A Streamlined Pathway for Community-Acquired Pneumonia with Rapid Conversion to Oral Therapy Improves Healthcare Value

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Background

- Community acquired pneumonia (CAP) is a leading cause of hospitalization and death worldwide.
- Streamlined treatment advances for CAP are likely to translate to improved quality and reduced healthcare costs and include:
  - Early transition from IV to PO antibiotics
  - Shorter durations of antibiotics
  - Use of Procalcitonin to help distinguish patients with bacterial vs viral lower respiratory tract infection
  - Reducing the use of atypical coverage

Methods

Intervention
- Best practice alert (BPA) was created and is triggered when orders for a chest radiograph and an antibiotic are placed on a patient in the Emergency Department
- BPA asks for confirmation of antibiotic use for pneumonia and if confirmed an order set is provided
- The order set offers guidance on: appropriate triage, diagnostic testing, risk assessment for drug resistant pathogens, antibiotic selection
- Patients admitted to medical floors are given a single intravenous (IV) antibiotic dose, followed by automatic switch to oral antibiotics for a total duration of 5 days
- Atypical coverage with azithromycin is discontinued after 24 hours unless Legionella urine antigen returns positive

Phase 1
- Pre-implementation training and education was provided to providers, nurses, respiratory therapists and pharmacists

Phase 2
- The antimicrobial stewardship team performed prospective audit of patients on medicine floors and provided feedback on appropriate diagnostic testing and antibiotic use for patients with CAP. This was limited to "phase 2" as resources were redirected to other patients

Phase 3
- BPA alone

Table 1. Intervention Timeline

Intervention Phase	Time Frame	Intervention Description	Number of patients
Baseline	4/2016 - 3/2017		378
Phase 1	4/2017 - 9/2017	Education alone	161
Phase 2	10/2017 - 3/2018	Education + BPA + Active Stewardship	235
Phase 3	4/2018 - 9/2018	BPA alone	199

Decision support **pathways** combined with **stewardship** can improve health care **value**

Results

Table 2. Patient Demographics

Characteristic	Baseline	Phase 1	Phase 2	Phase 3	P-value
Age, years, mean (SD)	59.56 (18.76)	59.63 (18.76)	62.18 (18.14)	64.25 (17.03)	0.01
CCI, mean (SD)	3.9 (3.36)	4.17 (3.2)	4.57 (3.32)	4.74 (3.63)	0.01
CURB 65, mean (SD)	1.25 (1.04)	1.42 (0.97)	1.42 (1.04)	1.48 (1.02)	0.03

Table 3. Outcomes by phase

Outcome	Baseline	Phase 1	Phase 2	Phase 3
Length of stay, days, (95% CI)	4.93 (4.46-5.45)	4.72 (4.04-5.51), p=0.65	4.72 (4.16-5.36), p=0.61	4.9 (4.26-5.63), p=0.95
Days on IV Antibiotics, (95% CI)	3.48 (3.18-3.82)	3.3 (2.86-3.8), p=0.52	2.69 (2.4-3.02), p<0.01	2.93 (2.58-3.33), p=0.03
Atypical Duration, (95% CI), days	2.35 (2.18-2.53)	1.97 (1.76-2.2), p=0.01	1.91 (1.74-2.1), p<0.01	1.72 (1.56-1.91), p<0.01
Procalcitonin Order, (95% CI), %	0.48 (0.43-0.53)	0.54 (0.46-0.61), p=0.18	0.75 (0.69-0.8), p<0.01	0.66 (0.59-0.72), p<0.01
Cost per visit, (95% CI), normalized cost	1 (0.89-1.13)	0.86 (0.71-1.03), p=0.18	0.82 (0.7-0.95), p=0.04	0.91 (0.77-1.08), p=0.39
Mortality, (95% CI), %	0.06 (0.04-0.09)	0.06 (0.04-0.11), p=0.98	0.04 (0.03-0.08), p=0.28	0.04 (0.02-0.08), p=0.23
30-day readmission, (95% CI), %	0.13 (0.1-0.16)	0.11 (0.07-0.16), p=0.49	0.13 (0.09-0.17), p=0.99	0.13 (0.09-0.19), p=0.87

Conclusions

A multifaceted decision-support triggered CAP care pathway combined with antimicrobial stewardship

- Facilitated use of more narrow-spectrum antibiotic agents, with earlier transition from IV to oral therapy, and shorter durations of antibiotic therapy

- Was associated with significant cost-savings with no increase in readmissions or 30-day mortality with these changes

- Days on IV antibiotic therapy and costs rebounded after antimicrobial stewardship efforts were shifted to other areas, suggesting dedicated resources, ongoing stewardship, prospective audit and feedback are needed for sustained impact.

Acknowledgments

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