
- LOS, 30d mortality, ICU-HDU admission, need for RRT
- Number of “rebound” referrals

2. Qualitative (CLARHC)

- GP- SN experience (changes in workload/confidence/behaviour)
- Admitting team
- Patient experience

Governance and Resources



Thank you

- Maqsood Ahmad - Senior Manager SCN
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- Dr. Sheila McCorkindale Salford CCG
- Dr. Peter Fink Out of Hours GP SRFT
- Dr. Smeeta Sinha CD Renal SRFT
- Dr. Jane Eddleston
- Dr. Khalid Alshawy - Lead GP CHMP
- Emma Flanagan Data Analyst
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