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### Evaluate the impact of polymerase chain reaction (PCR) rapid diagnostic testing on time to de-escalation of antibiotic therapy in methicillin sensitive staphylococcus aureus (MSSA) bacteremia

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## Background

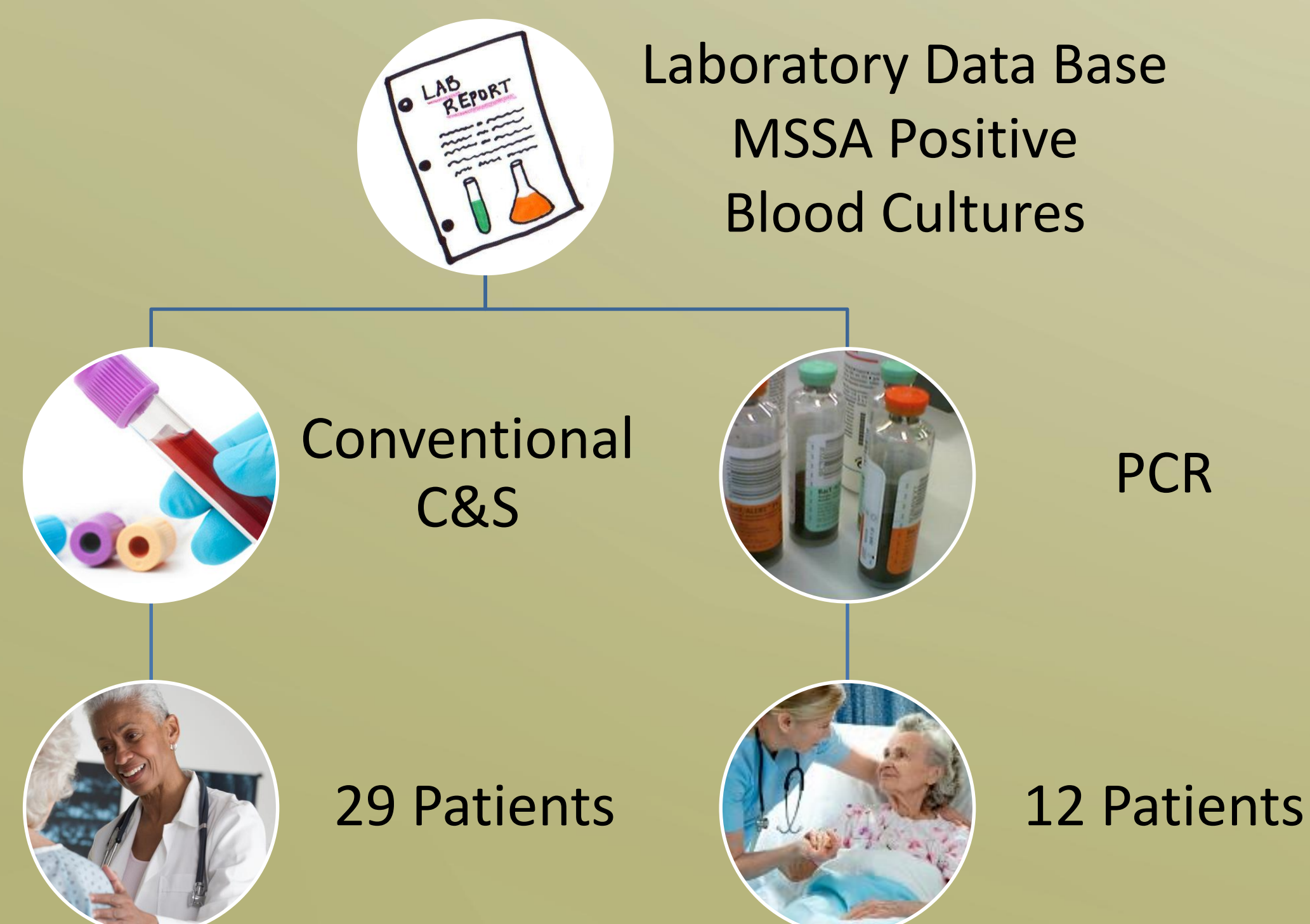
- Use of antimicrobials including broad-spectrum antibiotics has increased significantly over the years resulting in a rise in resistance.
- The Infectious Disease Society of America supports the use of rapid diagnostic testing to improve antibiotic utilization.
- Staphylococcus aureus (MSSA) and Methicillin-resistant Staphylococcus aureus (MRSA) are common pathogens that cause bloodstream infections.
- Vancomycin is often prescribed empirically until the strain can be identified and in cases of MSSA de-escalated to a more narrow spectrum antibiotic.
- Thus, rapid identification of staphylococcal species and methicillin susceptibility has important implications in guiding early optimal antibiotic therapy.

## Purpose

Determine if time to de-escalation of therapy is shortened when methicillin sensitive staphylococcus aureus (MSSA) is identified by rapid polymerase chain reaction (PCR) assay compared to the conventional method of organism identification by culture and sensitivity (C&S).

## Methods

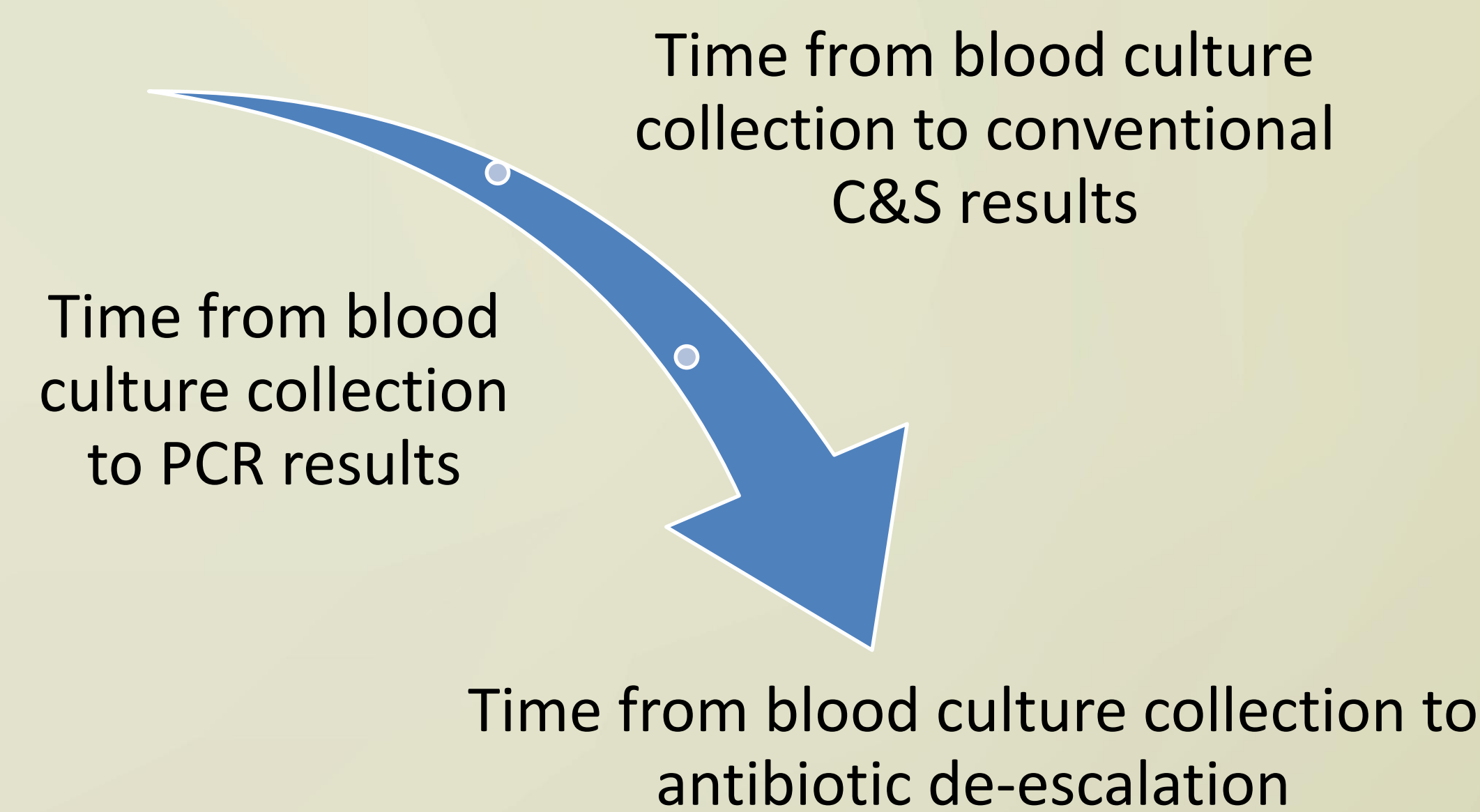
A quality assurance, retrospective cohort study was conducted. Blood cultures positive for MSSA species detected, by both polymerase chain reaction (PCR) rapid diagnostic testing and by conventional clinical microbiology procedures (C&S), were identified from the laboratory data base.



The electronic health record (EHR) was used to collect:

- Time of Blood Cultures Collection
- Time of PCR Results
- Time of Conventional C&S Results
- Time of antibiotic therapy de-escalation

Utilizing this data the following was calculated:



Interval in hours from culture collected to prescriber action was compared for PCR results to conventional C&S results.

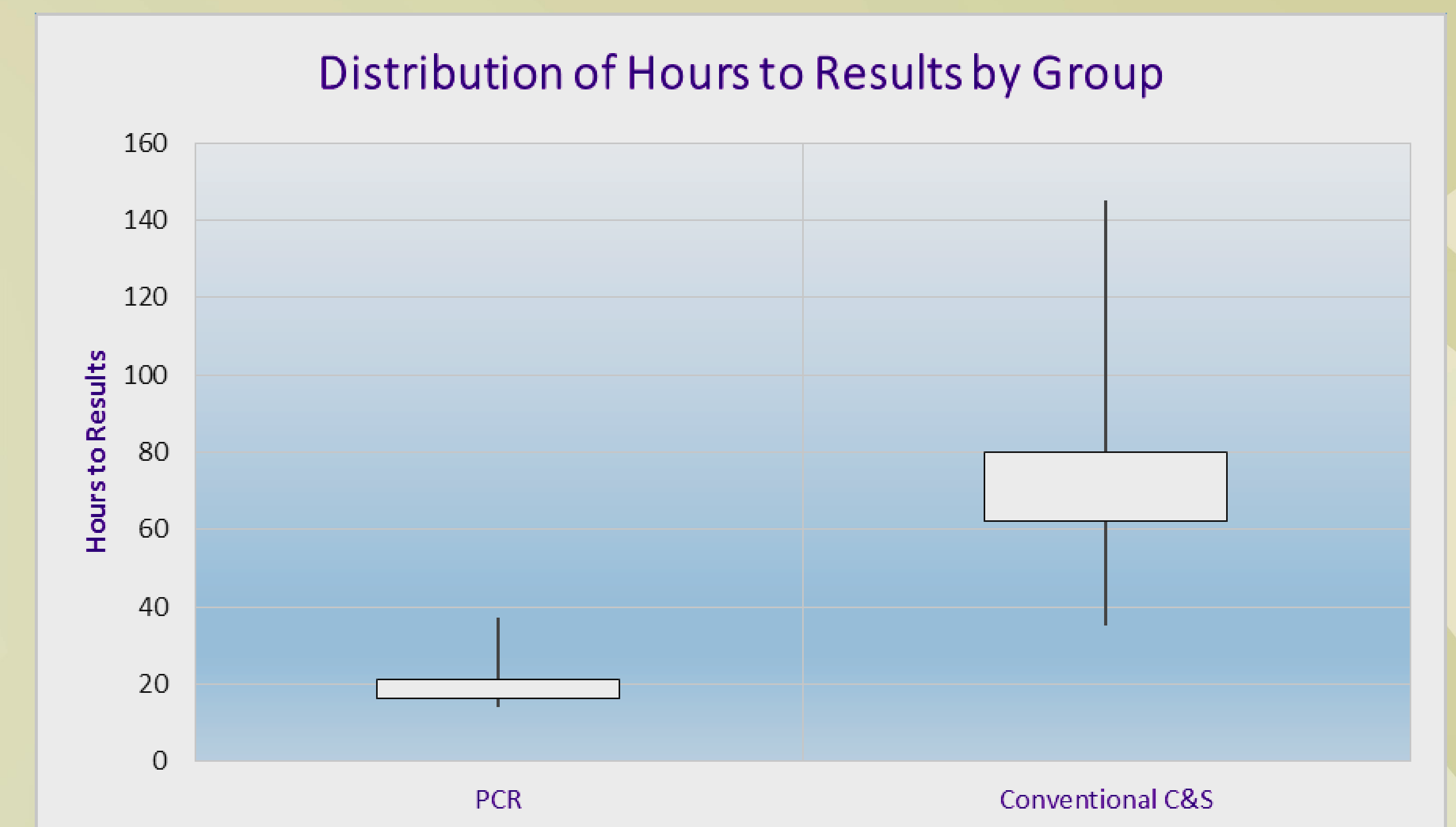
## Preliminary Findings

The table below shows the descriptive statistics for the 2 groups: Conventional C&S and PCR.

Group	Sample Size	Number de-escalated	Mean # of hours to results	Standard deviation	Median # of hours to results
Conventional C&S	29	19	75.4	±24.7	70
PCR	12	10	20.3	±6.1	19

The median time to results (compared using a Wilcoxon rank test) was significantly shorter in the PCR group compared to the Conventional C&S group ( $z = 4.234$ ,  $p < 0.001$ ).

Ten of the 12 cases (83.3%) in the PCR group were de-escalated to an antibiotic with narrower spectrum whereas 19 of the 29 cases (65.5%) for the Conventional C&S group were de-escalated. These two proportions (compared using a chi-square test) were not statistically significantly different between the two groups ( $\chi^2_{1df} = 1.301$ ,  $p = 0.254$ ).



The median time from culture collection to therapy de-escalation (compared using a Wilcoxon rank test) was significantly shorter in the PCR group compared to Conventional C&S group ( $z = 4.125$ ,  $p < 0.001$ ).

Group	Sample Size	Mean # of hours to de-escalation	Standard deviation	Median # of hours to de-escalation
Conventional C&S	17	101.4	±59.3	80
PCR	9	32.4	±12.9	30

## Conclusion

Preliminary data suggests a reduction in time to de-escalation of antibiotic therapy for methicillin sensitive staphylococcus bacteremias as a result of implementing PCR rapid diagnostic testing. However, more data is needed to successfully determine the impact on antibiotic consumption.

## Implications for Practice

- Improve time for optimal treatment of MSSA
- Reduce the unnecessary use of Vancomycin
- Decrease the resistance to antibiotics
- Decrease the use of broad-spectrum antibiotics

## References

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