

# A nurse-led clinical pathway reduced hospitalizations in nursing home residents with pneumonia

Loeb M, Carusone SC, Goeree R, et al. Effect of a clinical pathway to reduce hospitalizations in nursing home residents with pneumonia: a randomized controlled trial. JAMA. 2006;295:2503-10.

**Clinical impact ratings:** GIM/FP/GP ★★★★★☆ Hospitalists ★★★★★☆ Geriatrics ★★★★★☆ Infectious Disease ★★★★★☆ Pulmonology ★★★★★☆

**QUESTION**

In nursing home (NH) residents with pneumonia, is a nurse-led clinical pathway more effective than usual care for reducing hospitalizations?

**METHODS**

**Design:** Cluster randomized controlled trial.  
**Allocation:** Concealed.\*  
**Blinding:** Unblinded.\*  
**Follow-up period:** Up to 30 days.  
**Setting:** 22 NHs in Hamilton, Ontario, Canada.  
**Patients:** 680 NH residents ≥ 65 years of age (mean age 85 y, 70% women) who had ≥ 2 of new or increased cough, new or increased sputum production, temperature > 38 °C, pleuritic chest pain, and new or increased findings on chest examination. Residents with pulse ≤ 100/min, respiratory rate < 30/min, systolic blood pressure < 90 mm Hg, and oxygen saturation ≥ 92% who were able to eat and drink were included. Exclusion criteria were life expectancy < 30 days, history of anaphylactic or serious allergic reaction to fluoroquinolones, or advance directives precluding transfer to hospital. Inclusion criteria of NHs were ≥ 100 residents and no stated policies for pneumonia treatment. NHs located on the campuses of tertiary care centers were excluded.  
**Intervention:** Clinical pathway (10 NHs, n = 327) or usual care (10 NHs, n = 353). For the clinical pathway, residents with pulse ≤ 100/min, respiratory rate < 30/min, sys-

tolic blood pressure < 90 mm Hg, and oxygen saturation ≥ 92% who were able to eat and drink were treated with hypodermoclysis for dehydration and levofloxacin, 500 mg once daily for 10 days (reduced to 250 mg for residents with known renal insufficiency). If ≥ 1 of these criteria was not met, the resident was transferred to hospital. In the usual care group, physicians and NH staff made treatment decisions.  
**Outcomes:** Hospital admission. Secondary outcomes included mortality, health-related quality of life (the Minimum Data Set Health Status Index, range 0 [dead] to 1 [full health]), adverse events, and cost.  
**Patient follow-up:** 20 NHs (91%) and 661 residents (97%) (intention-to-treat analysis).

**MAIN RESULTS**

Residents in the clinical pathway group had a lower hospitalization rate than did those in

the usual care group (Table). Groups did not differ for mortality (Table), change in quality of life from baseline (Table), or adverse events (nausea, vomiting, diarrhea, or rash). Compared with usual care, the clinical pathway had an overall cost savings of U.S. \$1016 per resident (95% CI 207 to 1824).

**CONCLUSION**

In nursing home residents with pneumonia, a nurse-led clinical pathway was more effective than usual care for reducing hospitalizations.

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*For correspondence:* Dr. M. Loeb, McMaster University, Hamilton, Ontario, Canada. E-mail loebm@mcmaster.ca.

\*See Glossary.

**A nurse-led clinical pathway vs usual care in nursing home residents with pneumonia up to 30 days†**

Outcomes	Weighted event rates		Weighted ARR	NNT (CI)
	Clinical pathway (95% CI)	Usual care (CI)		
Hospitalization	8.0% (4 to 12)	20% (15 to 26)	12% (5 to 18)	9 (6 to 20)
Mortality	3.1% (-0.2 to 6.4)	6.0% (1.8 to 10.3)	2.9% (-2.0 to 7.9)	Not significant
			WMD (CI)	P value
Hospital d per resident	0.79 (0.45 to 1.13)	1.74 (1.17 to 2.3)	0.95 (0.34 to 1.55)	0.004
Change in quality of life from baseline‡	-0.032 (-0.044 to -0.019)	-0.037 (-0.050 to 0.023)	-0.005 (-0.022 to 0.012)	0.055

†WMD = weighted mean difference. Other abbreviations defined in Glossary; NNT and CI calculated from weighted ARR.  
 ‡Score range 0 (dead) to 1 (full health).

**COMMENTARY**

Respiratory infection is a common reason for transferring NH residents to hospitals, and little or no evidence exists that such transfers are beneficial. On the contrary, transfers may lead to reduction in quality of life, decline in functional status, and increased costs to the health care system.

The study by Loeb and colleagues made the appropriate statistical adjustments for randomization of NHs rather than individual patients, which many do not (1).

The results show that, at least in Canada, a clinical pathway for on-site treatment administered by a trained study nurse can reduce hospitalization of NH residents with pneumonia, without compromising outcomes. A previous study also showed that interventions to reduce hospitalization of NH residents with pneumonia were consistent with resident and family member preferences (2). Use of the pathway reduced hospitalizations by more than half and led to savings > U.S. \$1000 per patient. The use of specially trained nurses has similarly been shown to improve outcomes, while reducing hospitalizations and saving money, in the management of other clinical problems in older patients, including Alzheimer disease (3) and congestive heart failure (4). It should be noted that the

benefits of using mid-level practitioners and clinical pathways for common problems are not limited to older persons.

The authors estimated that use of the pathway could save > \$800 million per year in the United States. This is a tiny fraction of the U.S. health care budget, but as the late U.S. Senator Everett Dirksen allegedly said, "A billion here, a billion there, pretty soon it adds up to real money." Unfortunately, the current structure of the U.S. health care system does not provide financial incentives to implement such systems, so their future in U.S. health care is uncertain.

*Henry S. Sacks, MD, PhD  
 Mount Sinai School of Medicine  
 New York, New York, USA*

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