Use of CRP in primary care to identify sepsis in NHS Lothian patients

Melissa McNaughton[1,2], Sara Jenks[1], Jonathan Malo[1], Rebecca Pattenden[1]
1. Clinical Chemistry Department, Western General Hospital, NHS Lothian. Crewe Road South, EDINBURGH, G4 0RE 2. Manchester Academy for Healthcare Science, University of Manchester
melissa.mcnaughton@nhs.net

Introduction

- CRP is an acute marker of inflammation .
- CRP is non –specific marker and is elevated in autoimmune conditions , infection, inflammatory illness, & malignancy.
- CRP replaced ESR as the first line measure of inflammation in NHS Lothian in January 2018.
- According to RCPath guidance[1], any CRP result >300 should be communicated rapidly .
- For CRP this is to avoid delayed treatment of sepsis which is a life threatening condition.
- Consensus amongst primary care clinicians was that this was too high and that 200 may be a more appropriate limit.

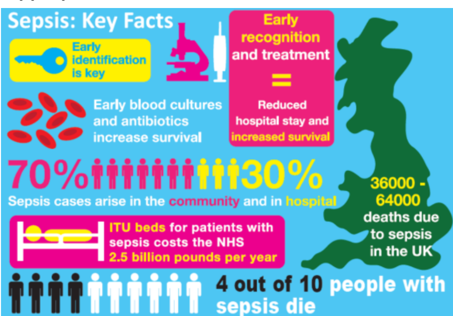

Figure 1. *Sepsis infogram from NHS advancing quality alliance[2].*

Aim:
To establish an evidence based phoning limit for CRP to avoid delayed treatment of sepsis.

Initial findings

- There is a lack of literature on CRP in primary care patients.
- RCPath phoning limits were based on consensus opinion rather than evidence.
- Next steps: establish the causes and levels of CRP in NHS Lothian primary care samples.

References

Croal, B. (2017) The phoneing of critical and unexpected pathology results. https://www.rcpath.org/uploads/assets/uploaded/92e3a5af-5190-443d-a0d249ccacfcdb53.pdf [Accessed online 17/01/2019]
Advancing quality alliance (AQuA) Sepsis postcard (2016) https://www.aquanw.nhs.uk/resources/sepsis-key-facts/23050 [accessed online 17/01/2019]

CRP audit 2017

Total CRPs Lothian GPs (2017)	44,124
CRP results >200	266
CRP results >300	58

Cause of ↑ CRP (200-300 mg/dL) from GPs >6pm	
Sepsis	18
Malignancy	4
Inflammatory Illness	3
Other (terminally ill, post op)	4

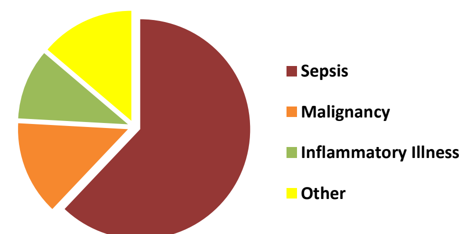

Figure 2. *Causes of raised CRP in Lothian GP samples 2017 (n=29).*

CRP re-audit May-Nov 2018

CRPs Lothian GPs (total 2018)	96,672
CRP results >200 (May-Nov 2018)	277
CRP results >300 (May-Nov 2018)	63

Cause of ↑ CRP (200-300 mg/dL) from GPs >6pm	
Sepsis	17
Malignancy	6
Inflammatory Illness	2
Other (terminally ill, post op)	6

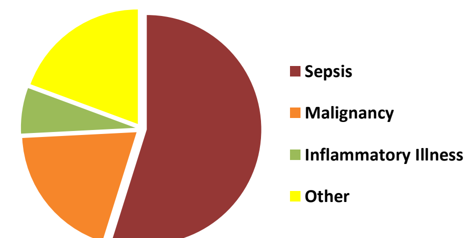

Figure 3. *Causes of raised CRP in Lothian GP samples May – Nov 2018 (n=31).*

Findings and Recommendations

Findings

- CRP requests have doubled since switch from ESR as first line inflammation marker
- Common causes of a high CRP are infection +/- sepsis, inflammatory conditions, malignancy. High CRP associated with sepsis must be communicated rapidly.
- There is no level of CRP at which sepsis can be ruled out.
- High proportion of patients with a CRP >200 (~25%) are admitted to hospital.
- Laboratory record review suggests there may be missed opportunities with some patient's developing severe sepsis prior to hospital admission.

Recommendations

- all CRPs >300 should be phoned ASAP as per the current FRCPath guidance.
- CRPs >200 from primary care should be reviewed by the duty biochemist
- For CRPs 200-300 DB reviews & decides if it needs phoned based on WCC (neutrophilia) and clinical details (e.g. sepsis/infection/rigors (phone) Vs inflammatory arthritis, malignancy, terminally ill (don't phone).

Impact

- Approx 25 calls per month to GPs across Lothian and 3 or 4 calls per month to LUCS (of which 2 would be CRP >300 and 1 or 2 would be CRP 200-300).

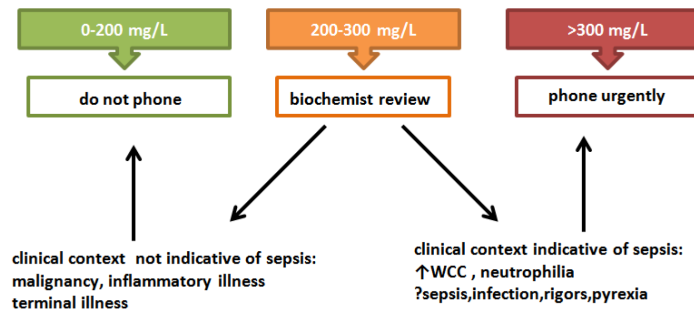

Figure 4. *Algorithm for phoneing of CRP result from primary care.*

Outcomes following implementation of changes

Days in hospital	pre change	post change
n =	9	9
Total	104	86
Average	10.4	8.6
Range	(1-48)	(2-21)
p value	0.34886	

Days to admission	pre change	post change
n =	9	9
Total days	47	12.5
Average	5.6	2.2
Range	(1-15)	(0.5-4)
p value	**0.03**	

Time to hospital admission has reduced following implementation of the recommendations