



University
of Glasgow

Digging Out the Data

Dr Charlotte Gilhooly

Senior Lecturer/Consultant,
Glasgow Royal Infirmary ICU,
Scotland

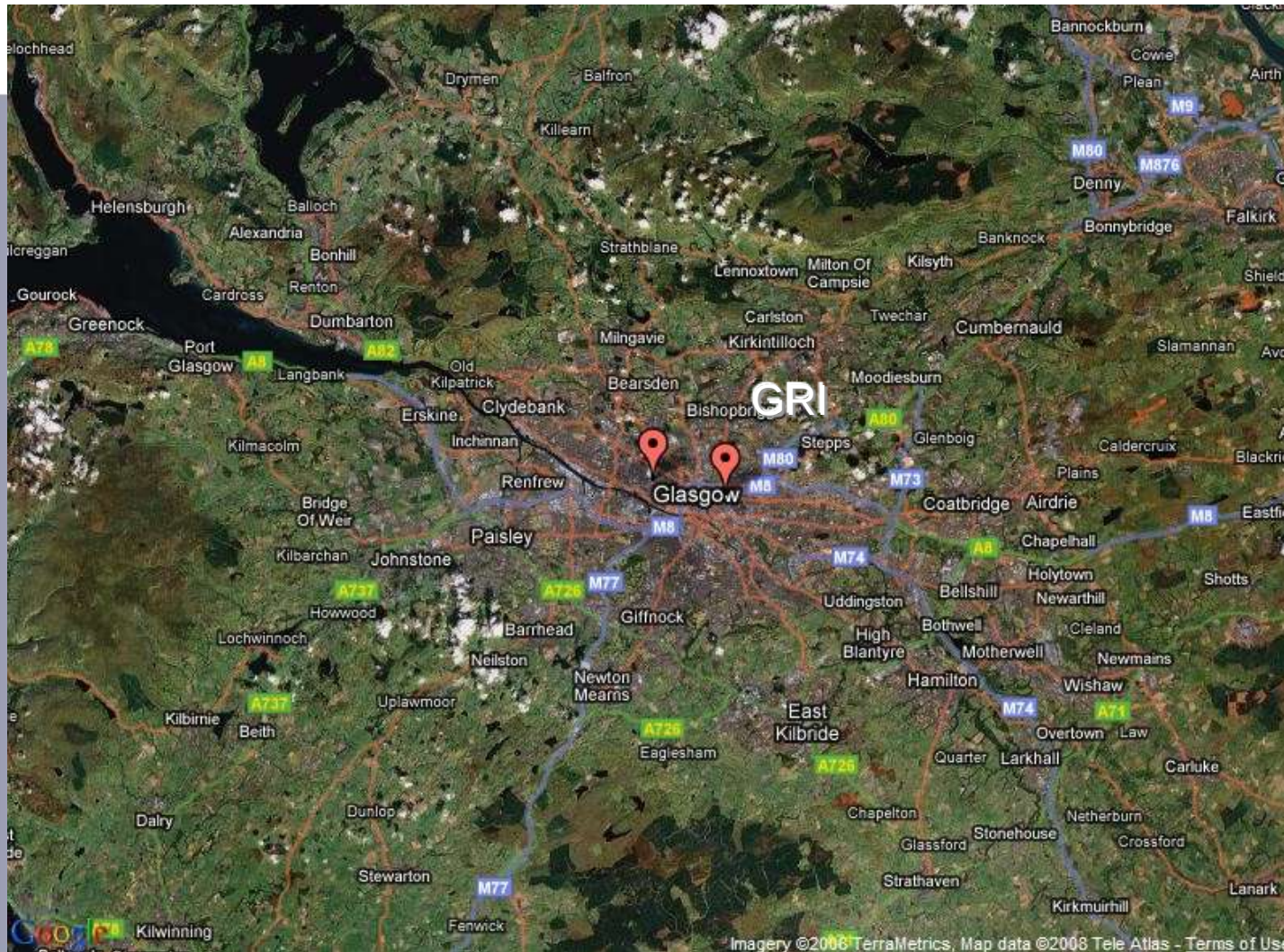
The Second Seminar on
Clinical Information System In Intensive Care

Pamela Youde Nethersole Eastern Hospital, Hong Kong, Nov 2010

Where am I from?... Scotland



Where is Glasgow Royal Infirmary?



Glasgow Royal Infirmary



Where is the Intensive Care Unit?



- Lead units in piloting/validating APACHE II (1980's)
- Part of national audit network collates and publishes data/SMR on all ICU patients in Scotland since 1995 (SICSAG)
- Using ICIP in GRI since 2006

GRI CIS (ICIP) History

- 2002 Decision for new ICU
- 2004 Commission Philips Carevue system
- 2005 Move into new Unit
- 2006 Rev B
- 2007 Rev C
- 2010 Rev D
- 2010 Expand unit – Extra 10 beds



How do we use the EPR in GRI ICU?

- Bedside workstation with client
- Data concentrator and monitor
- Mobile wireless computer to access EPR



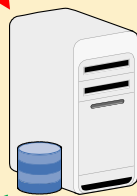
- Reporting
 - How we run reports
 - Data mining



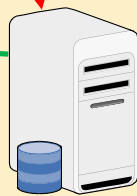
ICU Patients GRI



**CAREVUE
ICIP
(Charting Database)**



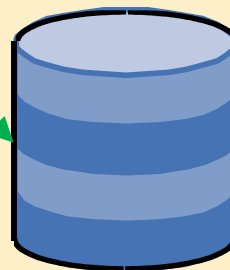
**DAR
(Reporting Database)**



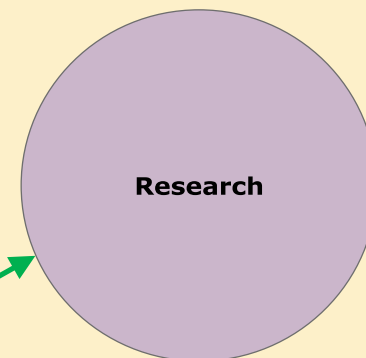
**WARDWATCHER
Database**



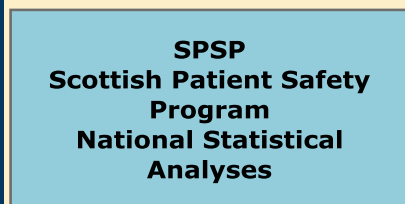
**Individual Audit
and Research
Queries**



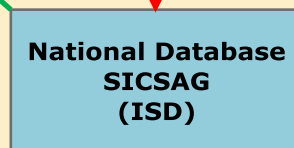
**ACHE
(Off Line Repository)**



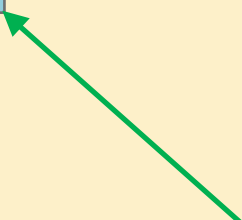
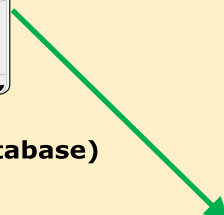
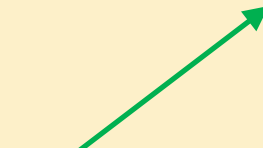
Research



**SPSP
Scottish Patient Safety
Program
National Statistical
Analyses**



**National Database
SICSAG
(ISD)**



How do we go about running the reports?

- Use Access 2003 to query reporting database and extract data
- Define (refine) the Question
- How can we define it using GRI ICIP Database Configuration?
- How is the thing we are looking for likely to be recorded in the database?
- Identify the tables to query
- Write the query



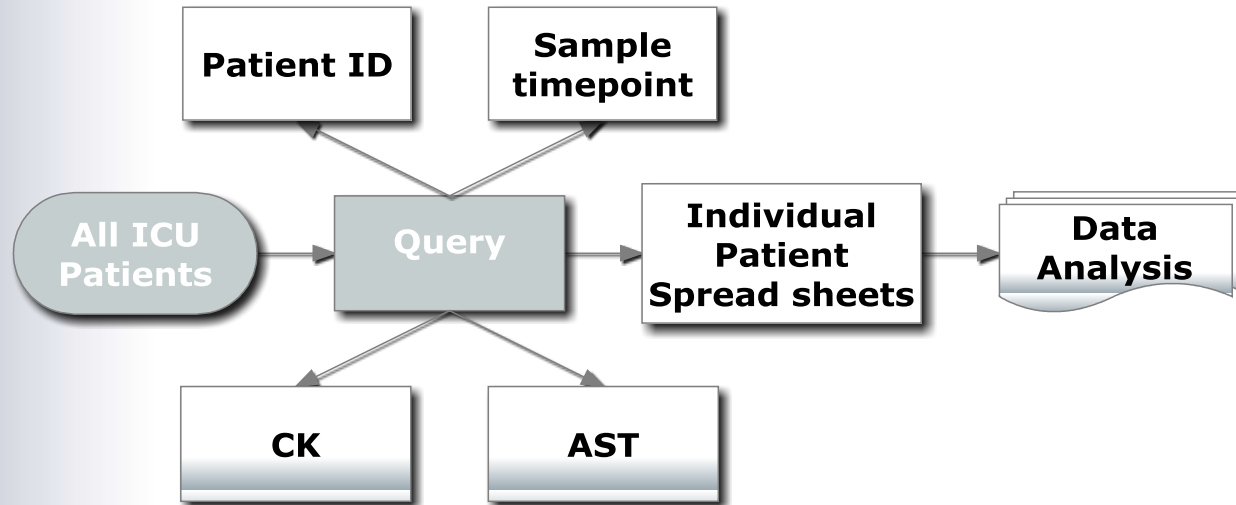
Clinical Reports produced using ICIP

- Over 30 Reports have been run on ICIP (>20 in GRI ICU)
- Administration Reports
 - » Bed occupancy
 - » Number of patients treated by an individual
 - » Costing queries – TPN, Disposable usage, investigations
- Practice Review
 - » Use of sedation agents
 - » Use of agents to treat delirium
 - » Bowel management
 - » Incidence and timing of rhabdomyolysis in Burns
 - » Incidence of hypophosphataemia
- Medical Research
 - » Cardiovascular stability on haemodialysis
 - » Incidence of myocardial infarction, and associated haemodynamic anomalies
 - » Error rates in electronic and written prescriptions
 - » Welfare attorney project
 - » Gentamicin associated renal failure
 - » Timing of renal replacement therapy in ICU
 - » Incidence of atrial fibrillation and mortality
 - » Relationship of AST to Creatine Kinase
- Clinical Audit
 - » Compliance with blood sugar protocol
 - » Compliance with nutritional support algorithm
 - » Reasons for missing investigation results (lab results)
 - » Compliance with "care bundles"
 - » Compliance with co-signing drug administration
 - » Unplanned admissions of elective surgical patients to ICU

Practical Example:

- For Example:
- Does a high AST reading correlate with a high CK
- i.e do patients with a high CK also have an elevated AST?

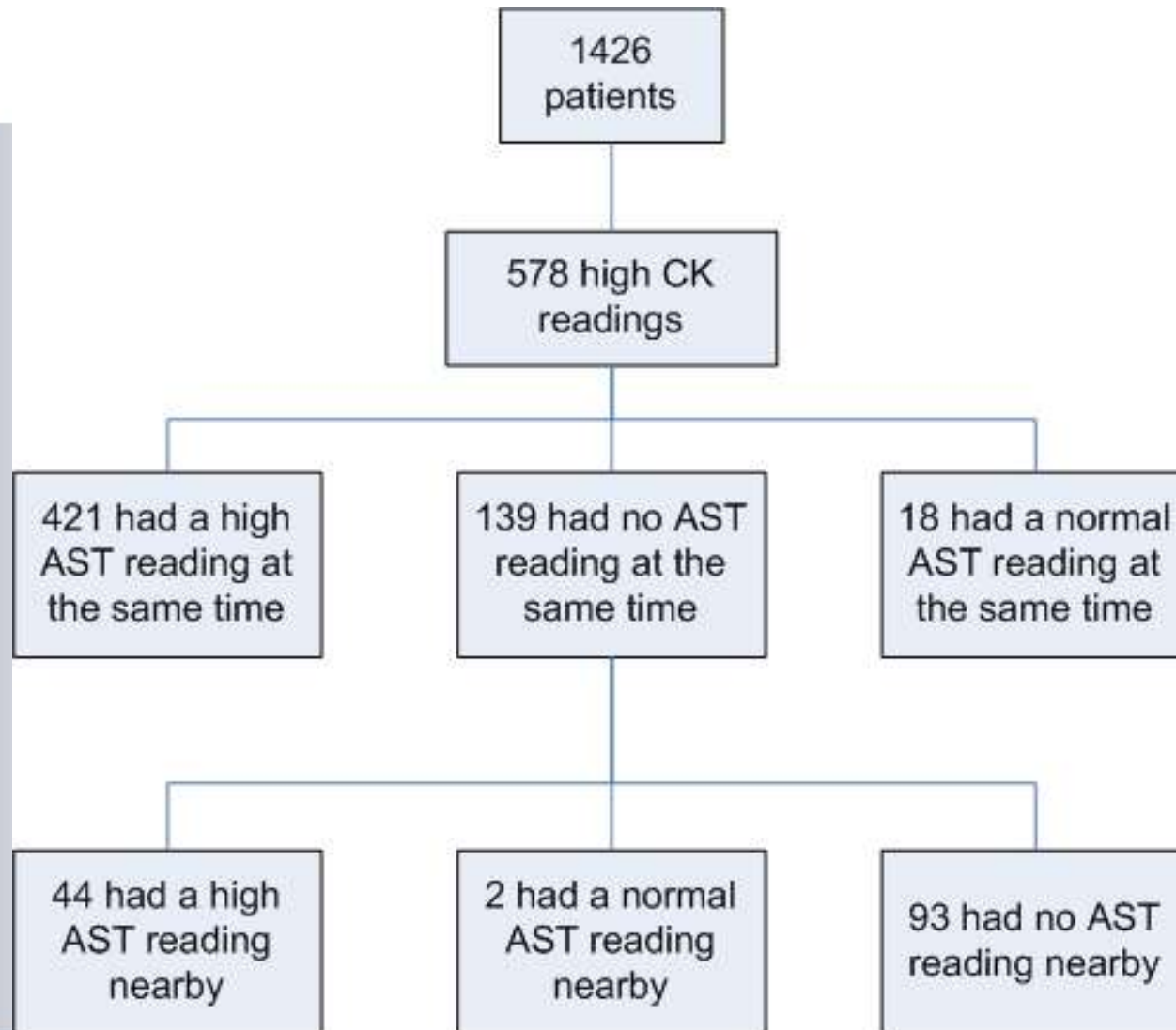
Manipulating the Data



The algorithm applied is as follows:

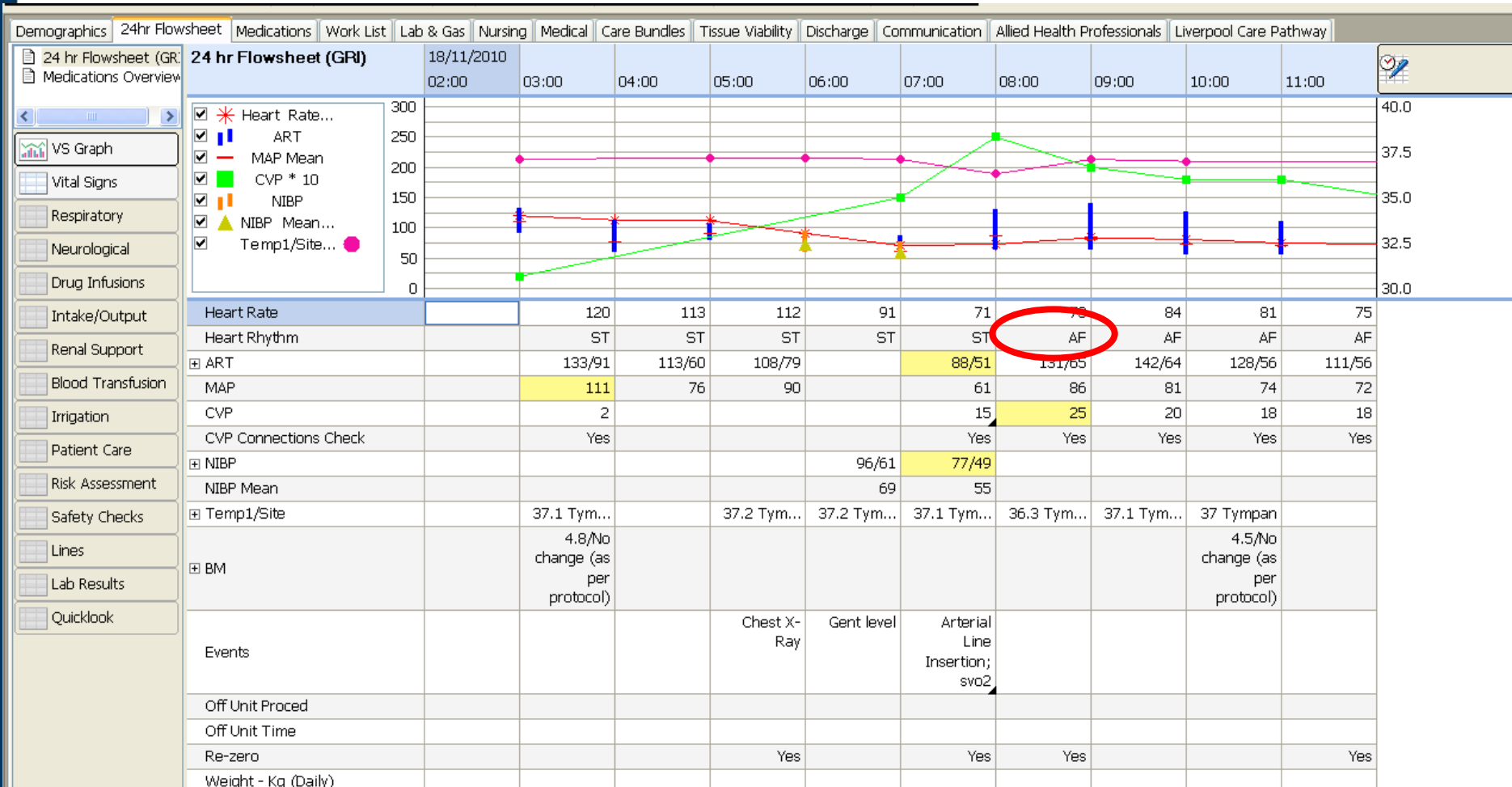
- For each CK reading > 1000
 - Determine if there is a corresponding AST value at the same time point
 - If there is AST value,
 - Determine whether it is > 40
 - If there is no AST value
 - Determine a 'window' of ± 4 hours around the time of the high CK reading
 - Search this window for an AST value
 - If an AST value is found
 - Determine whether it is > 40
- Report results

AST and CK results

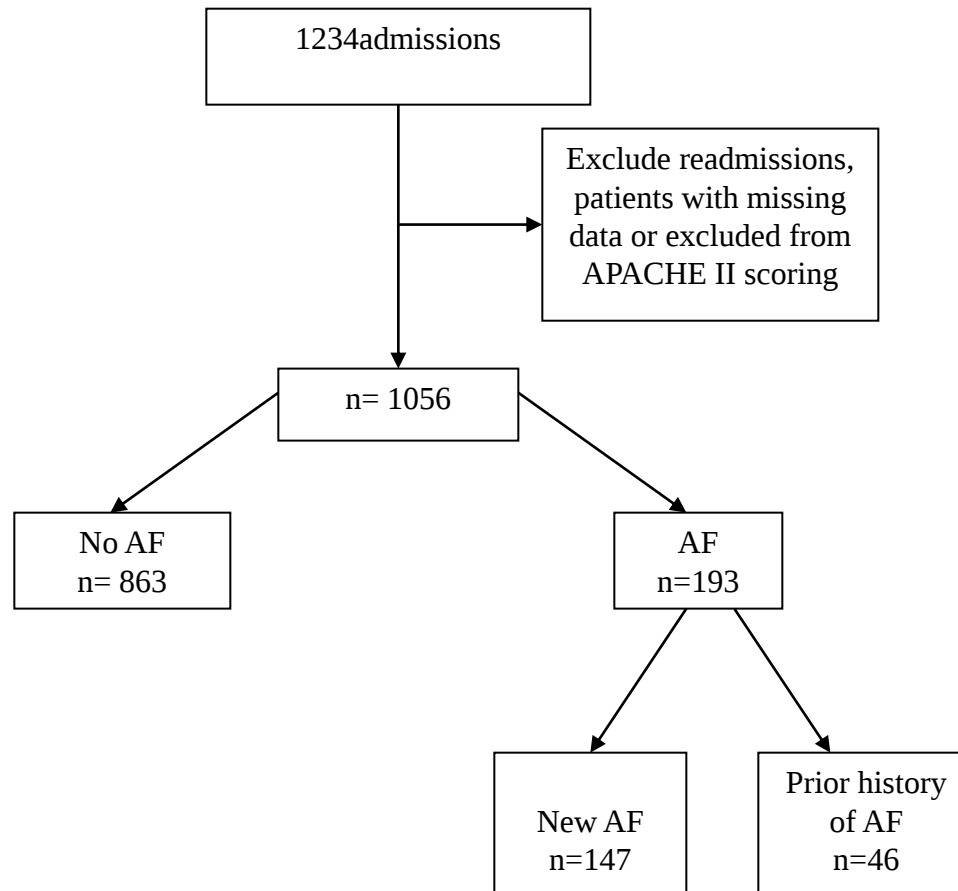


What is the incidence of
AF in ICU?

Incidence of AF in ICU



Incidence of AF in ICU



Over 30 Reports run on ICIP

- Administration Reports
- Practice Review
- Medical Research
- Clinical Audit

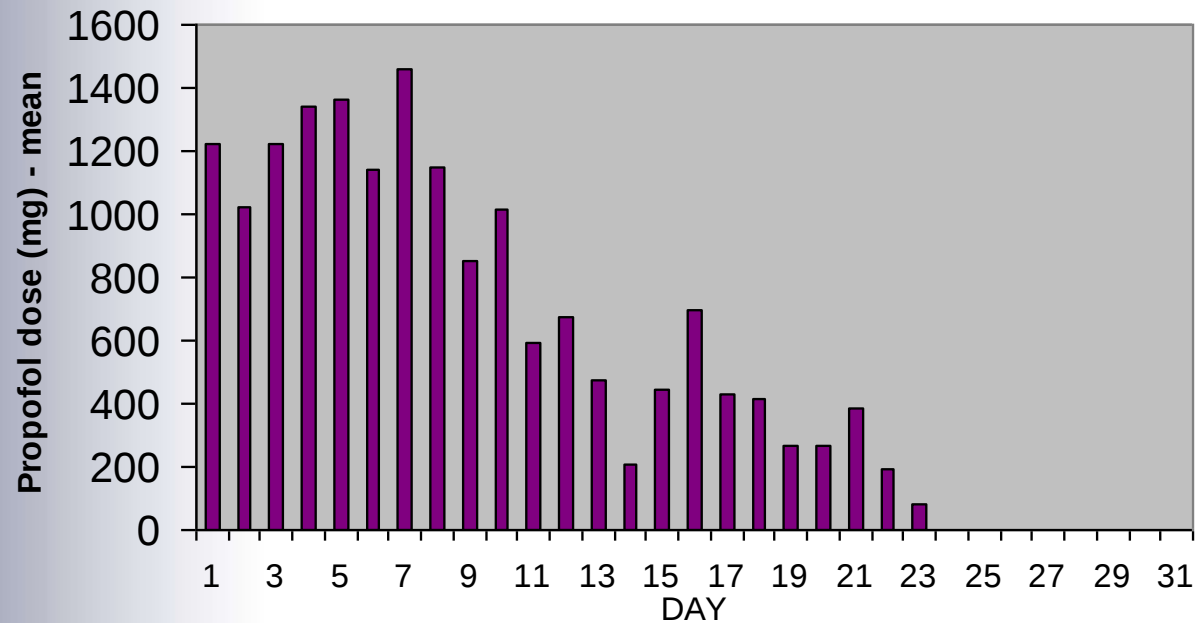
Administration Reports

- Bed occupancy
- Number of patients treated by an individual
- Costing queries – TPN, Disposable usage, investigations

ICU burns Workload Example

Total		Burns	
No Patients	4265	No Patients	148 (3%)
No Transferred in	690	No Transferred in	81
No Readmissions	311	No Readmissions	7
Mean LOS	6.2	Mean LOS	9.9
Median LOS	2.4	Median LOS	3.9
No Bed Days	26608	No Bed Days	1466 (6%)

Dose of sedative agent used

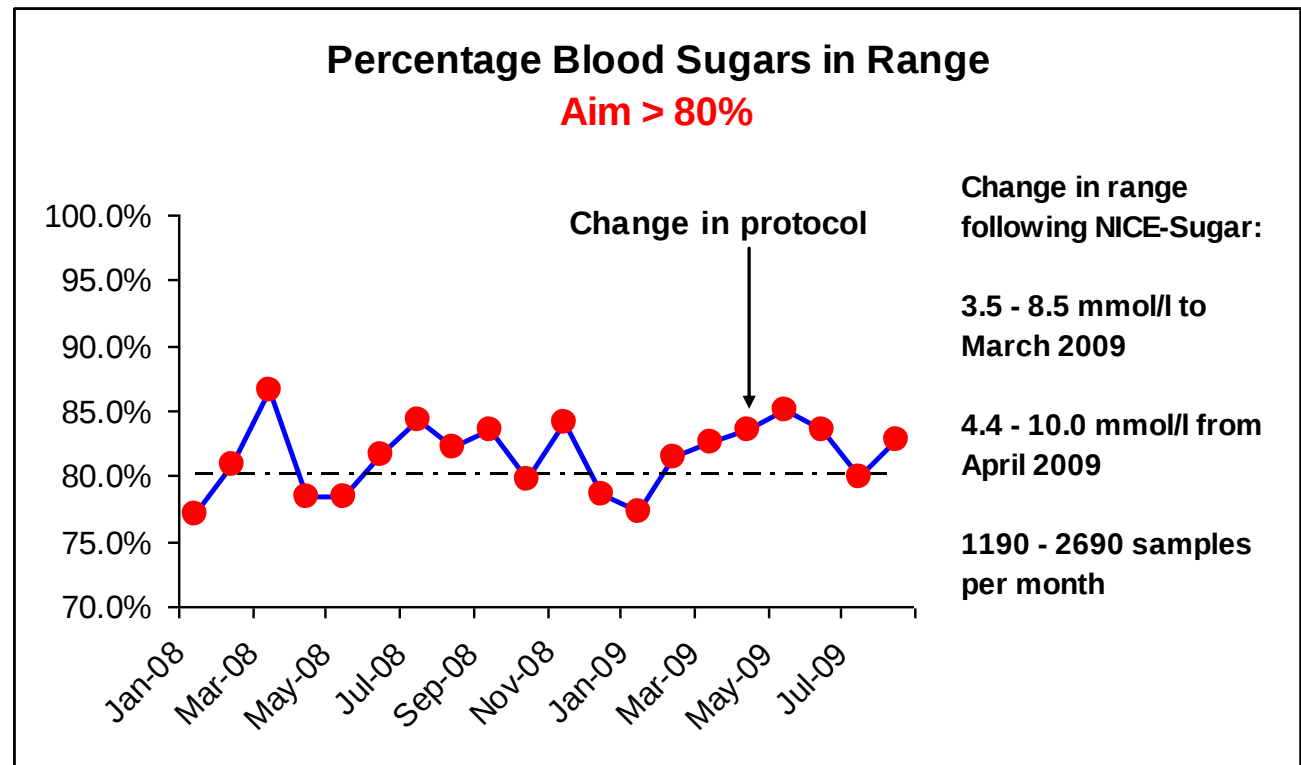


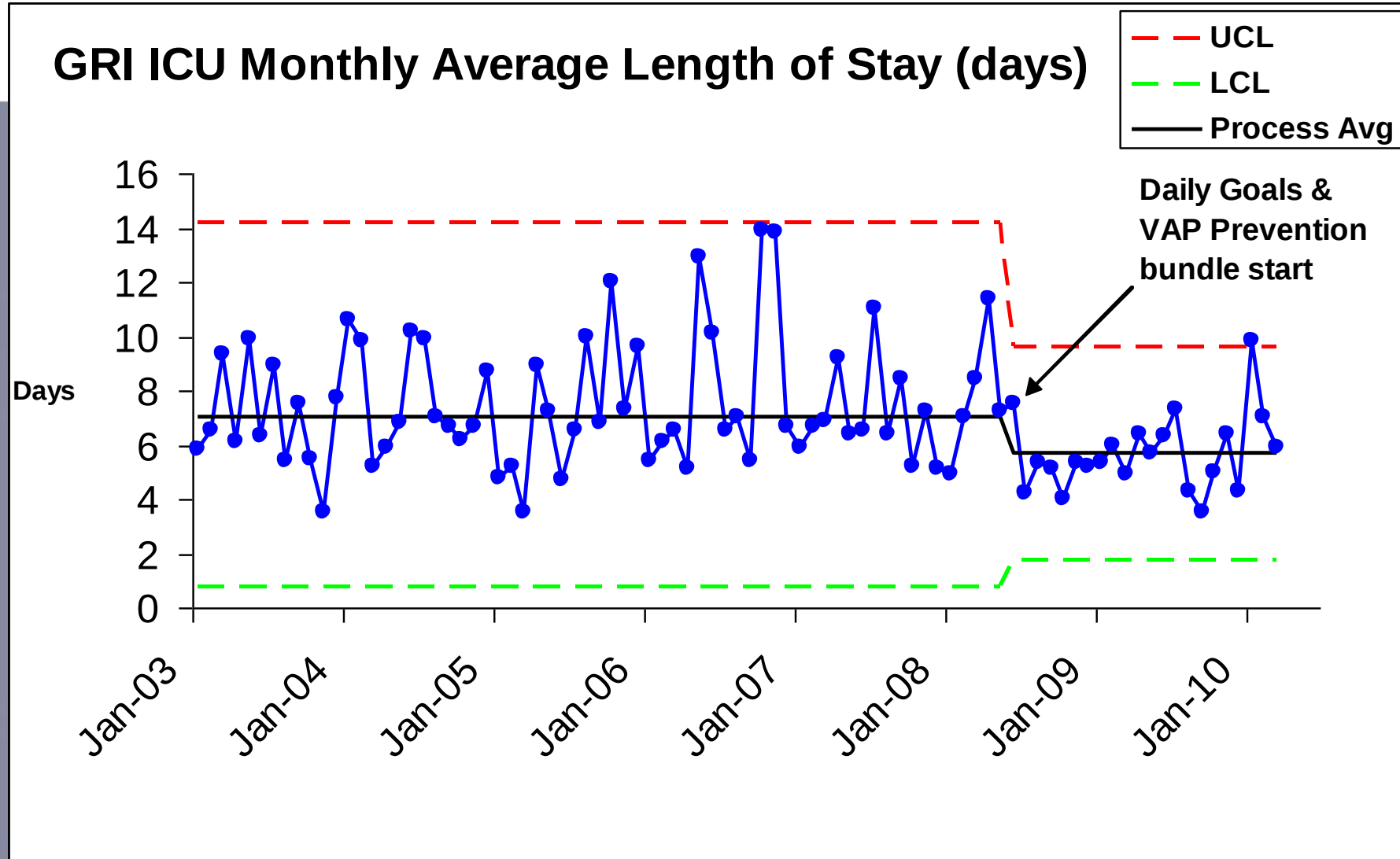
Quasim T, Tordoff C

How can a CIS be used to improve the standard of Critical Care Medicine?

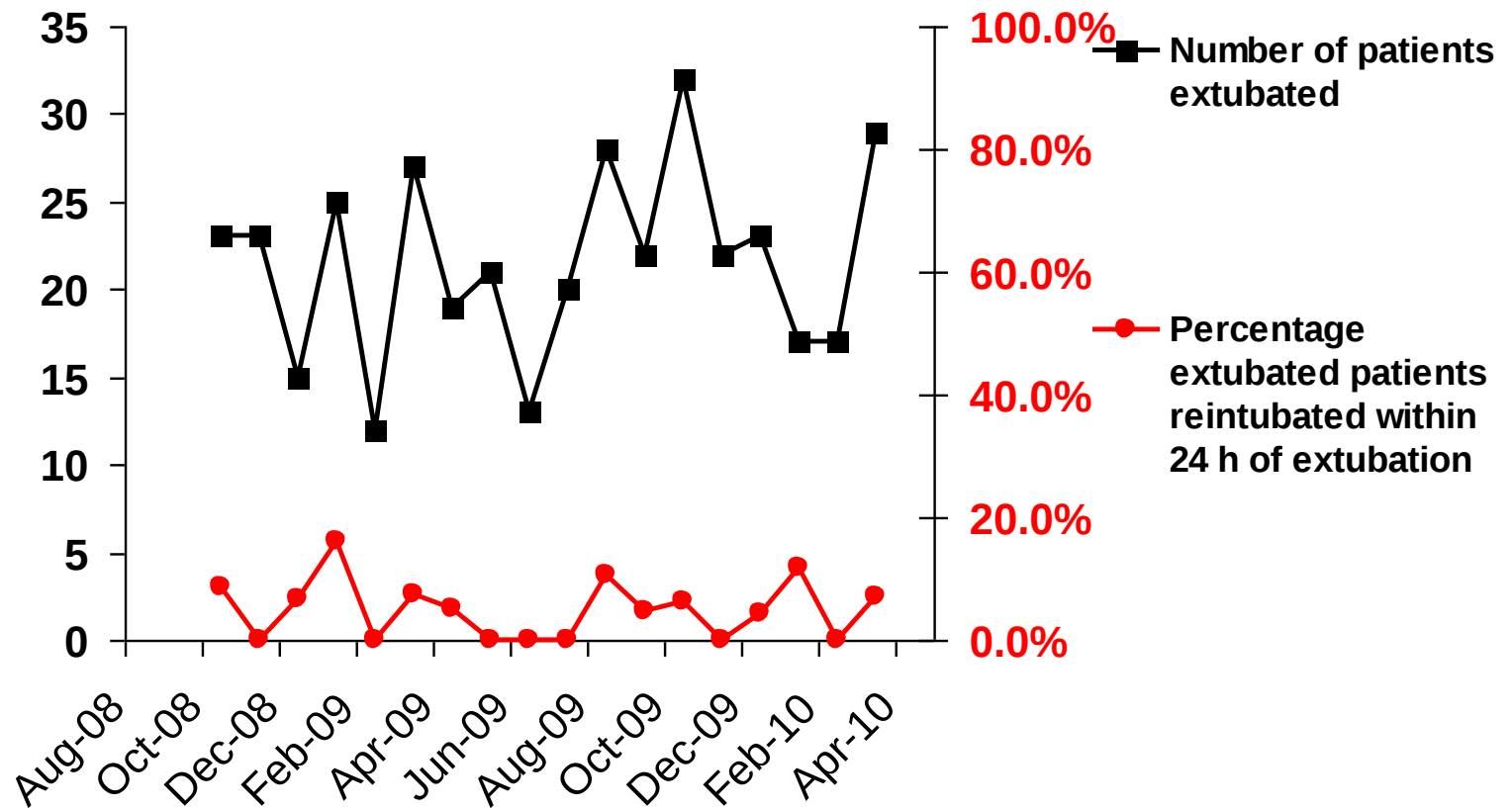


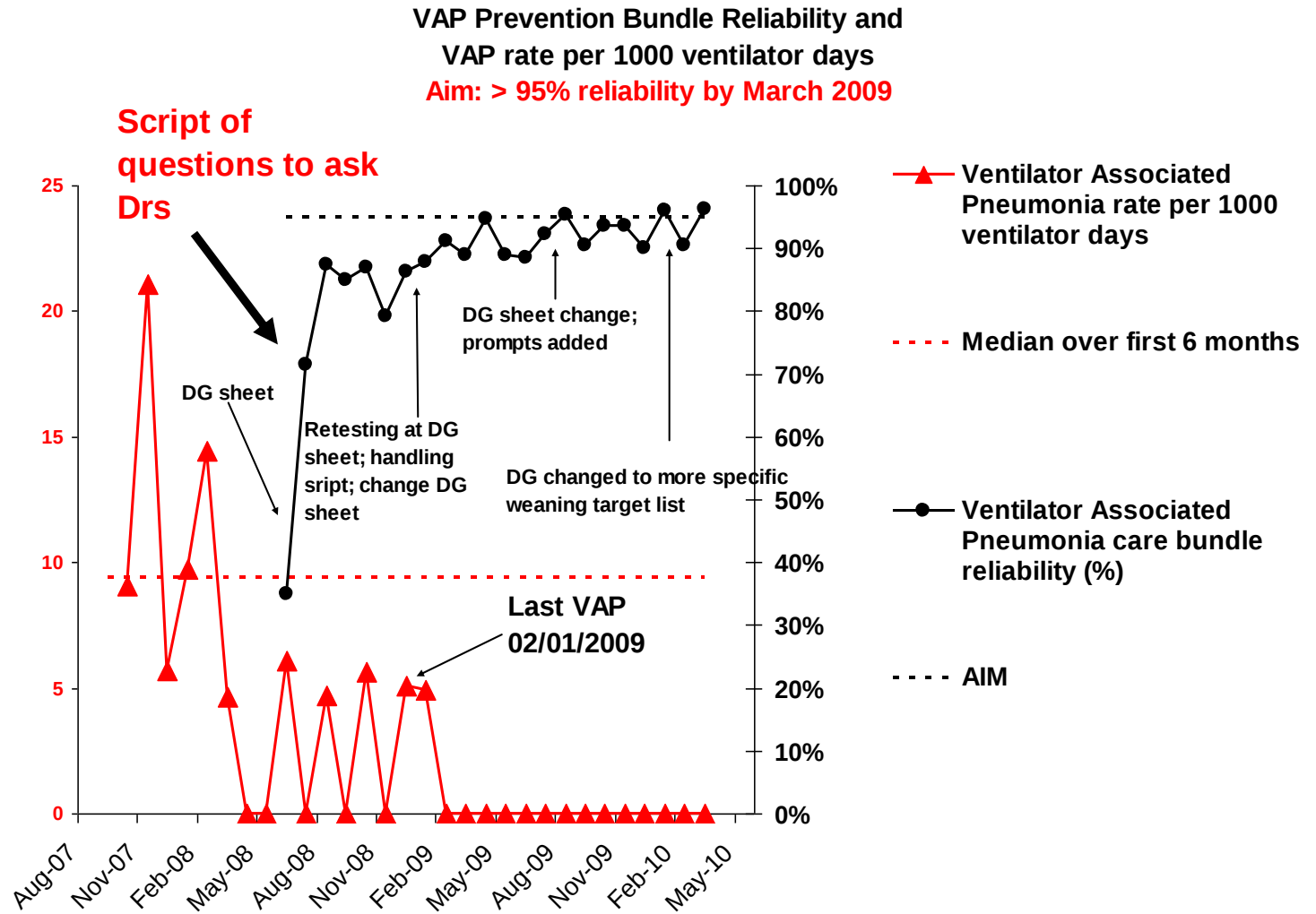
Blood Glucose Target in ICU /HDU





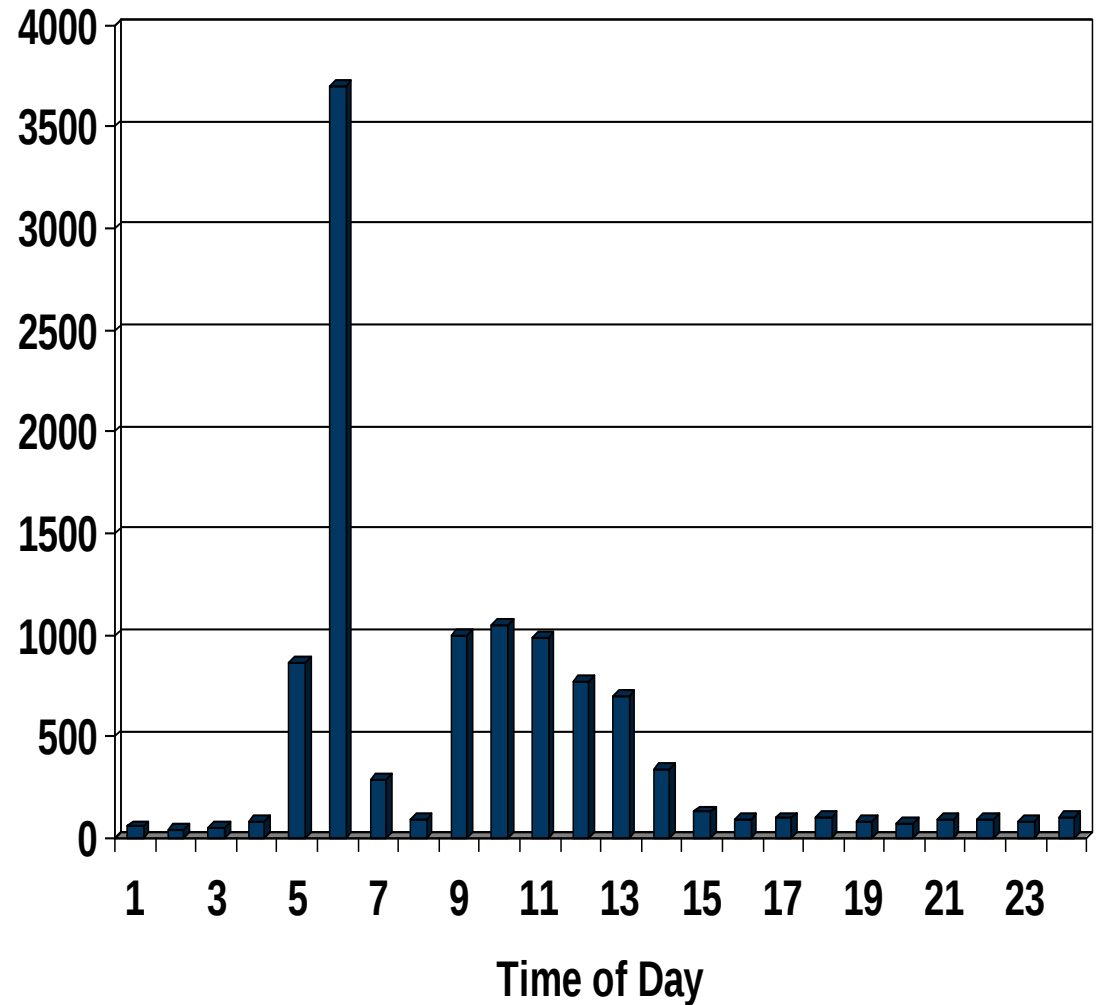
Number of patients extubated per month Percentage reintubated with 24 h of extubation



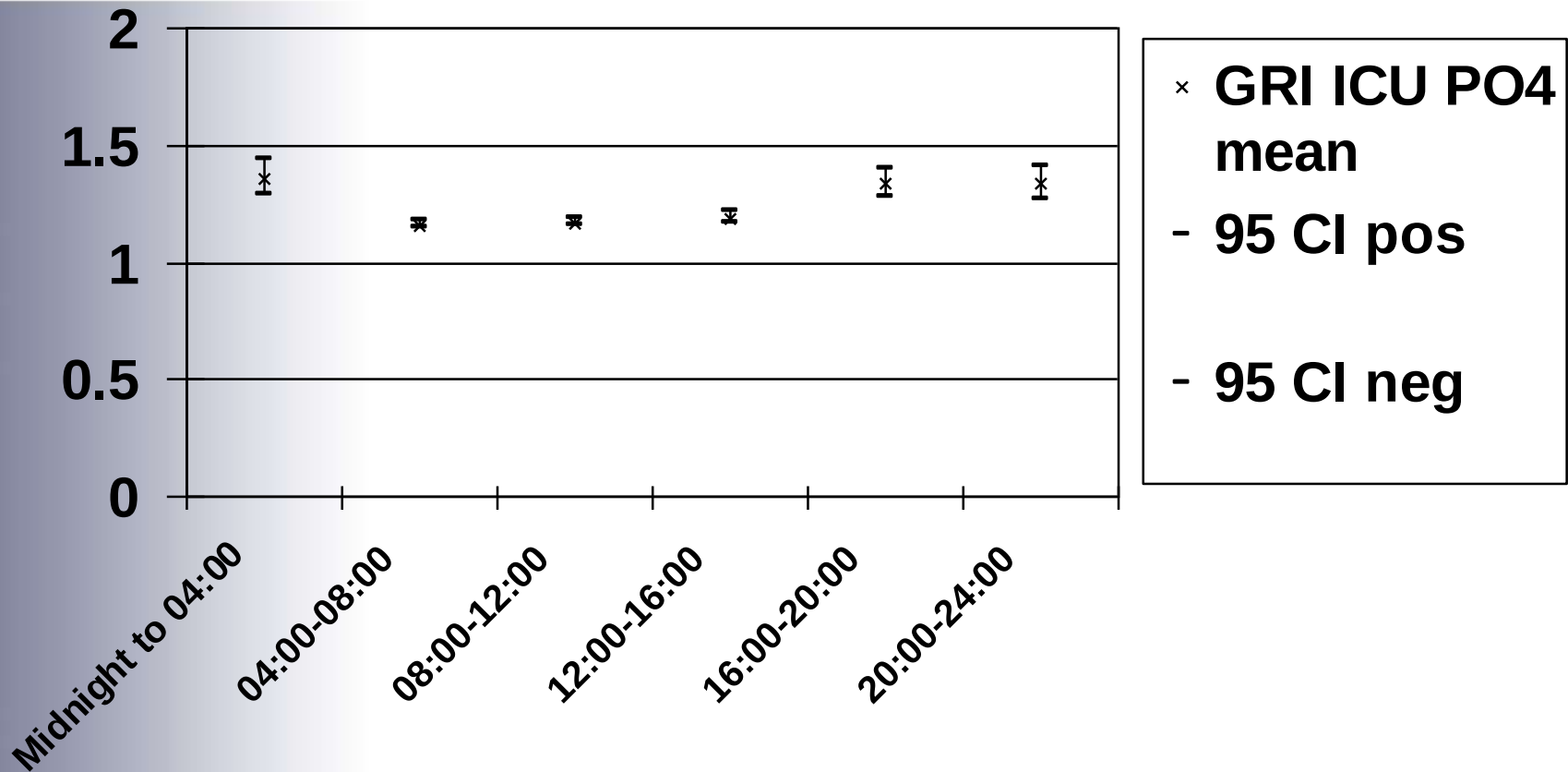


Number of Samples

- Number of Phosphate Samples taken in ICU



Circadian Rhythm of Phosphates in GRI ICU



- Frequently used – over-run with requests
- Integrated with all the information that we have on all our other computer systems
- Used to produce national audit data
- Used (along data from other IT systems) to make regular reports that provide the information that we use to feed back regularly to staff in a quality improvement programme.

Barriers to the use of reporting



- Access
 - appropriate
 - policing
- Confidentiality
- Data interpretation and noise

Barriers to the use of reporting

- Done on Ad Hoc basis – basically unfunded
- Needs combination of clinical and IT perspectives
- Needs intimate knowledge of reporting database and where the information can be found
- Needs regular practise to maintain skills
- TIME

From This.....



- Mutual Access to review EPR
- Clear Consistent Documentation
- Simultaneous access to record possible from multiple clients
- Customisation of charts and forms in record for each part of MDT



- ICIP in GRI
- Clinical Decision Support using ICIP
- Reporting/Data mining using ICIP

Many thanks to my team:

- **Medical NHS**
 - Dr M Booth,
 - Dr M Daniel,
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 - S/N Jenny McCallum
 - S/N L Elder
- **NHS IT**
 - David Gallacher
- **University**
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Department of Anaesthesia, University of Glasgow
 - Prof. Derek Sleeman, Laura Moss
Department of Computing Science, University of Aberdeen



Do you have any questions?

See you in Glasgow?

Please feel welcome to visit!

c.gilhooly@clinmed.gla.ac.uk





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