

Use of Procalcitonin in critical care unit as a guide to antibiotics use in COVID-19 patients.

Dr Ikenga Chidiebele, Dr Avinash Jha.

Department of Intensive Care Unit, Royal Preston Hospital, Lancashire Teaching Hospitals Foundation Trust, Lancashire. United Kingdom.

INTRODUCTION

- At the start of the pandemic first wave in March 2020, it was observed the usual markers of infection like the White blood cells (WBC) and C-reactive proteins (CRP) were also much elevated in patients in Covid-19 patients too.
- This made it difficult to differentiate the viral response from bacterial co-infection which were often present in patients.
- It meant that at the initial couple of months, the patients admitted in hospital with covid 19, were often placed on antibiotics for a long time.
- This led to our center in those early stages commencing on use of Procalcitonin (PCT) as a possible guide for antibiotics use.
- Procalcitonin (PCT) is a biomarker used to predict likelihood of bacteria infection. It is a 114 amino acid peptide precursor of calcitonin hormone.
- In absence of infection, Gene expression down regulated and restricted to neuroendocrine glands.. This lead to regulated Peptide secretion and no increase in procalcitonin.
- The reverse occurs In presence of bacterial infection where gene expression is unregulated.

OBJECTIVES

- Evaluate the use of Procalcitonin (PCT) as a guide of antibiotics use.
- Evaluate the correlation between procalcitonin and other inflammatory markers.
- Evaluate the use of PCT trend in determining the continuation and de-escalation of antibiotics and relationship to outcome.
- To evaluate if the trust guidelines on PCT use is being followed.

METHODS

- Retrospective study.
- Reviewed data of Covid-19 patients admitted in ICU from 3rd march to 1st June, 2020.
- Initially at the start of Covid-19, PCT test was not readily available and its use restricted to ICU and emergency department.
- PCT became very available for more widespread use in ICU and hospital.
- The study population were grouped into 2 groups of patients
 - Those that did not have PCT done (this were patients during the start of the pandemic when PCT tests were not readily available)
 - The group that had PCT tests done during their stay in the critical care unit.
- Study done between 6th June and 15th Aug, 2020.
- Medical records obtained from the hospital's medical online system Quadramed and allied records
- Data collection with Excel
- Statistical analysis with STAT Direct

- Data from 53 patients were used in this study.
- They were categorized into PCT and non PCT groups with 25 patients belonging to the PCT group.
- A total of 106 PCT tests done on the 25 patients. 15 patients from the PCT group continued antibiotics till either discharge from ICU or death.
- Patients from the non PCT group continued antibiotics until discharge from unit or death.
- There were positive correlation between PCT and Inflammatory markers in the PCT group.
- There was a correlation between rise in PCT and positive culture after septic screens.
- There is a significant difference in duration of antibiotics use in both groups with calculated p value of 0.0085.
- There was no significant difference in mortality across both groups.
- In the PCT group, 92% of patients hospital guidelines on the use of PCT and de-escalation of antibiotics were followed.

CONCLUSION

- The Audit achieved all its set objectives
- There was good compliance with trust antibiotics guidelines and PCT use..
- Observed Correlation between measured inflammatory markers and PCT.
- Significant relationship between reduced duration of antibiotics and PCT use

LIMITATIONS

- Small number of patients.
- A single center study which might limit the application of recommendations.
- An evolving disease with evolving management protocols.
- This was a snap shot of event in the first wave and likely to be different now with more widespread use of the procalcitonin test.

RECOMMENDATIONS

- The Procalcitonin test guidelines can be reviewed to give a clear suggestion on how frequent PCT can be done.
- Cost benefit evaluation of developing a protocol encouraging PCTs at particular points/stages in patient management in the unit..
- More widespread use of PCT test in the hospital to help reduce duration of antibiotics on patients with covid that are not in ICU.

POST AUDIT

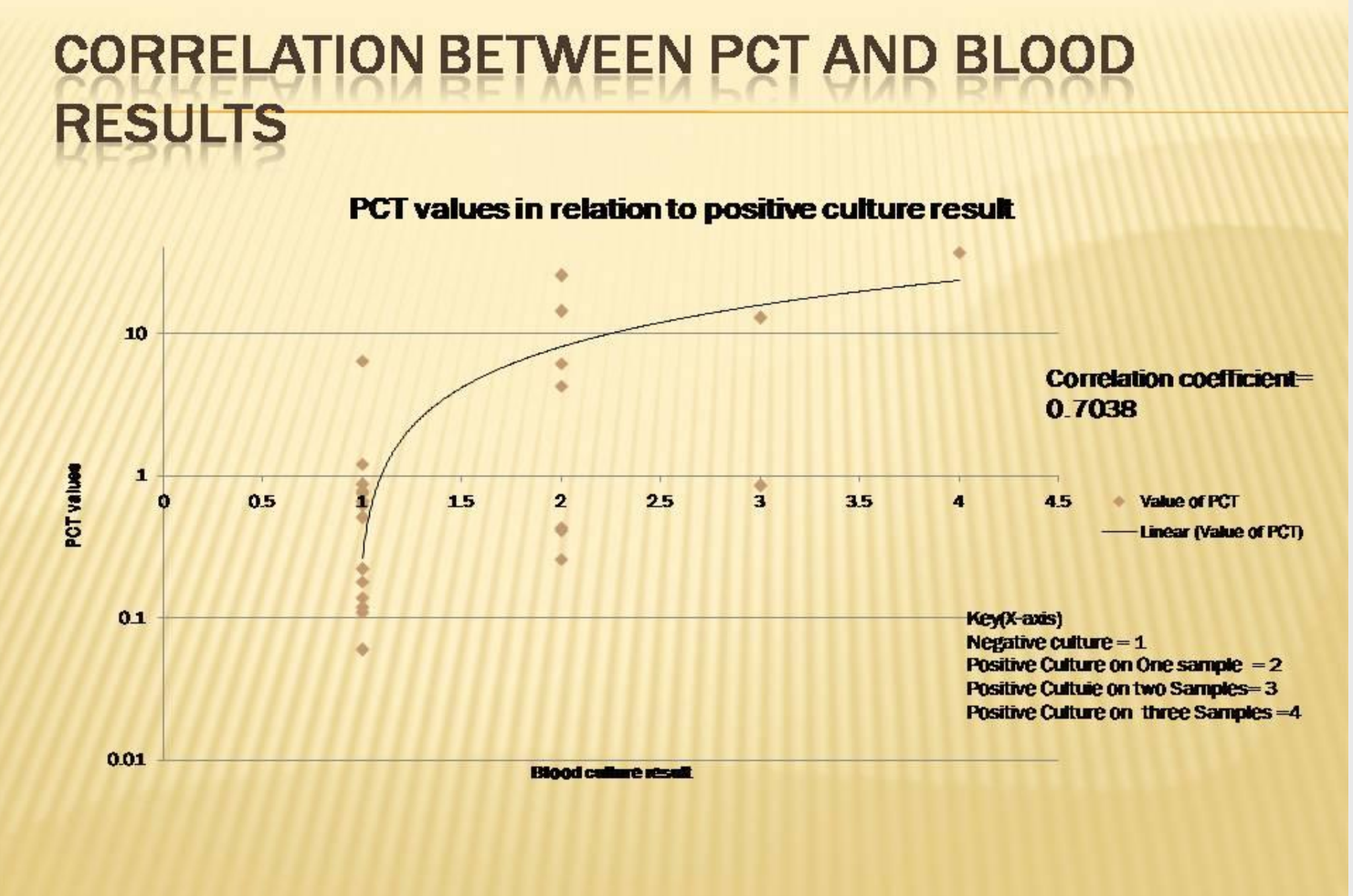
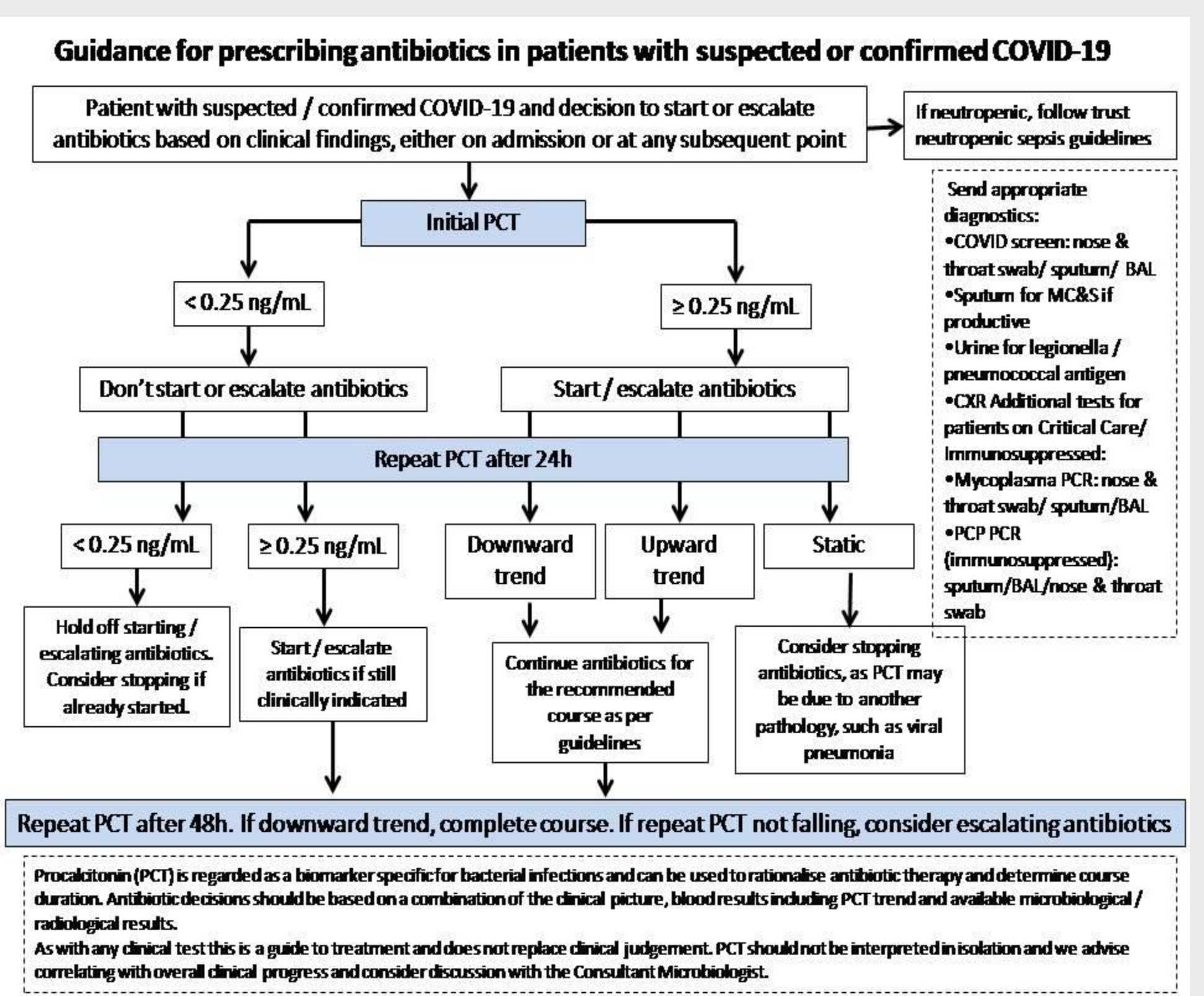
- Pro calcitonin test is now available for use in all parts of the hospital.
- The guideline has been updated to accommodate how frequent and who can order a pro calcitonin test in the hospital.

REFERENCES

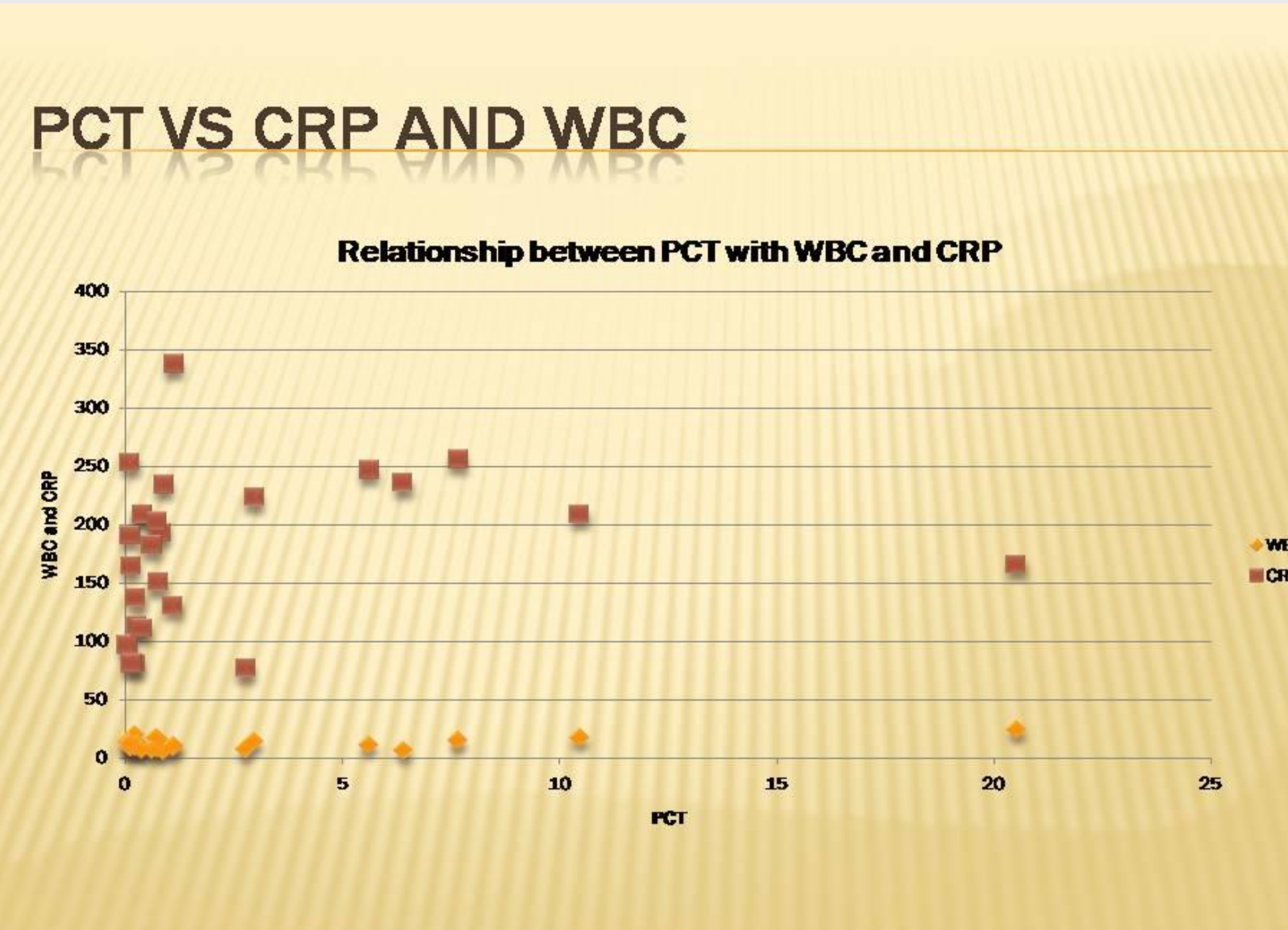
Christ-Crain M, Müller B. Procalcitonin in bacterial infections--hype, hope, more or less? *Swiss Med Wkly*. 2005 Aug 6;135(31-32):451-60PDF. Assessed on 30th, august 2020.

Mitsuma SF, Mansour MK, Dekker JP, et al. Promising new assays and technologies for the diagnosis and management of infectious diseases. *Clin Infect Dis*. 2013 Apr;56(7):996-1002full-text. Assessed on 20th August, 2020.

DynaMed Ipswich (MA): EBSCO Information Services. 1995 - . *Procalcitonin-guided Antibiotic Therapy*; [updated 2018 Nov 30, cited 30, August, 2020]. Available from <https://www.dynamed.com/topics/dmp~AN~T474234>.



RESULTS



PCT USE AND OUTCOME OF ICU STAY (DEATH/ TRIGGERED)

	PCT	No PCT
Discharged to the ward	14	17
Deceased	11	11

The chi-square test is 0.1208. The p-value is 0.7281. The result is **not significant** at $p < 0.05$.

