Sheffield Teaching Hospitals NHS
NHS Foundation Trust

An Introduction to Acute Kidney Injury (AKI)

An Education Package for Healthcare Professionals in the Surgical Care Group

proud to make a difference

The session will cover:

- What is Acute Kidney injury (AKI)
- Identifying the risk factors
- Use of the AKI Nursing Care Guideline (NCG) and AKI Care Bundle
- An AKI case study
- Monitoring and assessing AKI using:
  - Care Rounding
  - Deteriorating Patient Pathway (DPP)
  - AKI Care Bundle

What is Acute Kidney Injury (AKI)?

- AKI is now the universal term used to describe sudden deterioration of renal function, and it replaces the previous term know as Acute Renal Failure (ARF)
- AKI is detected by monitoring creatinine blood levels, and urine output
- AKI is a common condition amongst hospital inpatients and affects mortality and length of stay

NCEPOD 'Adding Insult to Injury' Report

A 2009 report by the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) found that 15% of AKI cases were avoidable and recommended:

- All acute NHS trusts should have a policy for the management of AKI
- All acute admissions should receive adequate senior reviews (with a consultant review within 12 hours of admission)
- Predictable and avoidable AKI should never occur

Identifying AKI

Stage	Urine Output	Relative Creatinine Rise	Absolute Creatinine / creatinine rise
I (Early)	Less than 0.5 ml/kg/hour for 6 hrs	1.5-2 fold rise	Greater than 26 umol/l
II (Moderate)	Less than 0.5 ml/kg/hour for 12 hrs	2-3 fold rise	
III (severe)	Less than 0.5 ml/kg/hour for 24 hrs or anuria greater than 12 hr	Greater than 3 fold rise	Greater than 350umol/l (with a greater than 44 umol/l acute increase)

Who is at risk?

At risk patient = High risk group + Insult

High Risk Groups	Common Insults

• Patients age is 65 and over
• Patient has heart failure, liver disease or diabetes
• Chronic kidney disease – adults with an estimated glomerular filtration rate (eGFR) less than 60 ml/min/1.73 m2 are at particular risk
• History of AKI
• Multiple Myeloma
	• Hypotension (absolute relative)
	• Sepsis
	• Use of iodinated contrast agents (contrast scan) within the past week.
	• Use of drugs with nephrotoxic potential such as:
	  ○ non-steroidal anti-inflammatory drugs (NSAIDs)
	  ○ aminoglycosides, e.g. Gentamicin
	  ○ angiotensin-converting enzyme (ACE) inhibitors, e.g. Rampril angiotensin II receptor antagonists (ARBs), e.g. Losartan
	  ○ and diuretics

Nursing Care Guideline (NCG) and AKI Care Bundle

- The new NCG has been produced to help nurses caring for patients with or at increased risk of AKI
- Patient's from high risk groups with an identified insult are at high risk of developing AKI & need to be assessed by Medical, Nursing & Pharmacy staff which should include a review of medications, SHEWS & Urine Output monitoring. Make sure daily & post operative bloods are taken to monitor creatinine levels.
- If identified as having AKI the AKI Care Bundle Checklist should be included in the patients notes, medical staff informed

CARING FOR PATIENTS WITH OR AT INCREASED RISK OF ACUTE KIDNEY INJURY (AKI)

Nursing Care Guideline no. 20

DEFINITION: Acute Kidney Injury (AKI) is characterised by a rapid reduction in kidney function, resulting in a failure to maintain fluid, electrolyte and acid-base haemostasis. AKI complicates a range of illnesses; the estimated incidence is 7-18% of all hospital admissions.

GOAL:-

- **To increase the early recognition of AKI and to prevent avoidable kidney injury.**
- **To improve the management of patients with AKI by ensuring that all who are at risk has an AKI Care Bundle Checklist (PD 7621) put in place.**

GUIDELINE TO NURSING ACTION:-

Assessment of patient's condition:

A) Review with medical staff on admission or with every change in clinical status the patients past and current medical history and consider if the patient has any 'predisposing risk factors to AKI'.
   - Aged 65 and over.
   - Heart failure, liver disease or diabetes.
   - Chronic kidney disease (adults with an estimated glomerular filtration rate [eGFR] less than 60 ml/min/1.73 m^2 are at particular risk)
   - History of acute kidney injury.
   - Sepsis.
   - Use of iodinated contrast agents (contrast scan) within the past week.
   - Use of drugs with nephrotoxic potential, (such as non-steroidal anti-inflammatory drugs [NSAIDs], aminoglycosides - e.g. Gentamicin, angiotensin-converting enzyme [ACE] inhibitors, angiotensin II receptor antagonists [ARBs] and diuretics).

N.B: The more risk factors the patient has the greater the chance the patient will develop AKI.

B) Ensure all patients who have been identified as at risk of AKI have an AKI Care Bundle Checklist completed by the medical and nursing staff.

C) Record the patient's observations as per STHFT SHEWS score at least 3 times a day or as the SHEWS score indicates. (Core Risk Screening and Assessment Record Long Stay Patients [PD6556] or Short Stay Patients [PD6097]).

D) Monitor the patient's blood pressure closely and report any hypotensive episodes (systolic blood pressure less than 100 mmHg or a fall in systolic blood pressure greater than 30 mmHg). Ensure any antihypertensive medication is **not** given if prescribed until the medical staff have reviewed the patient.

E) Commence a strict fluid monitoring chart (PD3741) and report if no urine has been passed for more than 6 hours.

F) **Carry out a urinalysis,** record the results on the patient's Amber Care Bundle checklist and report any abnormalities to medical staff. Ensure urine samples (midstream [MSU] or catheter specimen of urine [CSU]) are sent to the laboratory as detailed below:
   - If the urinalysis is positive for leukocytes or nitrites – send for microscopy, culture and sensitivity (MC and S)
   - If the urinalysis is positive for protein – send for protein to creatinine ratio (PCR).

G) Record the patient's weight daily and report any rapid increase in weight to medical staff.

H) Ensure the patient has daily bloods for renal profile to monitor renal function. Report any abnormalities, including a sudden rise in creatinine; greater than 26µmol/L or if the patient is hyperkalaemic (potassium greater than 5.5mmol) to the medical staff.

I) Monitor the patient for signs of fluid overload (raised respiratory rate, a fall in SPO_2, oedema), report these signs to the medical staff, and / or apply the 'Deteriorating Patient pathway' as appropriate.

Continued overleaf

Yvonne Bernes, Renal Sister, Hilary Lintern PD Sister 06 / 2014
DOCUMENT REVIEW DATE 06 / 2016

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GUIDELINE TO NURSING ACTION continued:-

Treatment:-

J) Consider scanning the bladder or catheterising the patient to monitor their urine accurately.

K) Patients may require an ultrasound of their kidneys as part of their management.

M) Administer oxygen therapy if prescribed on the Oxygen Prescription and Monitoring Chart (PD3786). See also Nursing Care Guideline 65, Nursing the Breathless Patient.

N) Ensure the current medication is reviewed as indicated by the AKI Care Bundle Checklist, and administer medication as prescribed on the Drug Prescription and Administration Record (SHO17009).

O) Administer intravenous fluids if prescribed on the Drug Prescription and Administration Record (SHO17009) and monitor their effects.

N.B: The patient's medication must be reviewed to ensure no nephrotoxic drugs have been prescribed and the doses of prescribed medications are appropriately reduced for the renal function.

Psychological care and patient education: Give the patient and their family / carers ongoing information and education on their condition and progress. Where appropriate refer to the Acute Renal Practitioner (bleep 2663).

PREFERRED OUTCOME:-

- **The patient's renal function is maintained and AKI is avoided.**
- **AKI is managed and renal function returns to the patient's baseline.**
- **Timely referral to the Renal Team, for advice / transfer for Renal Replacement Therapy (RRT).**

Evidence Link:-

Crowley, L, & Ostermann, M, (2013) *Acute Kidney Injury (AKI),* available via: http://www.renalmed.co.uk/database/
Lewington, A, & Kanagasundaram, S, (2011) *Acute Kidney Injury Guidelines*, London, The Renal Association, available via: http://www.renal.org/Clinical/GuidelinesSection/AcuteKidneyInjury.aspx
NCEPOD, (2009) *AKI: Adding insult to Injury. A review of the care of patients who died in hospital with a primary diagnosis of acute kidney injury (acute renal failure),* available via: http://www.ncepod.org.uk/2009report1/Downloads/AKI_report.pdf
NICE, (2013) *Clinical Guideline No. 169: Acute kidney injury: Prevention, detection and management of acute kidney injury up to the point of renal replacement therapy*, available via: http://guidance.nice.org.uk/CG169/NICEGuidance/pdf/English
STHFT, (2012) *Consent to Examination or Treatment Policy*, available via: http://nww.sth.nhs.uk/STHcontDocs/STH_Pol/ClinicalGovernance/Consent/ConsentPolicy.doc
STHFT, (2012) *Infection Prevention and Control Standard Precautions, Prevention of Sharps Injuries and Prevention of Exposure to Blood and Body Fluids Policy*, available via: http://nww.sth.nhs.uk/STHcontDocs/STH_Pol/HumanResources/BloodExposurePolicy.doc
STHFT, (2013) *Acute Kidney Injury Policy*, available via: http://nww.sth.nhs.uk/STHcontDocs/STH_Pol/ClinicalGovernance/AcuteKidneyInjuryPolicy.doc
STHFT, (2013) *Acute Kidney Injury – Quick reference summary sheet and referral flow chart*, available via: http://nww.sth.nhs.uk/STHcontDocs/STH_CGP/RenalServices/AKI_SummaryAndReferralFlowChart.doc
STHFT, (2014) *Acute Kidney Injury care bundle and checklist*, available via: http://nww.sth.nhs.uk/STHcontDocs/STH_CGP/PRCdocuments/PRC%20003-14.pdf
STHFT, (2013) *SHEWS Observations and Pain Assessment Chart*, available via: http://nww.sth.nhs.uk/STHcontDocs/STH_CGP/PRCdocuments/PRC%20045-04.pdf
STHFT, (2013) *Medicines Code – Prescribing of Medicines*, available via: http://nww.sth.nhs.uk/STHcontDocs/STH_Pol/ClinicalGovernance/MedicineCode/MedicineCode.htm
STHFT, (2014) *SHEWS – Frequently asked questions,* available via: http://nww.sth.nhs.uk/STHcontDocs/STH_CGP/CriticalCare/SHEWS/SHEWSfrequentlyAskedQuestions.doc
STHFT, (2014) *Collecting and labelling clinical samples,* available via: http://nww.sth.nhs.uk/STHcontDocs/STH_Pol/ClinicalGovernance/CollectingAndLabellingClinicalSamples.doc
STHFT, (2014) *Nursing Care Guideline No. 65: Nursing the Breathless Patient*, available via: http://nww.sth.nhs.uk/STHcontDocs/STH_CGP/Nursing/NursingCareGuidelines/ncg65_Dyspnoea-NursingTheBreathlessPatient.doc
Walsh, M, & Crumbie, A, (2007) *Watson's Clinical Nursing and Related Sciences*, 7th Edition, Edinburgh, Baillière Tindall.

Yvonne Bernes, Renal Sister, Hilary Lintern PD Sister 06 / 2014
DOCUMENT REVIEW DATE 06 / 2016

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Acute Kidney Injury Care Bundle Checklist

(For full guidance -
see Acute Kidney Injury Policy, section 3.4)

Name:
Date of Birth:
Hospital No:
NHS No:
Consultant:
Patient details or sticker

Action	Signature/ date
Haemodynamic stability achieved (if not, fluid resuscitation, senior review, critical care review as appropriate)	
Treat life threatening hyperkalaemia	
Commence strict fluid monitor charting	
Urinalysis Blood ☐ Protein ☐ Nitrites ☐ Leukocytes ☐ Is this a catheter sample? Yes ☐ No ☐ PCR sent if protein +? Yes ☐ No ☐ MSU sent if nitrites/leukocytes +? Yes ☐ No ☐	
Ultrasound Completed ☐ Requested ☐ Deferred ☐ - reason: _____	
Bloods Request renal profile (include bone chemistry and bicarbonate,) FBC, CRP ☐ Daily renal profile requested ☐ Other tests requested ☐ (please list): _____	
Medications review 1. **Stop nephrotoxic medications** ☐ Examples: NSAIDs (stop) Aminoglycosides (stop - *d/w microbiology alternative antibiotics)* Metformin (stop) 2. **Anti-hypertensives** ☐ ACE-I/ARBs (stop) Diuretics - stop in dehydrated and euvolaemic patients, continue in fluid overloaded patients Stop all antihypertensives if SBP less than 120 mmHg) 3. **Renally excreted medications** ☐ Reduce prophylactic LMWH (Dalteparin) to 2,500 units Discuss with haematologists if on therapeutic LMWH Review all other renally excreted medications e.g. antibiotics (consult ward pharmacist, or medicines information and if in doubt, omit non-essential medications)	
Senior Review taken place	
Indication for Renal Replacement Therapy	
Hyperkalaemia Fluid overload Severe acidosis Other	
Renal referral Completed ☐ Not indicated ☐	

PD7621
PRC003/14

Date of issue: January 2014
review date: January 2017

An AKI Case Study

What would you do differently?

Audrey – Day 1

- 86 year old woman
- Lives independently at home and still drives
- Just discharged from MAU for dizzy spells
- Found on the floor by her son after a fall
- Brought in to A&E at 14:00 on 21/06/14
- Complaining of right groin pain and unable to weight bear

Audrey – Day 1

- Past Medical History
  - Hypertension
  - Type 2 Diabetes
  - Fractured left femur 2004
  - Ca Cervix (curative resection)
  - Vaginal prolapse
  - Osteoporosis

Audrey – Day 1

- Current Drugs:
  - Metformin 500mg BD
  - Gliclazide 80mg BD
  - Amlodipine 5mg OD
  - Atorvastatin 20mg ON
  - Ramipril 5mg OD
  - Paracetamol 1g PR

Questions

Can you identify Audrey's AKI risk factors?

- Age
- Hypertension
- Diabetes
- Takes Ramipril
- Recent admission

Initiate the AKI Nursing Care Guideline

Audrey – Day 1

- Pelvic x-ray confirmed fractured neck of femur
- Bloods sent by A&E
- Referred to orthopaedics
- Transferred to SAC
- Observations and blood sugars stable
- IV fluids running and nil-by-mouth for theatre the next day
- Clerked and regular drugs prescribed by F1

Questions

What contributing risk factors can you think of that surgery brings?

- NBM
- Potential of infection/sepsis
- Potential of Bleeding
- Pain and pain medication
- Potential reduced mobility

- **Initiate Nursing Care Guidelines for the patient with or at risk of AKI, if not already done so**

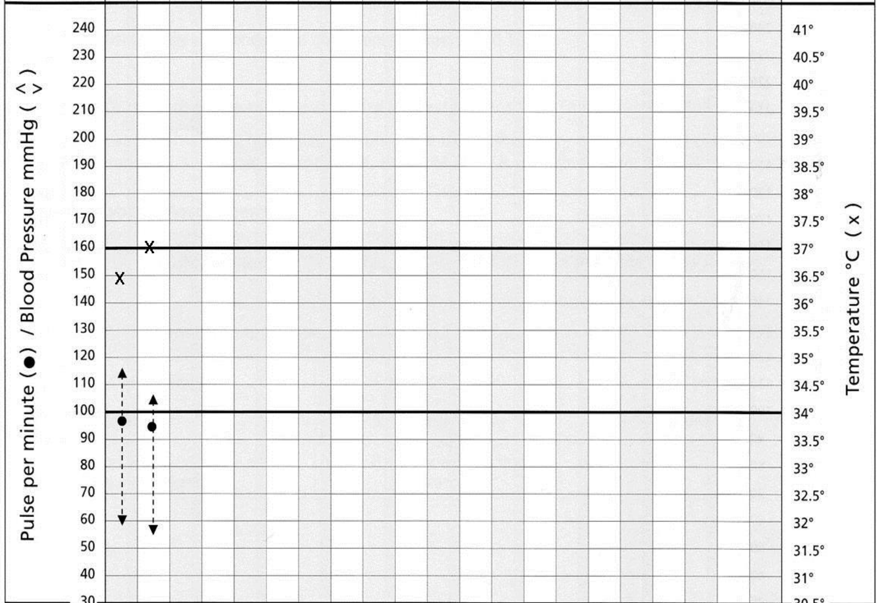
Patient's name: Audrey Roberts   Hospital number: AU6776

Observation SHEWS and Pain Assessment Chart

Observations must be monitored at least 12 hourly or more frequently as per SHEWS algorithm on reverse.

Chart commenced: month 0 6 year 2 0 1 4

Date	21	
Hour	18	23
Minutes	30	45



Resps	18	18	Resps
% O_2 / litres	A	A	% O_2 / litres
SpO_2	95	94	SpO_2
SHEWS	Insert individual scores for each observation and calculate total score		**SHEWS**
Resps	0	0	Resps
SpO_2 / 15L O_2	0	0	SpO_2 / 15L O_2
Pulse	0	0	Pulse
Systolic BP	0	0	Systolic BP
Urine	0	0	Urine
Conscious level	0	0	Conscious level
Total Score	0	0	**Total Score**
Pain			Pain
Sedation			Sedation
Nausea			Nausea
Initials	JK	RT	Initials

AFFIX SUPPLEMENTARY CHARTS TO THIS STRIP - USE BOTH SIDES

NAME Audrey Roberts	CONSULTANT LLD		
UNIT NUMBER AU6776	WARD SAC		

CHECK ALLERGY STATUS

REGULAR MEDICATION - 2

1. Patient away from ward
2. Patient could not take dose
3. Patient refused dose
4. Dose not available
5. Dose not given at nurse's discretion
6. Dose not given at doctor's request
7. Self administration

Year: 2014   Month: June   Date: 21/6   P.C.   Time

DALTEPARIN Hospital Acquired Thrombosis prophylaxis — Dose: 5000 Units — Freq: OD
Additional instructions: Monitor platelets — Start date: 21/6 — Route: SC
Signature / Print name / bleep no.: [signature] — Pharmacist Check — POD — Supply — Time: 18 — 21/6: X

Weight (kg)	Dalteparin dose	Booking weight (kg)	Dalteparin dose	eGFR less than 20ml/min/1.73m²
Non-pregnant		Pregnant and up to 6 weeks postpartum		
Less than 45	2500 units OD	Less than 50	2500 units OD	2500 units OD
45-99	5000 units OD	50-90	5000 units OD	
100-150	7500 units OD	91-170	5000 units BD	
Greater than150	5000 units BD	Greater than 170	75 units/kg/day (in 2 divided doses, rounded to nearest whole syringe)	

ANTI-EMBOLISM STOCKINGS — Knee / **Thigh** (orthopaedic knee surgery patients)
Leg(s): Both Left Right
Signature / Print name / bleep no. — Start date — Additional Instructions: — Size — Time

Prescribers: Circle the leg to which the stockings are to be applied and circle the length of stocking required. If stockings are not indicated, cross through this prescription clearly.
Nurses: each day, sign and date that the leg(s) have been assessed, stocking applied/reapplied and measured/remeasured as appropriate as per training package.

Approved Name of Medicine	Dose	Freq	Start date	Route	Additional instructions	Signature	Times
Metformin	500mg	BD	OA	PO		[signature]	08, 18
Gliclazide	80mg	BD	OA	PO		[signature]	08, 18
Amlodipine	5mg	OD	OA	PO		[signature]	08
Atorvastatin	20mg	ON	OA	PO		[signature]	22
Ramipril	5mg	OD	OA	PO		[signature]	08

(Each entry: Signature / Print name / bleep no. — Pharmacist Check — POD — Supply)

SELF ADMINISTRATION CHECK - Refer to Trust Policy

NAME	Audrey Roberts	CONSULTANT	LLD				
UNIT NUMBER	AU6776	WARD	SAC				

CHECK ALLERGY STATUS

RECORD OF INFUSION THERAPY

NB: Prescriptions for intravenous Infusion Therapy are valid for ONE DOSE ONLY and must be rewritten when subsequent doses are required.
ALWAYS CHECK FLUID BALANCE BEFORE ADMINISTERING INFUSIONS.

1. Patient away from ward 2. Patient could not take dose eg site tissued, line not in place 3. Patient refused dose 4. Dose not available 5.Dose not given at nurse's discretion 6. Dose not given at doctor's request

Date	Infusion fluid	Route	Volume of infusion	Additives			Rate of infusion	Start time	Prescriber's signature & bleep No.	Pharmacy	Infusion started				Batch No.	Pump No.	Reason not adminst.
				Approved name	Dose	Batch No.					Time	Vol.	Initials By	Initials Check			
21/6	0.9% NaCl	IV	1L	—			10°	1900	1122		1840	1000ml	JB	JD			

Additional infusion chart in use ☐ Date .....
(tick box)

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FLUID MONITORING CHART

DO NOT AFFIX PATIENT STICKER

Name: Audrey Roberts
Hospital number: AU6776
Ward: SAC

Please see guidance overleaf before using this chart

This chart is for monitoring: Intake ☒ Output ☒ Enteral feed ☐ Drains ☐ Urine/Catheter ☐

Date: 21 / 06 / 14	Fluid restriction: ml	Weight: kg (estimated/actual)	**Minimum** urine output/hr: ml

	INTAKE (ML)						OUTPUT (ML)						
Time	Oral	Enteral Feed ml	Enteral Feed pH	IV Therapy		ACC TOTAL IN	Urine / Catheter	Drains / Bowels / Stoma / Other			Vomit / NG Asp	ACC TOTAL OUT	Initials
07:00													
08:00													
09:00													
10:00													
11:00													
12:00													
13:00													
14:00													
15:00													
16:00													
17:00													
18:00							Incontinent						
19:00													
20:00													
21:00													
22:00													
23:00													
24:00													
01:00													
02:00													
03:00													
04:00				1000		1000	Few drops						
05:00													
06:00													
Totals													
TOTAL INTAKE				1000 ml			TOTAL OUTPUT ml				Fluid Balance (+ / -) ml		

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Patient Search
Discharge
Reporting
Cumulative Reports
View Patient Reports
View Ward Reports
Latest Reports (Unfiled)

Patient Name: MRS AUDREY ROBERTS
Hospital Number: AU6776
Sex: **Female**
Date of Birth: 21/04/1928
NHS Number:
Address:
Telephone No:

< | File | File & Next | > | Back | < | Cumulative | > | All | Print | Audit Trail

Reported	Specialty	Location	Clinician	Status
21 Jun 2014 19:32	Orthopaedics	SAC	Mr LLD	F

Reasons for Request :
NOF

Sample IB926245D (BLOOD) Collected 21 Jun 2014 17:00 Received 21 Jun 2014 17:45

UE

Sodium		142	mmol/L	133 - 146
Potassium		3.9	mmol/L	3.5 - 5.3
Urea	*	8.8	mmol/L	2.5 - 7.8
Creatinine		80	umol/L	44 - 80
eGFR		62	ml/min/1.73m^2	

www.renal.org/eGFR, eGFR is not adjusted for race.
eGFR is unreliable when creatinine unstable, e.g. AKI.
Only use for drug dosing if part of approved protocol.

Routine Biochemistry

C Reactive Protein	*	68.5	mg/L	0 - 5

CRP is a nonspecific marker of inflammation, infection and tissue damage. Repeat requesting is not indicated within 24 hours.

End of report

Audrey – Day 2

- Has uneventful right hip hemiarthroplasty under spinal anaesthetic.
- IVI (8 hourly) running and plan to mobilise and discharge when safe.
- Passed urine in recovery (incontinent)
- Post operative pain so given oramorph as needed (given 6 doses of 5mg over the day)
- Feeling nauseous after the morphine
- Slept for significant periods of the day

Audrey – Day 2

- Nursing staff bleep Orthopaedic F2 due to SHEWS score 1 (BP). She reviews Audrey and notes dropping BP so increases IVI rate.
- Audrey tries bed pan but can't pass urine so has in/out catheter (volume not documented)
- Poor oral intake noted by nursing staff
- Hypoglycaemia (BM 2.3) before bed, nurses give hypo stop and Ribena
- No bloods sent as Audrey in theatre

F:\Lou Lou

Patient's name: Audrey Roberts Hospital number: AU6776

Observation SHEWS and Pain Assessment Chart

Observations must be monitored at least 12 hourly or more frequently as per SHEWS algorithm on reverse.

Chart commenced: month 0 6 year 2 0 1 4

Date	21		22				
Hour	18	23	07	12	18	22	
Minutes	30	45	00	15	15	45	
Resps	18	18	16	18	12	14	Resps
% O_2 / litres	A	A	A	A	A	A	% O_2 / litres
SpO_2	95	94	95	94	97	97	SpO_2
SHEWS	Insert individual scores for each observation and calculate total score						**SHEWS**
Resps	0	0	0	0	0	0	Resps
SpO_2 / 15L O_2	0	0	0	0	0	0	SpO_2 / 15L O_2
Pulse	0	0	0	0	1	0	Pulse
Systolic BP	0	0	0	1	1	0	Systolic BP
Urine	0	0	0	0	0	0	Urine
Conscious level	0	0	0	0	0	0	Conscious level
Total Score	0	0	0	1	2	0	**Total Score**
Pain							Pain
Sedation							Sedation
Nausea							Nausea
Initials	JK	RT	AS	TH	TH	JK	Initials

Pulse per minute (●) / Blood Pressure mmHg (< >) — 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30

Temperature °C (x) — 41° 40.5° 40° 39.5° 39° 38.5° 38° 37.5° 37° 36.5° 36° 35.5° 35° 34.5° 34° 33.5° 33° 32.5° 32° 31.5° 31° 30.5°

NAME Audrey Roberts CONSULTANT LLD
UNIT NUMBER AU6776 WARD SAC

CHECK ALLERGY STATUS

REGULAR MEDICATION - 2

1. Patient away from ward
2. Patient could not take dose
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4. Dose not available
5. Dose not given at nurse's discretion
6. Dose not given at doctor's request
7. Self administration

Year: 2014 Month: June Date 21/6 22/6 P.C. Time

DALTEPARIN Hospital Acquired Thrombosis prophylaxis

Non-pregnant			Pregnant and up to 6 weeks postpartum			eGFR less than 20ml/min/1.73m²
Weight (kg)	Less than 45	2500 units OD	Booking weight (kg)	Less than 50	2500 units OD	2500 units OD
	45-99	5000 units OD		50-90	5000 units OD	
Dalteparin dose	100-150	7500 units OD	Dalteparin dose	91-170	5000 units BD	
	Greater than150	5000 units BD		Greater than 170	75 units/kg/day (in 2 divided doses, rounded to nearest whole syringe)	

Dose 5000 Units Freq OD
Additional instructions: Monitor platelets
Start date 21/6 Route SC
Signature / Print name / bleep no. Pharmacist Check POD Supply Time 18 X

ANTI-EMBOLISM STOCKINGS Leg(s): Both Left Right Knee **Thigh** (orthopaedic knee surgery patients)
Start date Additional Instructions: Size Time
Signature / Print name / bleep no.

Prescribers: Circle the leg to which the stockings are to be applied and circle the length of stocking required. If stockings are not indicated, cross through this prescription clearly.
Nurses: each day, sign and date that the leg(s) have been assessed, stocking applied/reapplied and measured/remeasured as appropriate as per training package.

Approved Name of Medicine: Metformin Dose 500mg Freq BD (08) X
Additional instructions Start date UA Route PO
Signature / Print name / bleep no. Pharmacist Check POD Supply (18)

Approved Name of Medicine: Gliclazide Dose 80mg Freq BD (08)
Additional instructions Start date UA Route PO
Signature / Print name / bleep no. Pharmacist Check POD Supply (18)

Approved Name of Medicine: Amlodipine Dose 5mg Freq OD (08)
Additional instructions Start date UA Route PO
Signature / Print name / bleep no. Pharmacist Check POD Supply

Approved Name of Medicine: Atorvastatin Dose 20mg Freq ON
Additional instructions Start date UA Route PO
Signature / Print name / bleep no. Pharmacist Check POD Supply (22)

Approved Name of Medicine: Ramipril Dose 5mg Freq OD (08)
Additional instructions Start date UA Route PO
Signature / Print name / bleep no. Pharmacist Check POD Supply

SELF ADMINISTRATION CHECK - Refer to Trust Policy

Questions

What is wrong with the SHEWs and Drug charts?

- Continuous low B/P during the day
- Shews score of 3 at 18:15 but documented as a score of 1
- No recognition of deterioration
- Therefore no increase of SHEWs monitoring as per ‘SHEWs algorithm for action’ and ‘deteriorating patient sticker’
- Urine output scored as 0
- Remains on all of her medications

NAME	Audrey Roberts	CONSULTANT	LLD				
UNIT NUMBER	AH6776	WARD	SAC				

CHECK ALLERGY STATUS

RECORD OF INFUSION THERAPY

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Date	Infusion fluid	Route	Volume of infusion	Additives			Rate of infusion	Start time	Prescriber's signature & bleep No.	Pharmacy	Infusion started				Batch No.	Pump No.	Reason not adminst.
				Approved name	Dose	Batch No.					Time	Vol.	Initials By	Initials Check			
21/6	0.9% NaCl	IV	1L				10°	1800	1122		1800	1000ml	JB	JB			
22/6	Hartmanns	IV	1L				8°	0800	1122		0800	1000ml	JB	JB			
22/6	Hartmanns	IV	500ml				4°	1800	2384		1800	500ml	JB	JB			

Additional infusion chart in use ☐ Date .....
(tick box)

Questions

What is wrong with the IV therapies Chart?

- No Fluid challenge only eventual increase of IVI flow then stopped.
- Hartmann's solution prescribed.

Sheffield Teaching Hospitals NHS
NHS Foundation Trust

FLUID MONITORING CHART

DO NOT AFFIX PATIENT STICKER

Name: Audrey Roberts
Hospital number: AU6776
Ward: SAC

Please see guidance overleaf before using this chart

This chart is for monitoring: Intake ☒ Output ☒ Enteral feed ☐ Drains ☐ Urine/Catheter ☐

Date: 22 / 06 / 14	Fluid restriction: ml	Weight: kg (estimated/actual)	**Minimum** urine output/hr: ml

	INTAKE (ML)						OUTPUT (ML)						
Time	Oral	Enteral Feed ml	Enteral Feed pH	IV Therapy		ACC TOTAL IN	Urine / Catheter	Drains / Bowels / Stoma / Other			Vomit / NG Asp	ACC TOTAL OUT	Initials
07:00													
08:00							Incontinent						
09:00													
10:00													
11:00													
12:00													
13:00													
14:00							Incontinent						
15:00													
16:00				1000		1000							
17:00													
18:00													
19:00							Small						
20:00													
21:00													
22:00				500		1500							
23:00													
24:00													
01:00													
02:00													
03:00													
04:00													
05:00													
06:00													
Totals													

TOTAL INTAKE 1500 ml | **TOTAL OUTPUT** ml | **Fluid Balance (+ / -)** ml

Questions

What is wrong with the fluid balance chart?

- No weight or minimal urine output calculated
- No oral intake documented
- No measurable urine output.
- The evidence is lacking to show if there is an insult for AKI (refer to back of fluid chart; 0.5mls of urine/Kg/Hour)

Based on this information why are the following interventions be necessary?

Increased frequency of SHEWs

- A- to monitor Clinical response, high early warning scores give greater risk of developing AKI

Encourage fluids, IV Fluid challenge, monitor input

- A- Optimise hydration and improve kidney perfusion

Catheterise

- A- Accurate Urine Output (Minimum requirements of 0.5mls/kg/hr)

Urinalysis

- A- If no obvious cause of AKI could suggest underlying disease process (intrinsic AKI). Also infection

Review medications

- A- for nephrotoxicity to adjust the dose or to stop these medications

Send blood samples U&Es/FRP (Full Renal Profile)

- A- To monitor kidney function and complications such as hyperkalaemia

Daily weights

- A- To assess hydration

Pain relief

- A- Adjust doses for kidney function

Nausea medication

- A- Aid eating and drinking

Audrey – Day 3

- Further hypoglycaemia overnight and remained drowsy and a bit confused. Obs stable. Settled in the morning.
- Ward round noted Audrey incontinent of urine and struggling to mobilise. Push oral fluid and stop IVI.
- Antiemetic's given due to worsening nausea
- Requiring oramorph for post-op pain

Audrey – Day 3

- Nursing staff inform doctors that blood stickers still in the request tray at 2 pm
- Orthopaedic SHO asked to review due to further hypoglycaemia BM 1.9
- Given 50ml 10% glucose and gliclazide reduced to 40mg BD. Plan for diabetic nurse review.
- Audrey catheterised due to being unable to pass urine but residual is not documented

Questions

Why might Audrey be hypoglycaemic?

- Not eating and drinking
- Not excreting gliclazide (kidneys!)
- Inappropriately high doses of gliclazide
- ?Sepsis

Audrey – Day 3

- Audrey now scoring SHEWS score 3 for BP 88/65 so reviewed by F1 on-call but is now managing oral fluids with regular antiemetics so plan is to encourage oral fluids and wait
- Further hypoglycaemia later so diabetes nurse reviews and stops all diabetic drugs. F1 doctor gives further IV glucose
- Nursing staff start new fluid balance chart due to catheter and realise anuric for 8 hours
- SHEWS score now 7 for BP, UO and GCS

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FLUID MONITORING CHART

DO NOT AFFIX PATIENT STICKER

Name: Audrey Roberts
Hospital number: AU6776
Ward: H7

Please see guidance overleaf before using this chart

This chart is for monitoring: Intake ☒ Output ☒ Enteral feed ☐ Drains ☐ Urine/Catheter ☐

Date: 23 / 06 / 14	Fluid restriction: ml	Weight: kg (estimated/actual)	**Minimum** urine output/hr: ml

	INTAKE (ML)						OUTPUT (ML)						
Time	Oral	Enteral Feed ml	Enteral Feed pH	IV Therapy		ACC TOTAL IN	Urine / Catheter	Drains / Bowels / Stoma / Other			Vomit / NG Asp	ACC TOTAL OUT	Initials
07:00													
08:00													
09:00	100ml tea												
10:00	200ml juice						Catheterised						
11:00													
12:00	200ml water												
13:00	200ml water												
14:00													
15:00	200ml water												
16:00													
17:00													
18:00													
19:00													
20:00	200ml tea					1100ml	15ml					15ml	
21:00													
22:00													
23:00													
24:00													
01:00													
02:00													
03:00													
04:00													
05:00													
06:00													
Totals													

TOTAL INTAKE ml | **TOTAL OUTPUT** ml | **Fluid Balance (+ / -)** ml

Questions

Q What is a significantly reduced urine output ("oliguria")?

Depends on body weight:

- Less than 0.5ml per kg body weight per hour (0.5ml/kg/hr)
- For *60kg* person, this is less than 30ml/hr
- "Anuria" – no or negligible urine output, less than 50ml/day

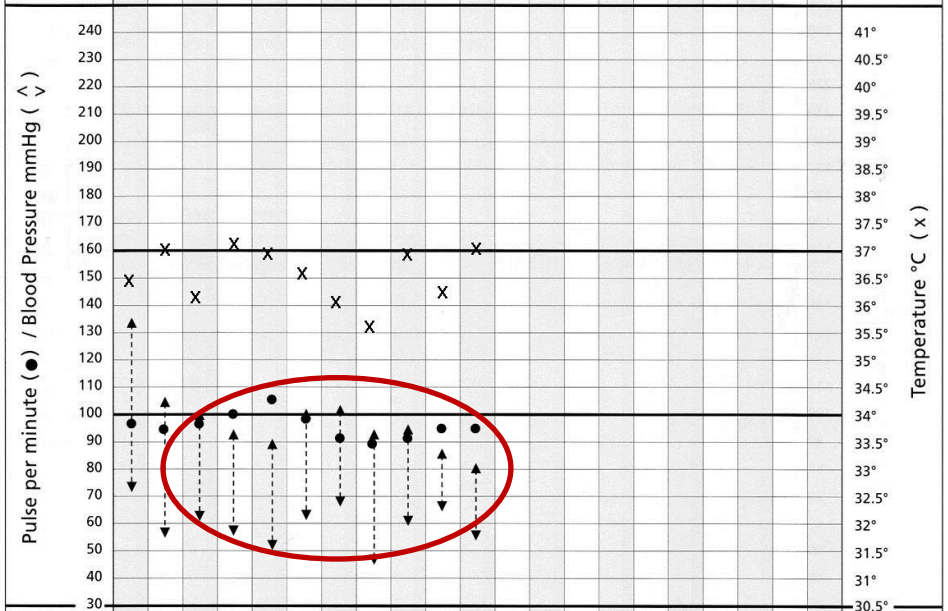
Patient's name: Audrey Roberts Hospital number: AU6776

Observation SHEWS and Pain Assessment Chart

Observations must be monitored at least 12 hourly or more frequently as per SHEWS algorithm on reverse.

Chart commenced: month 0 6 year 2 0 1 4

Date	21		22			23					
Hour	18	23	07	12	18	22	06	11	15	18	21
Minutes	30	45	00	15	15	45	30	45	00	15	15



Resps	18	18	16	18	12	14	14	16	16	16	16
% O_2 / litres	A	A	A	A	A	A	A	A	A	A	A
SpO_2	95	94	95	94	97	97	95	94	95	94	97
SHEWS	Insert individual scores for each observation and calculate total score										
Resps	0	0	0	0	0	0	0	0	0	0	0
SpO_2 / 15L O_2	0	0	0	0	0	0	0	0	0	0	0
Pulse	0	0	0	0	1	0	0	0	0	0	0
Systolic BP	0	0	0	1	1	0	0	1	1	3	3
Urine	0	0	0	0	0	0	0	0	0	0	3
Conscious level	0	0	0	0	0	0	1	1	1	1	1
Total Score	0	0	0	1	2	0	1	2	2	4	7
Pain											
Sedation											
Nausea											
Initials	JK	RT	AS	TH	TH	JK	JK	RT	AS	TH	TH

NAME Audrey Roberts CONSULTANT LLD
UNIT NUMBER AU6776 WARD SAC

CHECK ALLERGY STATUS

REGULAR MEDICATION - 2

1. Patient away from ward
2. Patient could not take dose
3. Patient refused dose
4. Dose not available
5. Dose not given at nurse's discretion
6. Dose not given at doctor's request
7. Self administration

Year: 2014 Month: June

Date: 21/6 | 22/6 | 23/6

P.C. Time

DALTEPARIN Hospital Acquired Thrombosis prophylaxis
Dose 5000 Units Freq OD
Additional instructions: Monitor platelets
Start date 21/6 Route SC
Signature / Print name bleep no.
Pharmacist Check | POD | Supply
Time: 18 X

Non-pregnant			Pregnant and up to 6 weeks postpartum		eGFR less than 20ml/min/1.73m²
Weight (kg)	Daltaparin dose	Booking weight (kg)	Daltaparin dose		
Less than 45	2500 units OD	Less than 50	2500 units OD		
45-99	5000 units OD	50-90	5000 units OD		
100-150	7500 units OD	91-170	5000 units BD		2500 units OD
Greater than150	5000 units BD	Greater than 170	75 units/Kg/day (in 2 divided doses, rounded to nearest whole syringe)		

ANTI-EMBOLISM STOCKINGS
Leg(s): Both Left Right
Knee
Thigh (orthopaedic knee surgery patients)
Start date | Additional Instructions: | Size | Time
Signature / Print name bleep no.

Prescribers: Circle the leg to which the stockings are to be applied and circle the length of stocking required. If stockings are not indicated, cross through this prescription clearly.
Nurses: each day, sign and date that the leg(s) have been assessed, stocking applied/reapplied and measured/remeasured as appropriate as per training package.

Approved Name of Medicine: Metformin
Dose 500mg Freq BD
Additional instructions
Start date OA Route PO
Signature / Print name bleep no.
Pharmacist Check | POD | Supply
08: X RT RT
18: RT RT RT

Approved Name of Medicine: Gliclazide
Dose 80mg Freq BD
Additional instructions
Start date OA Route PO
Signature / Print name bleep no.
Pharmacist Check | POD | Supply
08: RT RT RT
18: RT RT RT

Approved Name of Medicine: Amlodipine
Dose 5mg Freq OD
Additional instructions
Start date OA Route PO
Signature / Print name bleep no.
Pharmacist Check | POD | Supply
08: RT RT RT

Approved Name of Medicine: Atorvastatin
Dose 20mg Freq ON
Additional instructions
Start date OA Route PO
Signature / Print name bleep no.
Pharmacist Check | POD | Supply
22: RT RT RT

Approved Name of Medicine: Ramipril
Dose 5mg Freq OD
Additional instructions
Start date OA Route PO
Signature / Print name bleep no.
Pharmacist Check | POD | Supply
08: RT RT RT

SELF ADMINISTRATION CHECK - Refer to Trust Policy

Audrey – Day 3

- Orthopaedic SHO reviews due to SHEWS score 7 and starts IV fluid challenges when the labs ring with this afternoons blood results...

sunquest ICE Desktop Live

Patient Search
Discharge
Reporting
Cumulative Reports
View Patient Reports
View Ward Reports
Latest Reports (Unfiled)

Patient Name: MRS AUDREY ROBERTS
Hospital Number: AU6776
Sex: **Female**
Date of Birth: 21/04/1928
NHS Number:
Address:
Telephone No:

< | File | File & Next | > | Back | < | Cumulative | > | All | Print | Audit Trail

Reported	Specialty	Location	Clinician	Status
23 Jun 2014 20:15	Orthopaedics	Hunstman 7	Mr LLD	F

Reasons for Request :
NOF

Sample IB926245D (BLOOD) Collected 23 Jun 2014 17:00 Received 23 Jun 2014 17:50

UE

Sodium	*	131	mmol/L	133 - 146
Potassium	*	5.9	mmol/L	3.5 - 5.3
Urea	*	27.5	mmol/L	2.5 - 7.8
Creatinine	*	372	umol/L	44 - 80
eGFR	*	9	ml/min/1.73m^2	

www.renal.org/eGFR, eGFR is not adjusted for race.
eGFR is unreliable when creatinine unstable, e.g. AKI.
Only use for drug dosing if part of approved protocol.

Routine Biochemistry

C Reactive Protein	*	167.5	mg/L	0 - 5

CRP is a nonspecific marker of inflammation, infection and tissue damage. Repeat requesting is not indicated within 24 hours.

End of report

Sunquest Ice Desktop - Windows Internet Explorer

sunquest ICE Desktop Live

Patient Search
Discharge
Reporting
Cumulative Reports
View Patient Reports
View Ward Reports
Latest Reports (Unfiled)

Patient Name: MRS AUDREY ROBERTS
Hospital Number: AU6776
Sex: Female
Date of Birth: 21/04/1928
NHS Number:
Address:
Telephone No:

< | File | File & Next | > | Back | < | Cumulative | > | All | Print | Audit Trail

Reported	Specialty	Location	Clinician	Status
23 Jun 2014 14:42	Orthopaedics	Hunstman 7	Mr LLD	F

Reasons for Request :
NOF

Sample IB926245D (BLOOD) Col

UE

- **Sodium**
- **Potassium**
- **Urea**
- **Creatinine**
- **eGFR**

www.renal.org/eGFR, eGFR
eGFR is unreliable when
Only use for drug dosing

Routine Biochemistry

- **C Reactive Protein**

CRP is a nonspecific mar
and tissue damage. Repea
not indicated within 24

UE - Creatinine for mrs Audrey Roberts Webpage Dialog

Creatinine - (across all investigations) [umol/L]

Reference range: (44 - 80) Units: umol/L

Sample Collected Date	Sample ID	Value
23 Jun 2014 14:30:00	IB879221G	* 372
21 Jun 2014 17:00:00	IB878103Y	80
20 Jun 2014 15:30:00	IB877089M	55
19 Jun 2014 15:58:00	IB875414G	48
17 Jun 2014 14:49:00	IB869115A	52
19 Mar 2014 00:00:00	IB636213E	65
17 Dec 2013 00:00:00	IK803273X	50
03 Apr 2013 00:00:00	IK541149S	61

Graph | Print | Close

End of report

start | Microsoft Publisher | Sunquest Ice Deskto... | Sunquest Ice Deskto... | 02 July 2014 | 16:41

Audrey – Day 3

- Orthopaedic SHO pushes with IV fluids and discusses with the medical SpR on call due to drowsiness, deranged U&Es and anuria
- Medical SpR advises flush catheter, push IV fluids, stop all regular drugs / morphine, check hourly urine output & repeat U&Es

sunquest ICE Desktop Live

Patient Search
Discharge
Reporting
Cumulative Reports
View Patient Reports
View Ward Reports
Latest Reports (Unfiled)

Patient Name: MRS AUDREY ROBERTS
Hospital Number: AU6776
Sex: **Female**
Date of Birth: 21/04/1928
NHS Number:
Address:
Telephone No:

< | File | File & Next | > | Back | < | Cumulative | > | All | Print | Audit Trail

Reported	Specialty	Location	Clinician	Status
24 Jun 2014 00:40	Orthopaedics	Hunstman 7	Mr LLD	F

Reasons for Request :
NOF

Sample IB926245D (BLOOD) Collected 24 Jun 2014 21:30 Received 24 Jun 2014 22:30

UE

Sodium	*	130	mmol/L	133 - 146
Potassium	*	6.0	mmol/L	3.5 - 5.3
Urea	*	33.5	mmol/L	2.5 - 7.8
Creatinine	*	418	umol/L	44 - 80
eGFR	*	6	ml/min/1.73m^2	

www.renal.org/eGFR, eGFR is not adjusted for race.
eGFR is unreliable when creatinine unstable, e.g. AKI.
Only use for drug dosing if part of approved protocol.

Routine Biochemistry

C Reactive Protein	*	167.5	mg/L	0 - 5

CRP is a nonspecific marker of inflammation, infection and tissue damage. Repeat requesting is not indicated within 24 hours.

End of report

Audrey – Day 4

- Audrey clinically deteriorates in the early hours of the morning. She is hypotensive and tachycardic and repeat U&E are worsening
- The orthopaedic team, after discussion with general medical SpR, arrange urgent ITU / HDU review for ?haemofiltration
- In liaison with Renal SpR, the decision is made that ITU / HD not in her best interests
- DNAR filled in and Audrey dies at 06:23

Sheffield Teaching Hospitals NHS
NHS Foundation Trust

FLUID MONITORING CHART

DO NOT AFFIX PATIENT STICKER

Name: Audrey Roberts
Hospital number: AU6776
Ward: H7

Please see guidance overleaf before using this chart

This chart is for monitoring: Intake ☒ Output ☒ Enteral feed ☐ Drains ☐ Urine/Catheter ☐

Date: 23 / 06 / 14	Fluid restriction: ml	Weight: kg (estimated/actual)	**Minimum** urine output/hr: ml

	INTAKE (ML)						OUTPUT (ML)						
Time	Oral	Enteral Feed ml	Enteral Feed pH	IV Therapy		ACC TOTAL IN	Urine / Catheter	Drains / Bowels / Stoma / Other			Vomit / NG Asp	ACC TOTAL OUT	Initials
07:00													
08:00													
09:00	100ml tea												
10:00	200ml juice						Catheterised						
11:00													
12:00	200ml water												
13:00	200ml water												
14:00													
15:00	200ml water												
16:00													
17:00													
18:00													
19:00													
20:00	200ml tea					1100ml	15ml					15ml	
21:00							0						
22:00				500ml			0						
23:00				500ml			10ml					25ml	
24:00				500ml			0						
01:00							0						
02:00							20ml					45ml	
03:00							0						
04:00				1000ml			0						
05:00							10ml					55ml	
06:00													
Totals													

TOTAL INTAKE 3500 ml | **TOTAL OUTPUT** 55 ml | **Fluid Balance (+ / -)** +3445 ml

Patient's name: Audrey Roberts — Hospital number: AU6996

Observation SHEWS and Pain Assessment Chart

Observations must be monitored at least 12 hourly or more frequently as per SHEWS algorithm on reverse.

Chart commenced: month 06 year 2014

Date	21		22				23								24						
Hour	18	23	07	12	18	22	06	11	15	18	21	22	23	23	00	02	03	04	05		
Minutes	30	45	00	15	15	45	30	45	00	15	15	45	30	45	00	15	15	45	20		
Resps	18	18	16	18	12	14	14	16	16	16	16	18	18	18	18	20	20	22	30		Resps
% O_2 / litres	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	4l	4l	4l		% O_2 / litres
SpO_2	95	94	95	94	97	97	95	94	95	94	97	97	95	94	95	94	94	94	92		SpO_2
SHEWS	Insert individual scores for each observation and calculate total score																				**SHEWS**
Resps	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	2		Resps
SpO_2 / 15L O_2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		SpO_2 / 15L O_2
Pulse	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	1	0	0		Pulse
Systolic BP	0	0	0	1	1	0	0	1	1	3	3	3	3	3	3	3	3	3	3		Systolic BP
Urine	0	0	0	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3		Urine
Conscious level	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1		Conscious level
Total Score	0	0	0	1	2	0	1	2	2	4	7	7	8	8	8	9	9	8	10		**Total Score**
Pain																					Pain
Sedation																					Sedation
Nausea																					Nausea
Initials	JK	RT	AS	TH	TH	JK	JK	RT	AS	TH	TH	JK	JK	RT	AS	TH	TH	JK	ST		Initials

Pulse per minute (●) / Blood Pressure mmHg (^ v)

Temperature °C (x)

Questions

What could **Clinical Support Workers** have done better?

- Recorded vital signs on SHEWs chart correctly
- Report abnormalities and concerns to staff or charge nurse
- Monitor patients drinking, eating and urine output (report amount of incontinence of urine, a little or a lot?) and document
- Take urinalysis

Questions

What could the **nursing** staff have done better?

- Record, review and interpret vital signs on SHEWs chart correctly
- Follow the SHEWS ‘algorithm for action’ remembering to always consider the urine output
- Record on fluid balance chart correctly
- Monitor fluid input; oral or IV “Think Hydration”
- Catheterise acutely unwell patients to accurately monitor their output. Document any residual and act on findings
- Take a urinalysis
- Bloods must be taken daily or more frequently if indicated
- Use SBAR to communicate with medical staff. Question doctors decisions if you have concerns
- Initiate AKI NCG with risk factors & Insults
- Initiate AKI care bundle an with identified AKI

Questions

What could **medical** staff have done better?

- Communicate with nursing staff using SBAR
- Review recent creatinine and order U&E / FRP blood tests daily due to risk factors
- Review medications due to risk factors. Stop nephrotoxic drugs with AKI insult. Stop Gliclazide with hypoglycaemia and Amlodipine with hypotension cause for AKI)
- Initiate AKI care bundle checklist as AKI with Identified AKIs
- Prescribe and monitor fluid challenges
- Question fluid balance and urine output
- Seek more senior help earlier

Questions

When should the renal team have been informed?

When Cr > 350 or any degree of AKI and …

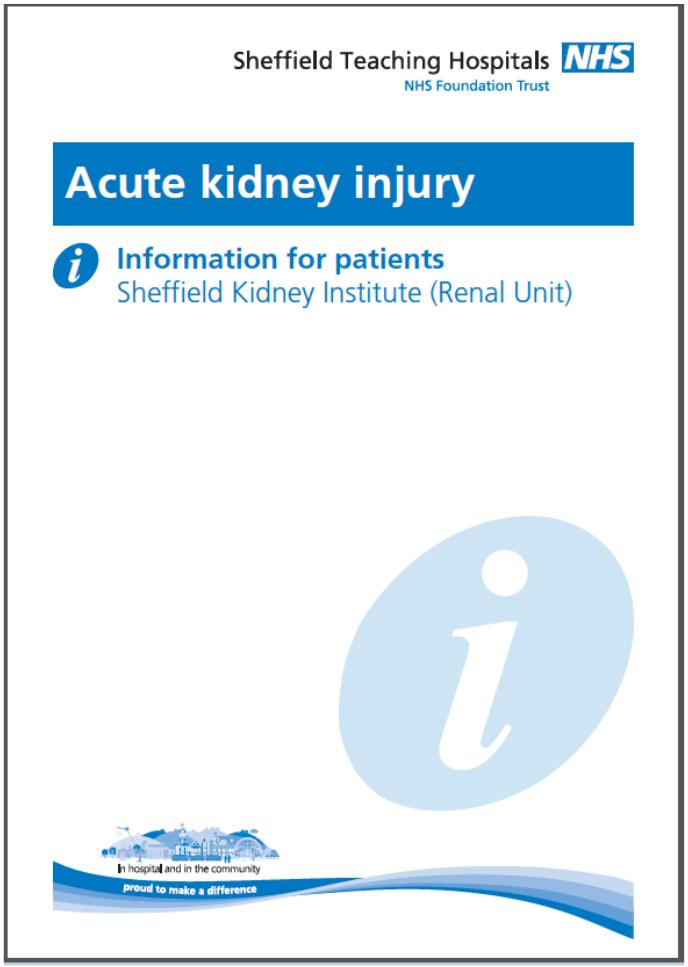
- Oliguria > 12 hours after haemodynamically stabilised (BP > 100mmHg) or > 6 hours if BP has been normal
- Hyperkalaemia resistant to medical treatment
- Pulmonary oedema
- Severe acidosis
- Blood and protein in urine (suspecting intra-renal cause)
- AKI due to poisoning

A Summary
Monitoring and Assessment of AKI

How can we do this in our everyday practice?

- Care Rounding
- Deteriorating Patient Pathway (DPP)
- AKI Nursing Care Guideline (NCG20)
- AKI Care Bundle (PD7621)

Give all Patients Identified as having an AKI a Patient Information Leaflet



PD7986


YOU DON'T LOOK SO GOOD... SHOULD I CALL THE NURSE?
I AM THE NURSE!
PATIENTS HEALTH LINKED TO NURSES WORKLOAD
NURSE SHORTAGE
BEEP-BEEP BEEP
Joe Heller

Final Points

- Remember the AKI risk factors
- Always consider urine output even if the patient isn't catheterised
- Ensure the AKI NCG is adhered to
- Ensure all patients at risk of AKI have been assessed
- Ensure all patients identified as having AKI have an AKI Care Bundle in their notes

Remember …

Thank you for your time