

Multi-Drug Resistant Pneumonia: A Clinical Pathway From Diagnosis To Resolution

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Background

•Advancement in antimicrobial therapy, lower respiratory tract infections and pneumonia are major causes of morbidity and mortality throughout the world and within the United States (American Thoracic Society, 2011; Halpape, Sulz, Schuster, & Taylor, 2014; Shindo et al., 2013; Shorr et al., 2013; Tedja, & Gordon, 2013; Zimlichman et al., 2013).

•The clinical impact of pneumonia created a major financial burden to both the patient and the healthcare industry. Thomas et al., in 2010 estimated that the United States healthcare system dedicates about seven billion dollars annually to the annual excess cost of hospital-treated pneumonia in the elderly fee-for-service Medicare population (Thomas et al., 2012).

•Pneumonia is associated with many negative outcomes from impairment in activities of daily living as well as with functional and cognitive impairment (Davydow, Hough, Levine, Langa, & Iwashyna, 2013).

•Health-care associated pneumonia had a mortality rate of 19.8%, noted to be significantly higher than community acquired pneumonia 10% (Kollef et al., 2005).

•According to the World Health Organization (WHO) the fourth leading cause of death in the world in 2012 was due to lower respiratory infections, comprising 3.1 million cases in total (“FastStats,” n.d.).

•CDC (2013) data reported the total number of pneumonia deaths as 53,282 annually, with 16.9 deaths per 100,000 yearly (“FastStats,” n.d.).

•The 2010 National Hospital Discharge data concluded that 37,000 of the annual deaths occurred in inpatient settings due to pneumonia (“FastStats,” n.d.).

Aim/Objectives

• The overall objective was to determine if the use of a high-risk MDR pathogen clinical pneumonia pathway would (a) reduce 30-day readmissions, and (b) reduce length of stay.

Theoretical Framework

• The guiding principle in healthcare is to prevent disease and promote health. Leavell and Clark proposed the Levels of Prevention Model in 1975 (“Models of Prevention,” 2012).

•Leavell and Clark’s model defined three different levels of prevention and included how to incorporate various preventative measures by promoting health and intervening at various points along the disease continuum to halt the disease process (Pandve, 2014).

•In Leavell and Clark’s model, the primary prevention level is focused on health education and promotion for people at risk (Pandve, 2014).

•Secondary prevention in those who are asymptotically sick, according to Leavell and Clark, involves early detection, diagnosis and early treatment (Pandve, 2014).

•In a symptomatically sick patient with pneumonia, the tertiary care hospital’s primary goal is to determine if that patient should be admitted and how that patient should be treated by utilizing a high-risk MDR pneumonia pathway (Pandve, 2014).

•Once a patient reaches the tertiary level of prevention the focus becomes delaying or preventing any further deterioration of a patient’s health. This is accomplished through ongoing medical treatment and rehabilitation to prevent complete disability (Pandve, 2014).

•This model encourages healthcare providers to recognize an illness or disease early with prompt treatment, which will allow for the prevention of communicable and complicated disease.

•This pathway is an example of an intervention that could halt the disease from progressing and could prevent further complications with the implementation of the necessary care and ongoing education, treatment, and future prevention (Pandve, 2014).

Methodology

• This study was a quasi-experimental non-equivalent posttest design with historical controls to assess the impact of a high-risk MDR pneumonia pathway on LOS and readmission rates among patients with high-risk MDR pneumonia presenting to the emergency department of an acute care health network of hospitals.

• The population of this study was all adult patients 18 years of age and older who had been admitted to the tertiary care hospital network in the northeastern United States with the primary or secondary diagnosis of pneumonia or APR-DRG 137 and 139. The HCAP and CAP patients were filtered out of these codes and fit into ICD 10 codes (A31.0, J13, J14, J15.1, J15.211, J15.212, J15.3, J15.4, J15.5, J15.6, J15.7, J15.9, J16.8, J18.0, J18.8, J18.9). The sample included every adult patient with the above-mentioned ICD 10 codes who had a definitive diagnosis of pneumonia, refined down to high-risk MDR pathogen pneumonia and those incorrectly diagnosed and treated as CAP.

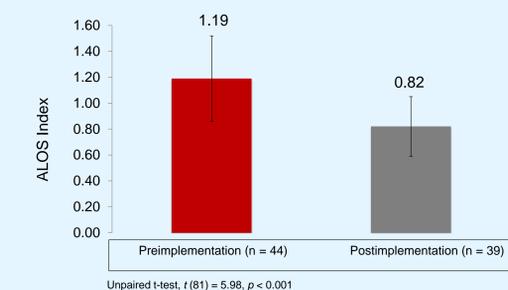
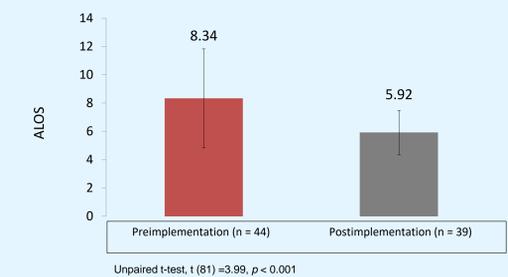
• Patients who had pneumonia ruled out within 48 hours of admission and had antimicrobial treatment discontinued due to low suspicion for high-risk MDR pathogen pneumonia were not included in the data analysis; however, these patients were recorded in order to exclude these data from the total pneumonia data set.

Results

Table 1. Comparison of Readmission from Pre to Post-implementation (N=83)

Variable	Time Period	
	Preimplem (n = 44)	Postimplem (n = 39)
Readmissions		
Yes	10 (29%)	8 (26%)
No	34 (61%)	31 (74%)

Chi Square Test (1,83) = 0.06, $p = 0.81$



Summary of Findings

- Readmission rate was slightly lower but not statistically significant.
- Post implementation ALOS and ALOS index were significantly lower than pre-implementation, thus findings were significantly significant.
- Did not have enough power for the decreasing readmission rate to reach statistical significance.

Practice Recommendations

- Although the concept of high-risk MDR pathogen pneumonia is still not clearly defined, the most recent literature reviewed indicated that the benefit of implementing such a pathway does have positive outcomes.
- Previously, under the HCAP guidelines, patients received a blanket diagnosis with a blanket treatment allowing for increased anti-microbial resistance, increased LOS due to little de-escalation, prolonged antimicrobial treatment, or inappropriate antimicrobial treatment.
- This study demonstrated that implementing a pathway/guideline results in some improvement in quality and consistency of care, helping to reduce the need to keep patients in an acute care setting for an extended period of time.
- These interventions may eventually reduce 30-day readmissions with improved adherence to the clinical pathway, lower costs, and lower morbidity from short stays.