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Hospital discharge disposition of adults with invasive pneumococcal disease in a U.S. population

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Background: Invasive pneumococcal disease (IPD) is a group of severe medical conditions caused by *Streptococcus pneumoniae*, including meningitis, bacteremia and septicemia. There is limited information on the type and intensity of health care services following the acute hospitalization for IPD, which is addressed by this study.

Material/methods: Kaiser Permanente Northern California (KPNC) is an integrated and comprehensive health care system with approximately 3.5 million members annually. An active laboratory-based IPD surveillance in children and adults has been implemented in KPNC from May 2010 through April 2015, as a phase IV, post-marketing commitment with the United States Food and Drug Administration.

IPD cases were defined as an acute illness with a positive culture of *S pneumoniae* from a normally sterile site. We analyzed in-hospital case fatality rates and dispositions of acute hospitalizations when patients were discharged alive.

Results: There were a total of 2007 IPD cases in the KPNC population during the study period. Of them, 1801 (90%) occurred in adults ≥ 18 years of age. More than half (54%) of the IPD cases in adults occurred among those 18-64 years of age, with a hospital case-fatality rate of 7%. Among adult 18-64 years who survived hospitalization for IPD, 3.6% and 5.2% were discharged to an acute care setting or skilled nursing facility, and 8.8% required home care services.

Forty-six percent of IPD cases occurred in those ≥ 65 years of age, with a hospital case-fatality rate of 14.5%. Among those ≥ 65 years of age discharged alive from the hospital, 3.9%, 1.8%, and 21.6%, went to hospice care, another acute care facility, or a skilled nursing facility, and 17.8% required home care services.

Conclusions: IPD cases in adults caused substantial in-hospital mortality as well as intensive utilization of health services following hospitalization. As expected, case-fatality rates and utilization of health care services following hospitalization for IPD increased with age. However, adults aged 18-64 years still accounted for a large share of health services utilization. This study provides evidence that IPD patients often need expensive health care services extending beyond the discharge from the acute hospitalization. Many of the costs associated with those services are not routinely included when calculating direct medical care costs of patients with IPD.

Table 1. Disposition from Acute Hospitalization for Invasive Pneumococcal Disease among Adults in Kaiser Permanente Northern California, 2010-2015

Age Group	IPD Cases		Hospital Deaths		Discharged Alive		Disposition if Discharged Alive					
	Number	%	Number	Case Fatality Rate	Number	% of IPD Cases	Another Acute Care Facility	Hospice	Skilled Nursing Facility	Home	Home Care	Other*
≥ 18 - <50 Years	404	22%	18	4.5%	386	95.5%	4.1%	0.0%	1.3%	86.5%	5.2%	2.8%
≥ 50 - <65 Years	563	31%	50	8.9%	513	91.1%	3.1%	0.4%	8.2%	74.5%	11.5%	2.3%
≥ 18 - <65 Years	967	54%	68	7.0%	899	93.0%	3.6%	0.2%	5.2%	79.6%	8.8%	2.6%
≥ 65 - <80 Years	490	27%	47	9.6%	443	90.4%	2.3%	2.3%	16.7%	61.6%	15.6%	1.6%
≥ 80 Years	344	19%	74	21.5%	270	78.5%	1.1%	6.7%	29.6%	40.7%	21.5%	0.4%
≥ 65 Years	834	46%	121	14.5%	713	85.5%	1.8%	3.9%	21.6%	53.7%	17.8%	1.1%
Total Adults	1,801	100%	189	10.5%	1,612	89.5%	2.8%	1.9%	12.5%	68.2%	12.8%	1.9%

Note: **"Other" includes patients discharged to other health care facility and those who left against medical advice.