

# Disposition of Adults with Invasive Pneumococcal Disease in a US Population

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\*This Presentation Is Dedicated to the Memory of

**Roger Baxter, M.D. (6/14/52 - 12/20/2016)**

# Disclosures

Suaya JA, Jiang Q, Sings HL, McLaughlin J, Center KJ, Isturiz R, Swerdlow D are Pfizer employees and may be shareholders

Yee A and Aukes L are employees of Kaiser Permanente and have no conflicts of interest to disclose

# Objective and Rationale

- ④ Invasive pneumococcal disease (IPD) is a group of severe medical conditions including meningitis, bacteremia and septicemia caused by *Streptococcus pneumoniae*
- ④ There is limited information on the type and intensity of health care services following initial diagnosis of IPD
  - Cost of many of services such as hospice and skilled nursing facility (SNF) are usually not integrated into economic burden of IPD
- ④ This study assesses IPD cases disposition of adults in Kaiser Permanente Northern California (KPNC) population

# Setting: KPNC, 1

- ⦿ Integrated health care delivery system with 54 clinics and 22 hospitals in greater San Francisco Bay area
- ⦿ About 4M members (3.5M adults)
- ⦿ Membership representative of general population in Northern California
- ⦿ Members receive almost all medical care at KPNC facilities

## Setting: KPNC, 2

- ⦿ Members with a unique medical record number for life
- ⦿ Electronic medical records and all health care utilization data linked:
  - Settings (outpatient, emergency room, inpatient), diagnoses, lab testing, imaging, procedures, vaccination, etc.
- ⦿ Single central microbiology laboratory

# IPD Surveillance Study

- Led by Kaiser Permanente Vaccine Study Center
- Active laboratory-based IPD surveillance
- Specimens serotyped by Boston University
- This analysis was restricted to IPD in adults  $\geq 18$  years from May 2008 through April 2015

# IPD Case Definition

- ⦿ Acute illness with a positive culture of *S. pneumoniae* from a normally sterile site
- ⦿ Sterile sites for specimen identification included:
  - Blood
  - Cerebrospinal fluid (CSF)
  - Pleural fluid
  - Other (e.g., peritoneal, pericardial, or joint fluid, etc.)
- ⦿ Unique IPD case if *S. pneumoniae* identified in a new specimen separated by a period of 14 days

# Disposition Categories

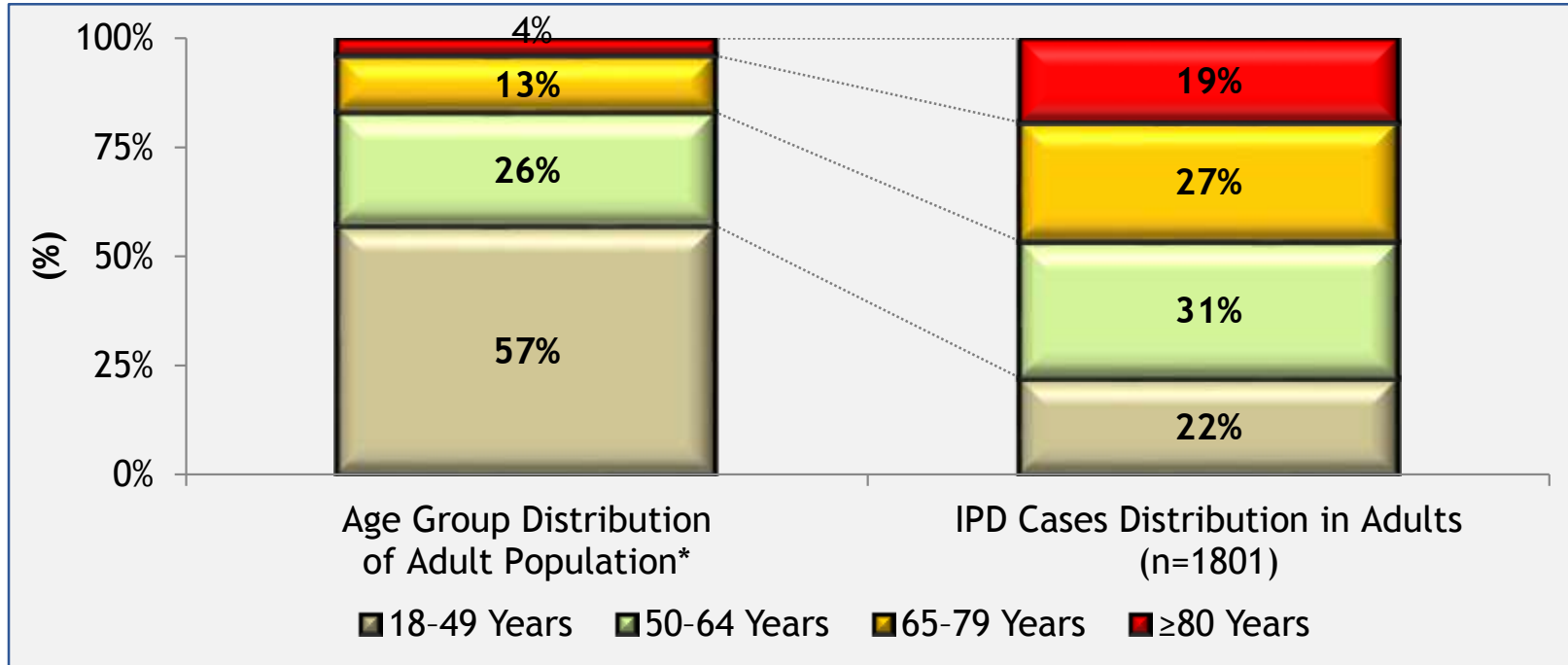
- ⦿ Based on the disposition linked to the most complex care received during the diagnosis and treatment of the IPD case:
  - ⦿ Died in Emergency Room or during hospitalization: in-hospital fatality
  - ⦿ Disposition to:
    - ⦿ Hospice
    - ⦿ Skilled nursing facility (SNF)
    - ⦿ Home with home health care
    - ⦿ Home (routine discharge)
    - ⦿ Another acute care facility
    - ⦿ Other: To other health care facility or left against medical advice



# Analyses

- ⦿ Adults stratified by four age groups: 18-49, 50-64, 65-79, and  $\geq 80$  years of age
- ⦿ Estimations
  - IPD cumulative incidence rates by age groups
  - IPD incidence rate ratios compared to 18-49 years age group
  - Disposition rates by age groups
  - Risk ratios of disposition categories compared to 18-49 years age group
- ⦿ Alpha level for rate ratios and risk ratios=0.05

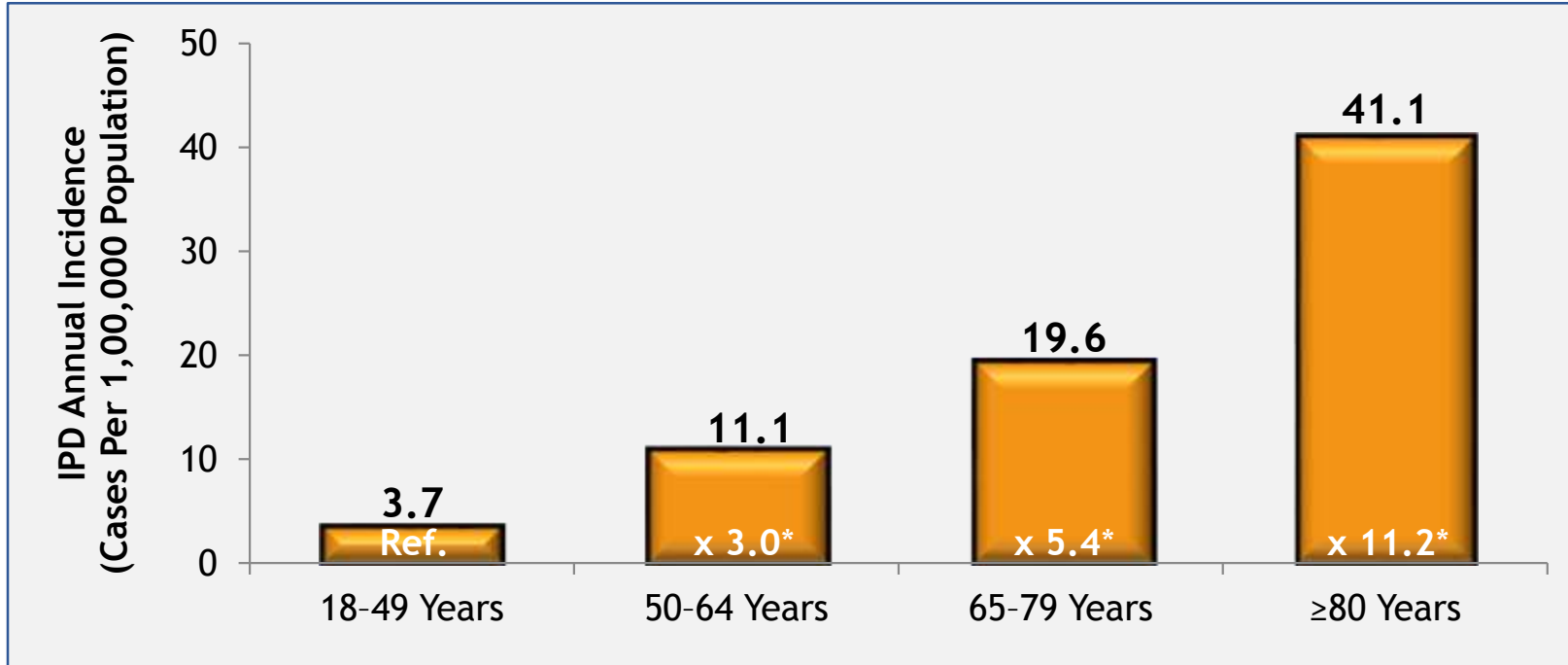
# IPD Cases in Adults by Age Group



Distribution of IPD cases in older adults larger than population share

\*Annual average adult members during study period: 2.78M

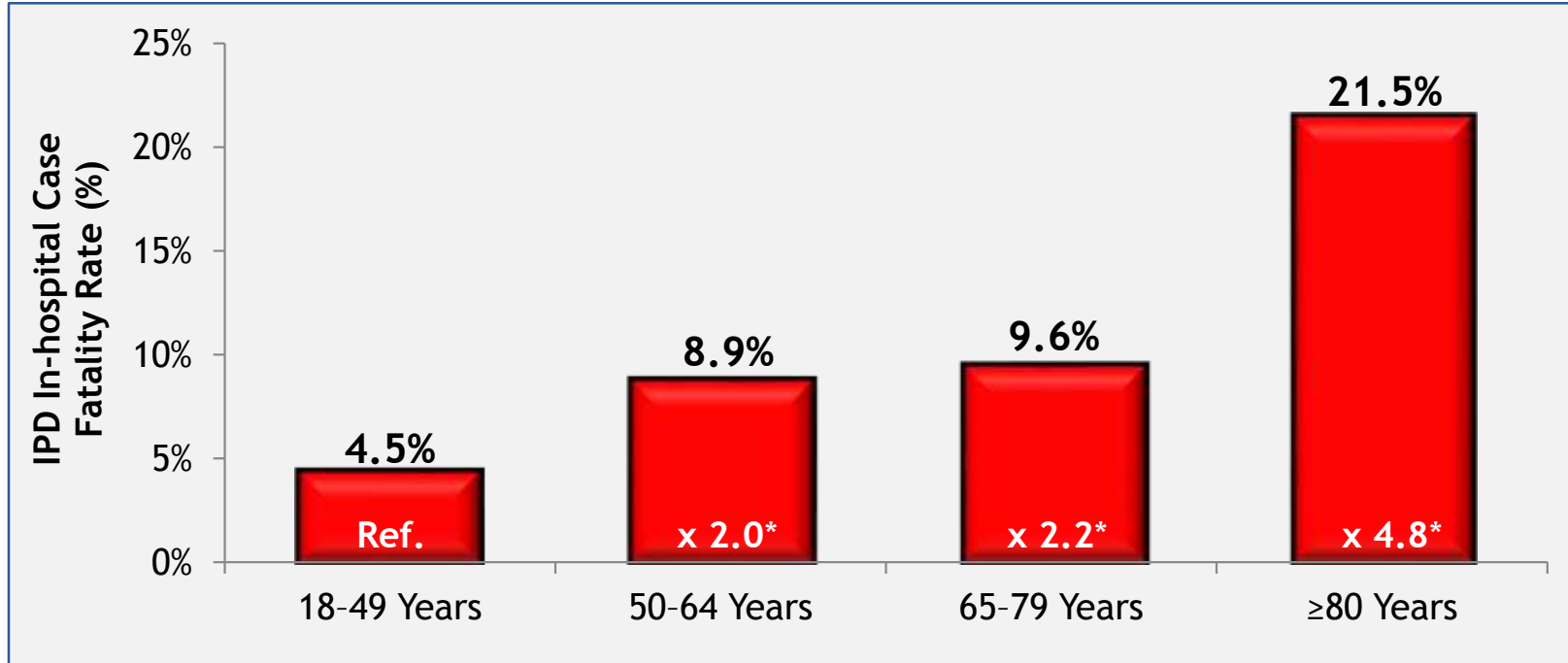
# IPD Incidence by Age Group



IPD incidence increased with age

\* P<0.05.

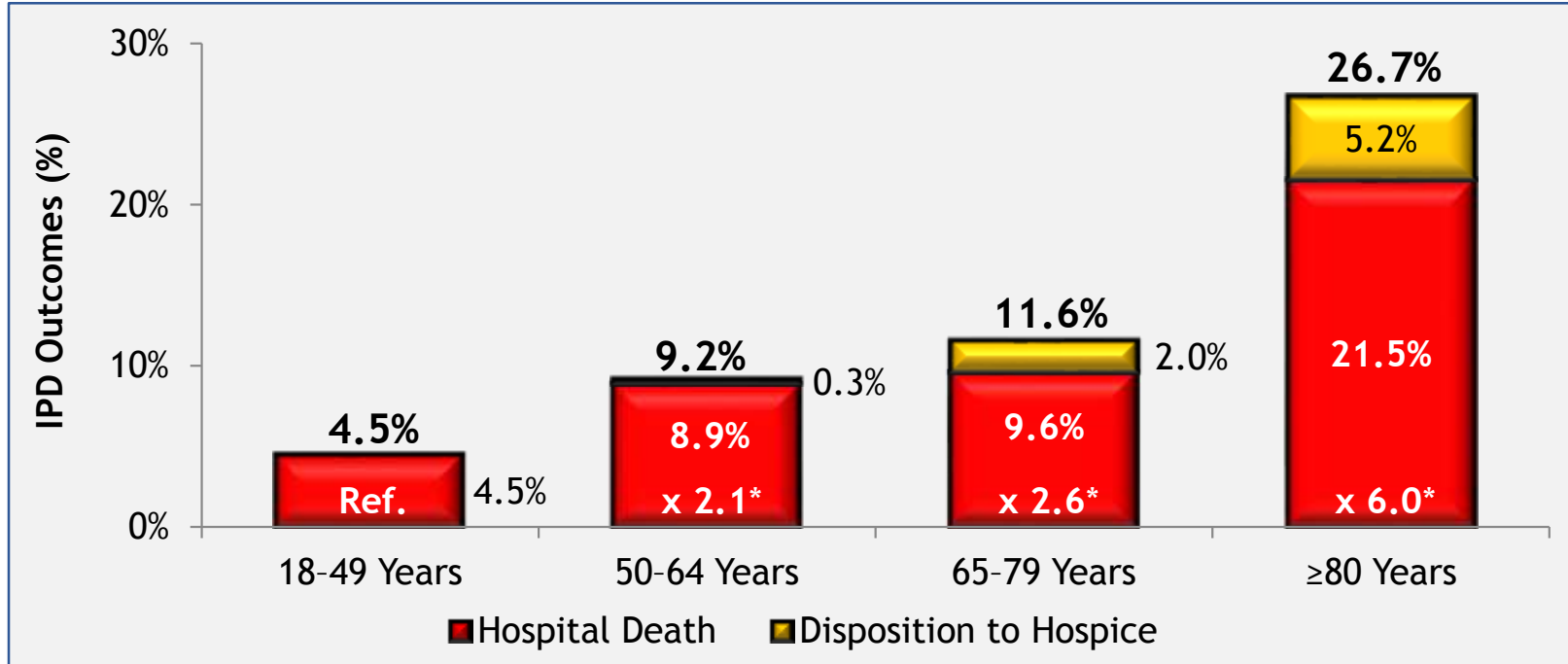
# IPD In-Hospital Case Fatality Rate



IPD case fatality rates increased with age with peak of 20% in ≥80 years

\* P<0.05.

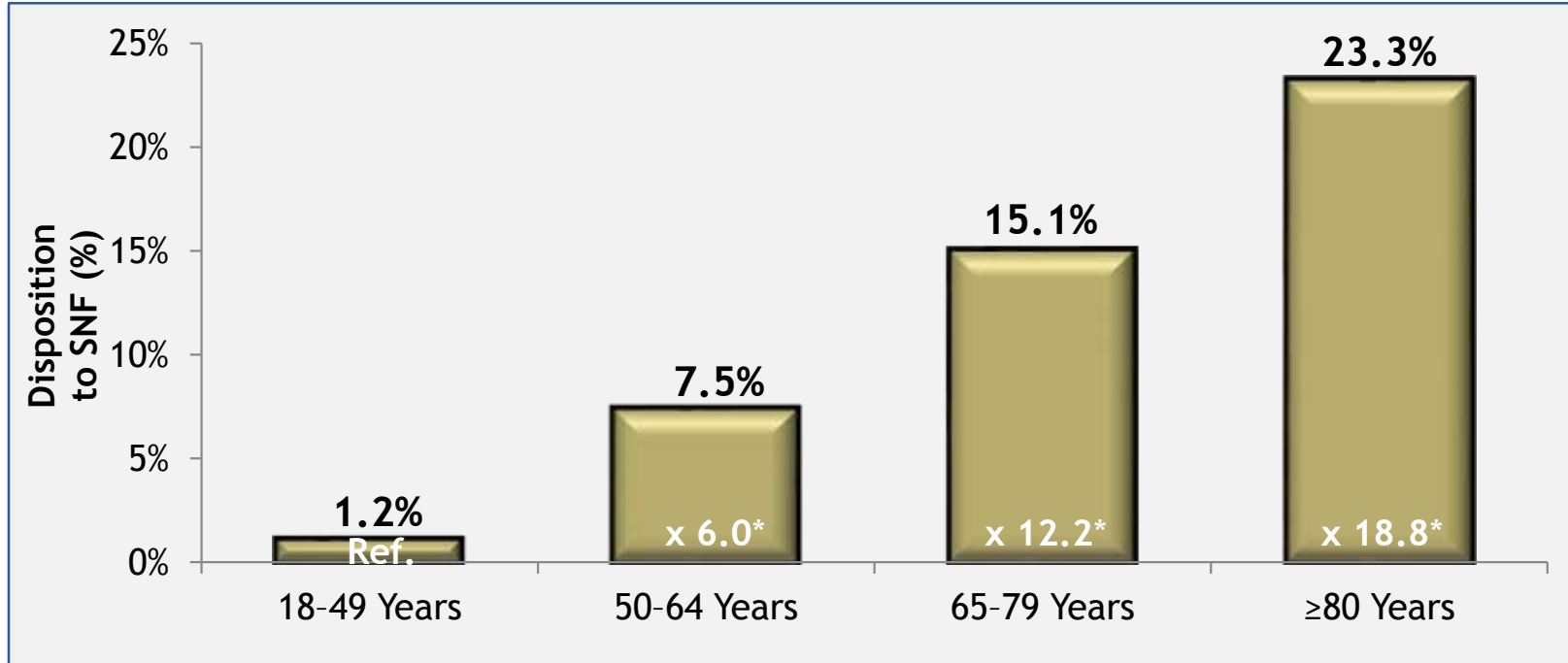
# IPD Patient In-Hospital Death or Disposition to Hospice



1 in 4 IPD case in ≥80 years resulted in death or disposition to a hospice

\* P<0.05.

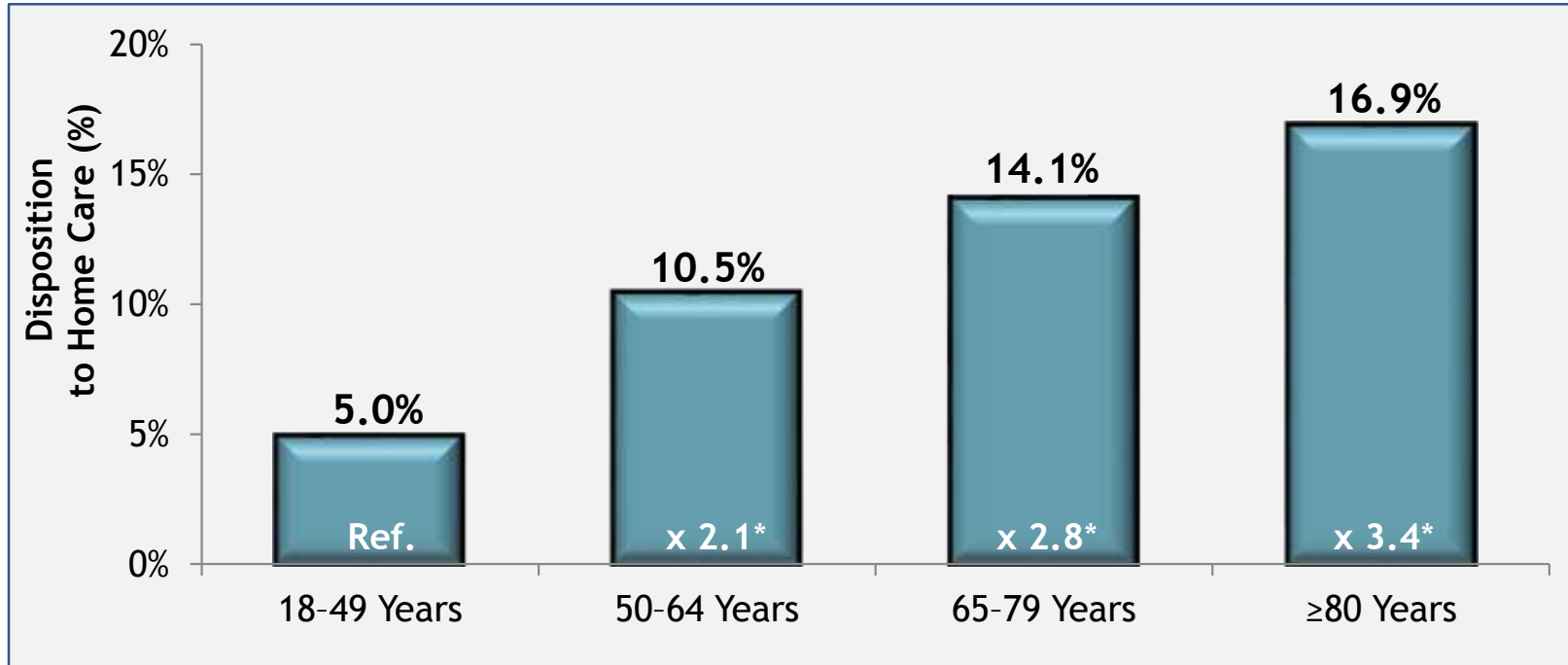
# IPD Patient Disposition to SNF



IPD disposition to a SNF increased with age; 1 of 4 in ≥80 years

\* P<0.05.

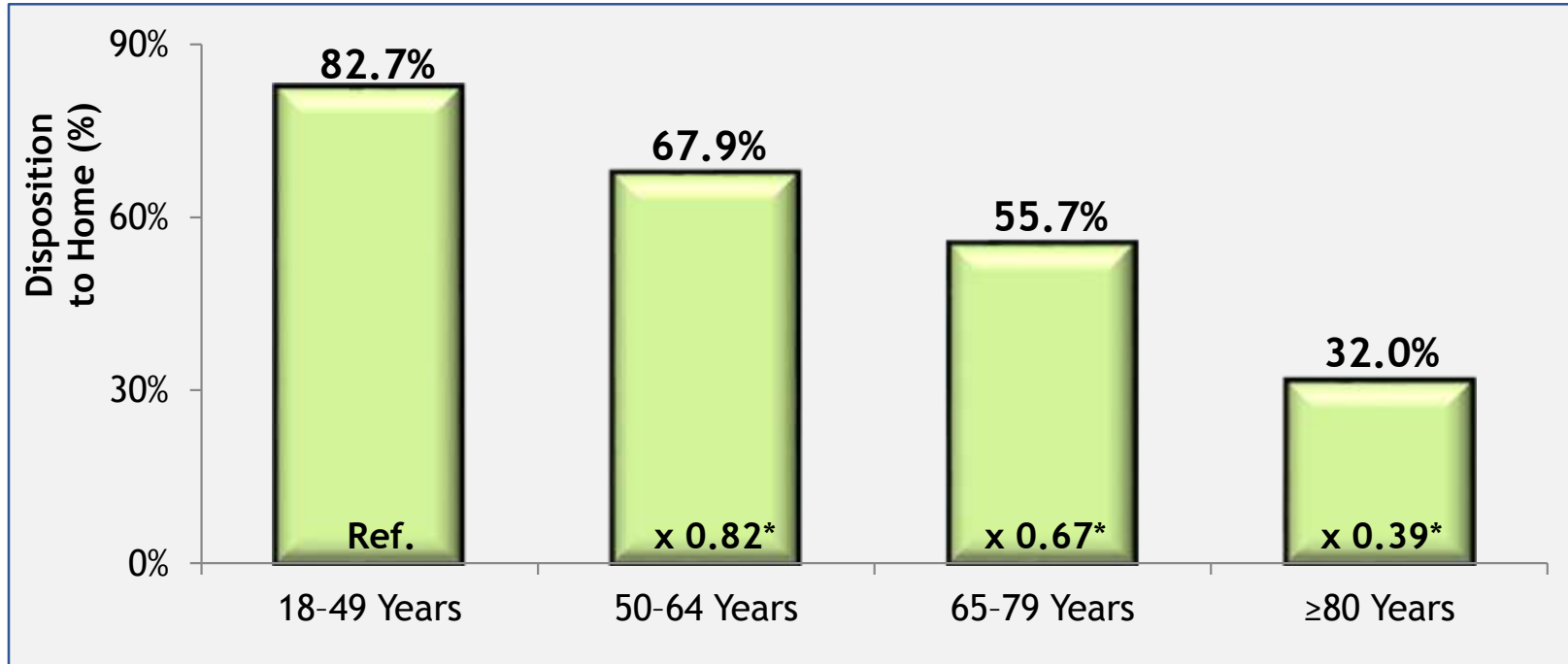
# IPD Patient Disposition to Home with Health Services (HHS)



Disposition to HHS increased with age ranging from 5% to 17%

\* P<0.05.

# IPD Patient Disposition to Home

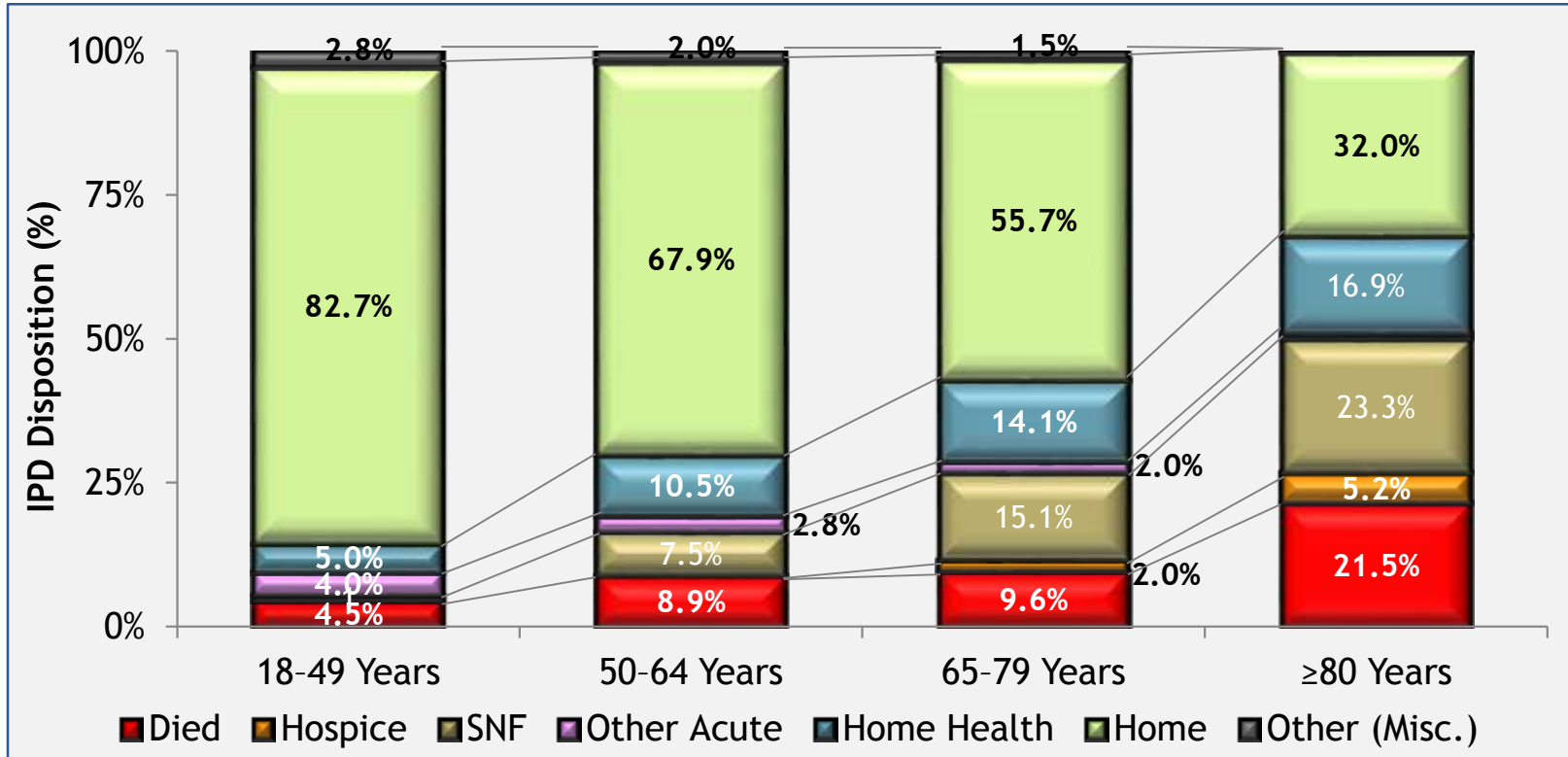


Disposition to home decreased with age ranging from 83% to 32%

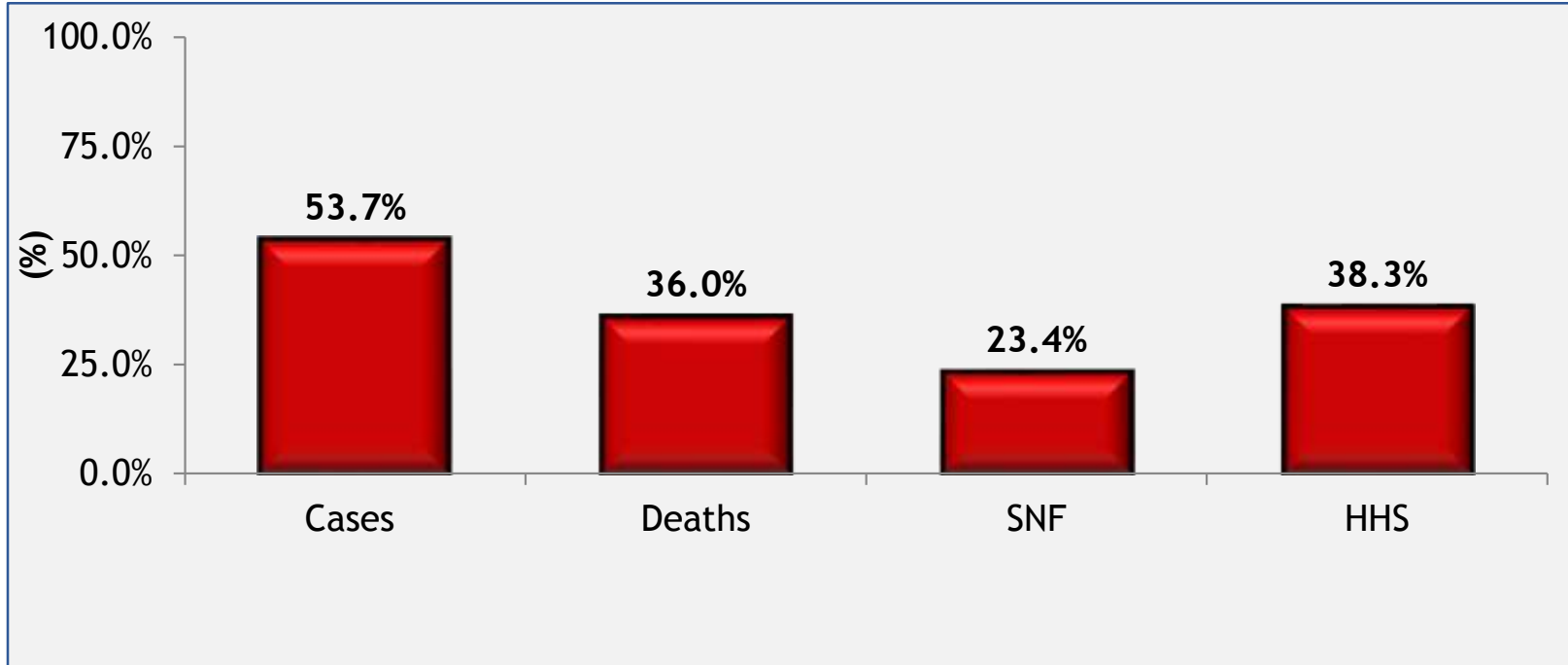
\* P<0.05.



# IPD Patient Disposition by Age Group



# IPD Burden in 18-64 Years



Adults 18-64 years account for a significant share of burden imposed by IPD

# Limitations

- ⦿ Generalizability to populations without health insurance, other health care delivery systems, or other regions of U.S. may be challenging
- ⦿ While disposition of IPD cases was known, intensity of complex services (e.g. days in hospice, or in SNF) was not assessed
- ⦿ Cost estimates were not sought
- ⦿ Count of IPD cases of population coming from SNF was not obtained

# Conclusions

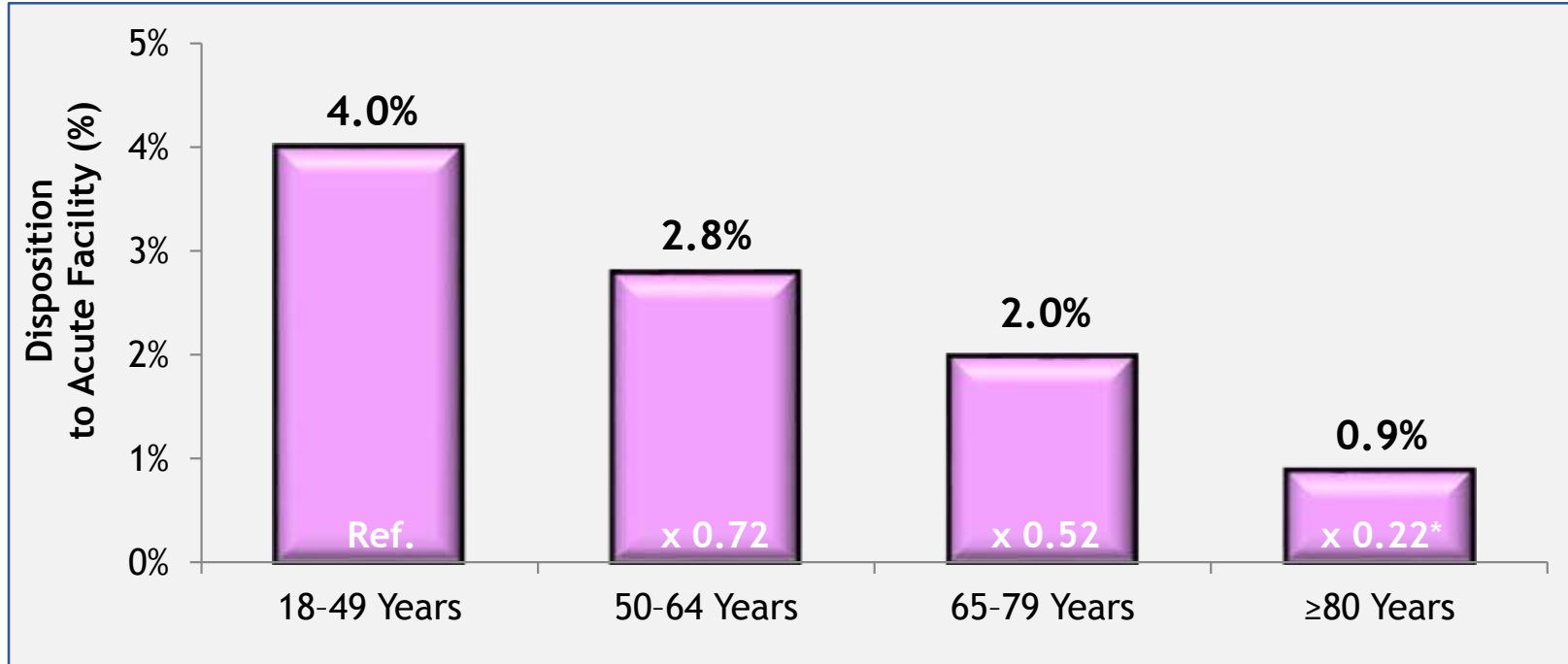
- ◉ IPD in adults increases with age and has severe consequences as measured by mortality and disposition to hospice, SNF and to other complex services
- ◉ Still a large share of the IPD cases and their consequences are in population aged 18-64 years
- ◉ When determining the economic burden of IPD and the value of pneumococcal vaccination, the costs associated with these consequences should be taken into account

# Acknowledgement

- ⦿ Ronika Alexander (Pfizer) for project support
- ⦿ Nicola Klein, Kaiser Permanente Vaccine Study Center

# Back-up

# IPD Disposition to Other Acute Care Facility



Disposition to other acute facility decreased with age ranging from 4% to 0.9%

\* P<0.05.