Saving the Microbiome one Phlegm at a Time:
Sputum Collection in the ED for Patients Admitted with Pneumonia

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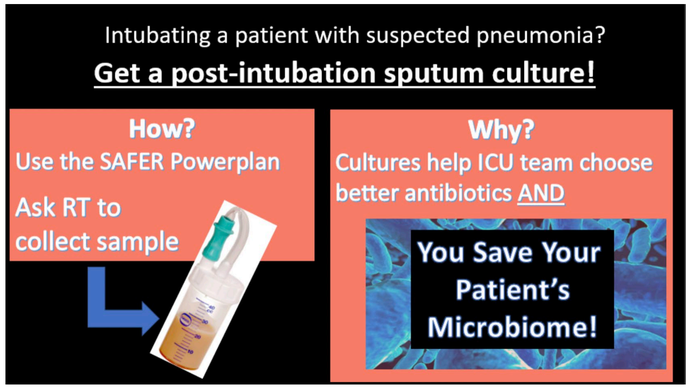
PROBLEM IDENTIFICATION

Patients brought into the Emergency Department (ED) with pneumonia who require admission often receive broad-spectrum antibiotics, due to high acuity and desire to cover an array of possible pathogens. While this is reasonable, broad-spectrum antibiotics come with potential harms to both the individual patient and the community at large, and efforts should be made to narrow coverage as soon as possible, usually informed by culture data and sensitivities. To this end, IDSA guidelines for hospital acquired pneumonia currently recommend antibiotic treatment based on culture data, over empiric treatment[1]. However, culture data takes time. Therefore, antibiotic stewardship efforts should include mechanisms to improve culture collection in the ED, usually the first point of patient-provider contact. Indeed, there is some evidence that sputum cultures obtained in the ED identifies a plausible pathogen in >50% of patients with community acquired pneumonia[2]. Furthermore, tracheal aspirate cultures drawn from endotracheal tubes that have been in place for some time may be more reflective of colonizing organisms rather than true pathologic infection. We aimed to improve the rate of collection of sputum samples in the ED for pneumonia patients requiring admission, and to evaluate whether this was helpful to inpatient teams or allowed sooner antibiotic de-escalation. This project was primarily focused on ICU-level patients requiring intubation, but we did also look at all admitted patients with presumed pneumonia.

METHODS

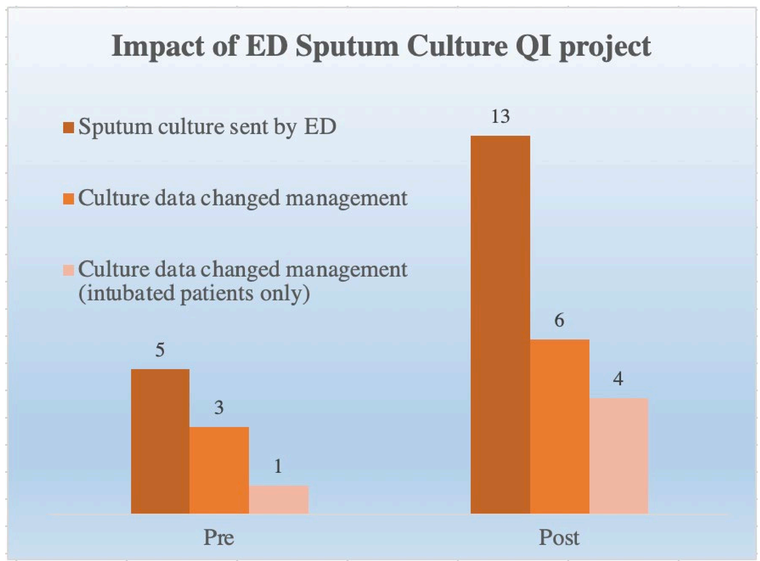
In the University of New Mexico ED, feasibility of obtaining sputum cultures in the ED was beta-tested by the resident author of this project, with assistance from respiratory therapy in obtaining cultures for intubated patients, and ED nurses for patients who were being admitted but not intubated. Presentations were given to ED residents and attendings on how and why to obtain sputum cultures for pneumonia patients upon diagnosis. Reminders were also created using ED resuscitation unit TV screen (pictured), by word-of-mouth and via resident group-chat. Data analysis is currently ongoing, involving data abstraction from Theradoc. Initial analyses as presented here were comparing number of ED sputum cultures drawn in a winter four-month period before intervention, versus the same four-month period one year after, following this intervention. Chart review was done on all cases to determine if culture data changed management, based on available documentation (this was done by a single author, who is an ER and ICU physician).

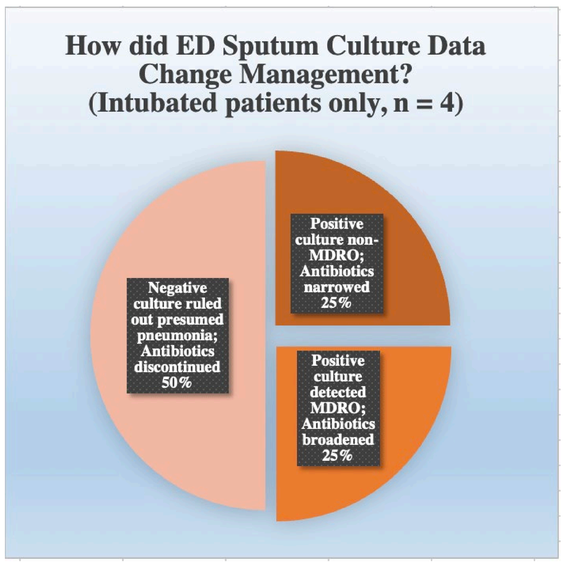


RESULTS

There has been a slight increase in sputum cultures drawn in the ED for patients admitted with pneumonia. Based on a single reviewer and a very limited single-center data set, it did appear that ED sputum culture data changed management in some cases (bar graph below). This continues to be true for patients requiring intubation and ICU admission. It did appear that increasing the number of sputum cultures drawn in the ED impacted patient care.

Chart review revealed that sputum data from the post-intervention time period impacted care in 3 ways (pie chart below): negative culture ruled out presumed pneumonia and prompted investigation of other pathology (2/4), positive culture allowed narrowing of antibiotics (1/4), positive culture identified MDRO and justified broader antibiotics (1/4).





CONCLUSIONS

Implementation of this quality-improvement project demonstrated that sputum collection in the ED for patients admitted with pneumonia is feasible, and provided some very limited but promising evidence that it is also safe and efficacious. Implementation of an education-based quality improvement project to ED residents and attendings increased number of sputum cultures drawn in the ED, when comparing two time periods before and after intervention. ED sputum collection did appear to change inpatient management in a select number of cases. It does not appear that there were any adverse events due to sputum collection during this project. It is likely that more appropriate antibiotic selection improves patient outcomes, however this data does not provide any evidence to answer this question due to lack of power. This project also did not answer whether collection of sputum culture in the ED is superior to inpatient collection. Further work is needed to determine whether sputum culture collection in the ED for admitted patients with pneumonia is connected to any patient-relevant outcome such as mortality or morbidity.

REFERENCES

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2. McCauley LM, Webb BJ, Sorensen J, Dean NC. Use of Tracheal Aspirate Culture in Newly Intubated Patients with Community-Onset Pneumonia. Ann Am Thorac Soc. 2016 Mar;13(3):376-81. Pirracchio R, Mateo J, Raskine L, et al. Can bacteriological upper airway samples obtained at intensive care unit admission guide empiric antibiotherapy for ventilator-associated pneumonia? Crit Care Med. 2009 Sep;37(9):2559-63

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