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New perspectives on community-acquired pneumonia in 388,406 patients.

Results from a nationwide mandatory performance measurement program in healthcare quality

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ABSTRACT

Background. The database of the German program for quality in healthcare including data of every hospitalized patient with community-acquired pneumonia (CAP) during a two year period (n = 388,406 patients in 2005 and 2006) was analyzed.
Methods. Endpoints of the analysis were: 1) incidence 2) outcome 3) performance of CRB-65 score in predicting death 4) lack of ventilatory support as possible indicator of treatment restrictions. The CRB-65 score was calculated resulting in three risk classes (RC).
Results. The incidence of hospitalized CAP was 2.75 and 2.96 per 1,000 inhabitants/year in 2005 and 2006, respectively, higher for males (3.21 versus 2.52), and strongly age-related, with an incidence of 7.65 per 1,000 inhabitants/year in patients aged ≥ 60 years over two years. Mortality (13.72 and 14.44%) was higher than reported in previous studies. The CRB-65 risk classes (RC) accurately predicted death in a three class pattern (mortality 2.40% in CRB-65-RC 1, 13.43% in CRB-65-RC 2, and 34.39% in CRB-65-RC 3). The first days after admission were consistently associated with the highest risk of death throughout all risk classes. Only a minority of patients who died had received mechanical ventilation during hospitalization (15.74%).
Conclusions. Hospitalized CAP basically is a condition of the elderly associated with a higher mortality than previously reported. It bears a considerable risk of early mortality, even in low risk patients. CRB-65 is a simple and powerful tool for the assessment of CAP severity. Hospitalized CAP is a frequent terminal event in chronic debilitated patients, and a limitation of treatment escalation is frequently applied.

INTRODUCTION

In the last two decades, considerable progress has been made in the investigation of community-acquired pneumonia (CAP), e.g. in the understanding of severity assessment, underlying pathogen patterns, and the importance of rapid initiation of appropriate empiric antimicrobial treatment. These are reflected in current authoritative guidelines for the management of adult CAP from the US and Europe (1-4). Nevertheless, only few widely representative data are available reflecting the clinical presentation and outcome of patients with CAP in real life, and only few studies are based on large databases derived from hospital chart records (5-7). Since 2005, CAP was included in the nationwide mandatory perpetual performance measurement program in Germany. The National Institute for Quality in Healthcare (BQS) is responsible for inpatient quality assurance in the German health care system on behalf of the Federal Joint Committee (Gemeinsamer Bundesausschuss) and the ministry of health. BQS together with national specialty groups develops mandatory quality assurance programs covered by the German Social Code, collects and analyzes data sets of all German hospitals (more than 2,000). The CAP performance program obligates all hospitals in Germany to document all in-hospital patients with CAP on a predefined quality report sheet (8, 9). After two years, the database from this performance measurement program offers a unique opportunity to report on the results of all adult patients (≥ 18 years) in Germany treated in hospital with CAP in particular regarding epidemiology, attitudes of management, and outcomes.

METHODS

Database

The data items required for the nationwide performance measurement program were defined by the specialty group on CAP together with BQS. A case of CAP was identified by encoding pneumonia without severe immunosuppression (HIV-infection, solid organ or bone marrow/stem cell transplants, severe neutropenia) as the principal diagnosis of hospital admission. The underlying ICD-Codes (ICD-10–German modification (GM)) used for in- and exclusion of cases are given in appendix 1 (online supplement). These codes clearly exclude acute bronchitis and exacerbations of COPD. Patients transferred from another hospital had to have CAP as initial admission diagnosis to be included. Rehabilitation facilities in Germany are not hospitals and pneumonia acquired in these facilities was therefore considered community-acquired. Malignancies were not excluded because they do not represent severe immunosuppression per se, even during treatment, unless there is severe neutropenia which in turn represents an exclusion criterion. Aspiration pneumonia was included since it is considered as a main cause of CAP.
The data base comprised information on the referral mode (from home, nursing home, another hospital, or rehabilitation facilities), age and sex, comorbidities according to the international classification of diseases (ICD-10-GM) (optional); clinical condition (chronically bedridden defined as definite inability to undergo mobilization prior to admission); respiratory rate, systolic and diastolic blood pressure, presence of acute pneumonia-related mental confusion at admission, the use of ventilatory support (noninvasive or invasive), the presence of stability criteria at discharge (including respiratory rate, systolic and diastolic blood pressure, and mental state), and outcome (survival or death). These data were assessed electronically.
The items of the CRB-65 score were included in the raw data. Three risk classes were calculated (modified according to Lim et al. (10)) as follows: Risk-class (RC) 1 (CRB-65 = 0 points); Risk-class (RC) 2 (CRB-65 = 1 or 2 points); Risk class (RC) 3 (CRB-65 = 3 or 4 points or mechanical ventilation at admission, since no reliable assessment of respiratory rate is realistic in these latter patients).
Additional data exclusively retrieved for purposes of the nationwide performance measurement program were not included in this analysis. No data were available on pathogen patterns and choices of antimicrobial treatment.

Statistics

Categorial variables were compared using the chi-square test and giving the relative risks (RR), for testing for differences across the two observation years. The significance level was chosen to be 5%. Baseline population figures for the calculation of the incidence of pneumonia originated from the Statististisches Bundesamt (11). The incidence was calculated by dividing the number of new cases per year by the number of persons at risk per year, illustrated as number per 1,000 inhabitants (aged ≥18 years) and year.

RESULTS

Database

During 2005 and 2006, 1,310 of 1,435 (91.3%) and 1,377 of 1,433 hospitals (96.1%), respectively, participated in the performance measurement program and delivered complete data-sets. Overall, a number of 388,406 (2005: 186,691; 2006: 201,715) in-patient data records of patients with CAP were retrieved and analyzed.

Incidence of hospitalized CAP

In 2005 and 2006, the number of inhabitants in Germany was 82,437,995 and 82,314,906, respectively, including 67,880,591 inhabitants in 2005 and 68,072,756 in 2006 aged ≥ 18 years (population at risk) (11). Thus, the incidence of hospitalized CAP was 2.75 and 2.96 per 1,000 inhabitants (≥ 18 years) and year in 2005 and 2006, respectively.
The incidence of hospitalized CAP was strongly age-dependent and increased with every decade (figure 1). The mean incidence in persons ≥ 60 years was 7.65 per 1,000 inhabitants and year over two years.
The mean incidence for males was 3.21 per 1,000 inhabitants per year as compared to 2.52 for females (figure 2).

Patient characteristics

Age and Sex

In both years, the distribution of age was remarkably similar with a median of 76 years. (IQR = 20 and 19 years in 2005 and 2006, mean age = 71.94 and 72.09 years, SD = 16.86 and 17.00). The large majority of patients was aged ≥ 60 years, accounting for 81.00% of patients. The single largest age decade including 28.64% of patients was 80-89 years old (table 1).

Table 1. Age distribution

Age class (years)	2005 n (%)	2006 n (%)	Total n (%)
18-19	674 (0.36)	626 (0.31)	1,300 (0.33)
20-29	4,321 (2.32)	4,329 (2.15)	8,650 (2.23)
30-39	7,290 (3.91)	7,071 (3.51)	14,361 (3.70)
40-49	10,213 (5.47)	10,712 (5.31)	20,925 (5.39)
50-59	13,448 (7.21)	15,094 (7.48)	28,542 (7.35)
60-69	28,380 (15.21)	30,569 (15.15)	58,949 (15.18)
70-79	48,904 (26.20)	53,498 (26.52)	102,402 (26.37)
80-89	52,258 (28.00)	58,965 (29.23)	111,223 (28.64)
≥ 90	21,157 (11.34)	20,849 (10.34)	42,006 (10.82)
Total patients with valid data	186,645	201,713	388,358

48 cases of the total sample had no valid age data

There was a preponderance of male patients in both years (211,579 (54.47%) male versus 176,827 (45.53%) female). The raw number of male patients exceeded the number of female until the seventh decade (70-79), thereafter more female than male patients were documented (figure 3).

Admittance to hospital

86,387 patients were admitted from nursing homes and 16,158 from other hospitals or rehabilitation facilities.

Comorbidities and clinical condition

Patient comorbidity according to ICD-10-GM is given in table 2. The most frequent comorbidity was cardiac comorbidity (19.2%), followed by CNS-disorders (13.8%), pulmonary comorbidity other than COPD (13.0%) and diabetes mellitus (11.9%). Overall, 26.07% (101,249 / 388,406) patients were classified as chronically bedridden.

Table 2. Patient comorbidity. List of the ten most frequently recorded comorbidities.

Comorbidity as defined was present in 209,997 patients (54.07%). Some patients had more than one comorbidity. Of patients with at least one comorbidity, 36,604 (17.43%) died.

Comorbidity	2005		2006		Total	
	n	(% of 2005 population)	N	(% of 2006 population)	n	(% of overall population)
Cardiac comorbidity	36,380	19.49%	38,307	18.99%	74,687	19.23%
CNS disorders	25,660	13.74%	27,763	13.76%	53,423	13.75%
Pulmonary diseases (other than COPD)	23,506	12.59%	27,171	13.47%	50,677	13.05%
Diabetes mellitus	22,189	11.89%	23,991	11.89%	46,180	11.89%
COPD	17,247	9.24%	19,314	9.57%	36,561	9.41%
Renal diseases	15,536	8.32%	18,034	8.94%	33,570	8.64%
Dementia	11,037	5.91%	12,129	6.01%	23,166	5.96%
Malignancy (other than bronchial)	5,805	3.11%	6,852	3.40%	12,657	3.26%
Lung cancer	2,645	1.42%	3,427	1.70%	6,072	1.56%
Liver diseases	2,921	1.56%	2,948	1.46%	5,869	1.51%
Total	100,381	53.77%	109,616	54.34%	209,997	54.07%

Pneumonia severity at admission

Of the whole CAP-population, 16.55% of patients belonged to CRB-65-RC 1, 71.55% to CRB-65-RC 2, and 11.91% to CRB-65-RC 3 (table 3).

Table 3. Pneumonia severity at admission according to the CRB-65 score.

The CRB-65 risk score is based on four parameters:
C = mental confusion
R = respiratory rate ≥ 30/min
B = systolic blood pressure < 90 mmHg or diastolic blood pressure ≤ 60 mmHg
65 = age ≥ 65 years.
One point is assigned in case of the presence of each parameter, adding up to a minimum of zero and a maximum of four points. The CRB-65 risk score classification is then calculated as follows:
CRB-65 = 0 points equivalent to risk class 1;
CRB-65 = 1 or 2 points equivalent to risk class 2,
CRB-65 = 3 or 4 points or mechanical ventilation at admission equivalent to risk class 3

CRB-65 risk class	2005 n (%)	2006 n (%)	Total n (%)
1 (CRB-65 = 0)	30,285 (16.22)	33,982 (16.85)	64,267 (16.55)
2 (CRB-65 = 1, 2)	127,652 (68.38)	150,238 (74.48)	277,890 (71.55)
3 (CRB-65 = 3, 4)	28,754 (15.40)	17,495 (8.67)	46,249 (11.91)
Total patients with valid data (n)	186,691	201,715	388,406

Overall, 3,924 patients (2.10%) and 4,428 (2.20%) received ventilator support at admission in 2005 and 2006, respectively (p = 0.045, chi-square test). 10,294 (5.51%) CAP patients received ventilator support at admission or during hospitalization in 2005 and 12,106 (6.00%) in 2006 (p < 0.001, chi-square test).

Mortality

Overall in-hospital mortality was 13.72% (95% CI 13.57-13.88%, n = 25,622) in 2005 and 14.44% (95% CI 14.29-14.60, n = 29,132) in 2006 (p < 0.001, chi-square test). Mortality varied within hospitals from 0-40% and 0-35% in 2005 and 2006 respectively.
In patients older than 40 years, mortality increased with age (figure 4). There was no statistically significant difference in mortality between men and women (overall: RR = 1.01; 95% CI 0.99-1.02; 2005 and 2006 RR = 1.01; 95% CI 0.99-1.03).
Patients admitted from nursing homes had a statistically significantly higher mortality (2005: 10,169 / 30,601, 24.94%; 2006: 11,674 / 33,943, 25.59%) compared to patients from other provenience (2005: 15,453 / 130,468, 10.59%; 2006: 17,458 / 138,640, 11.18%) (RR = 2.32; 95% CI 2.29-2.36). Accordingly, chronically bedridden patients had a high mortality of 30.37% (30,745 / 101,249; RR = 3.63; 95% CI 3.58-3.69). On the other hand, excluding patients from nursing homes and being chronically bedridden reduced the overall mortality to 7.60% (19,842 / 261,038).

Mortality and comorbidities

In patients with defined comorbidities, the highest mortality was observed in patients with malignant diseases (28.20% for patients with tumours other than bronchial tumours, 25.21% for patients with bronchial tumours). Pulmonary comorbidity excluding COPD and dementia were also associated with a high mortality of 24.45% and 22.36%, respectively, whereas patients with COPD had a remarkably lower mortality of 10.12% (table 4).

Table 4. Patient mortality according to comorbidity. List of the ten most frequently recorded comorbidities.

Comorbidity as defined was present in 209,997 patients. Of these, 36,604 (17.43%) died.

Comorbidity	2005 deaths (%)	2006 deaths (%)	Total
Malignancy (other than bronchial)	27.65%	28.66%	28.20%
Lung cancer	25.07%	25.33%	25.21%
Pulmonary diseases (other than COPD)	24.03%	24.82%	24.45%
Dementia	21.93%	22.76%	22.36%
Renal diseases	20.20%	21.30%	20.79%
CNS-disorders	19.27%	19.54%	19.41%
Cardiac comorbidity	17.06%	17.63%	17.35%
Diabetes mellitus	13.41%	13.88%	13.66%
Liver diseases	12.26%	13.60%	12.93%
COPD	9.85%	10.37%	10.12%
total	17.08%	17.75%	17.43%
no comorbidity	12.50%	13.35%	12.95%

In 2005, nonsurvivors died at day day 5 (median, IQR 9 days) after hospital admission, in 2006 at day 6 (median, IQR 10 days), respectively. However, most patients died within the first days after hospitalization (figure 5a). This pattern of mortality was consistently present throughout CRB-65-scores, even in the lowest CRB-65 class (figure 5b).
Of those patients who died during hospital stay, only 15.74% (8,618 / 54,754) had received ventilatory support at admission or during hospitalization (2005: 15.47% (3,964 / 25,622); 2006: 15.98% (4,654 / 29,132)). On the other hand, of those who received ventilator support, 38.47% (8,618 / 22,400) died (2005: 38.51% (3,964 / 10,294); 2006: 38.44% (4,654 / 12,106)). The proportion of mechanically ventilated

patients increased steadily with age until the seventh age decade to 31.44% but decreased to 23.05% and 4.21% in the eighth and ninth decade, respectively. Proportion of mortality according to the three factors associated with highest mortality crossreferenced with each other are listed in table 5. These increased with every additional factor from 25.29% to 42.79%.

Table 5. Proportion of mortality in patients with factors associated with highest mortality: admission from nursing home, bedridden status and mechanical (noninvasive and invasive) ventilation

Factor	2005 n (%)	2006 n (%)	Total n (%)
admission from nursing home and bedridden	8,264 (28.96)	9,412 (29.66)	17,676 (29.33)
admission from nursing home and ventilated	478 (39.54)	640 (40.35)	1,118 (40.00)
admission from nursing home, bedridden and ventilated	348 (42.08)	453 (43.35)	801 (42.79)

Performance of CRB-65 severity score

The CRB-65 severity score predicted death in a three class pattern, with overall mortality of 2.40% in CRB-65-RC 1, 13.43% in CRB-65-RC 2, and 34.39% in CRB-65-RC 3 (table 6).

Table 6. Performance of CRB-65 severity score to predict in-hospital mortality from community-acquired pneumonia

CRB-65 class (risk class)	2005 n deaths (% of risk class)	2006 n deaths (% of risk class)	Total n deaths (% of risk class)
RC 1 (CRB-65 = 0)	532 (1.76)	1,009 (2.97)	1,541 (2.40)
RC 2 (CRB-65 = 1 or 2)	15,439 (12.09)	21,871 (14.56)	37,310 (13.43)
RC 3 (CRB-65 = 3 or 4 or requirement for mechanical ventilation at admission)	9,651 (33.56)	6,252 (35.76)	15,903 (34.39)
Total deaths	25,622 (13.72)	29,132 (14.44)	54,757 (14.10)

The length of hospital stay (LOS) was associated with the severity of pneumonia (mean LOS 9.45 vs.12.39 vs. 14.50 days (SD: 7.82, 8.47, 10.69) for RC 1-3, respectively, excluding deaths).

DISCUSSION

The main results of the present analysis of this German nationwide quality performance data on hospitalized patients with CAP are the following:

1) The incidence of hospitalized CAP was high, strongly age-related and increased with every decade until the eighth decade.
2) Mortality was higher than reported in previous studies of selected patients.
3) The first days of admission were associated with the highest mortality, and this was consistently true throughout all CRB-65 risk classes.
4) The CRB-65 score accurately predicted death in a three class pattern.
5) Only a minority of patients who died had received mechanical ventilation during hospitalization, hinting at a limitation of treatment escalation for debilitated patients.

Previous epidemiologic studies have reported a total incidence of pneumonia including outpatient and inpatient cases of about 1.6-12.0 per 1,000 inhabitants and year (12-14). In a population based study from a region of Barcelona/Spain, an incidence of 1.62 was found (12). Similar studies from Kuopio/Finland and from Elche/Spain found a higher incidence of 11.6 per 1000 inhabitants and year and 12 per 10000 person-years, respectively (13, 14). In a one year study of adult hospitalized CAP in patients residing in two counties in Ohio/US, the overall incidence was 2.67 per 1,000 inhabitants and year (15). This latter figure fits perfectly with the incidence found in our database. We also could confirm the higher incidence of CAP in males.

In line with previous epidemiologic data, the incidence of CAP was strongly age-related. Moreover, a very high number of patients resided in nursing homes (22%) and were chronically bedridden (26%). The highest incidence was reached in the very old aged (80 years and older). Although these numbers are lower than those reported in a recent large American study reaching 18.3 per 1000 population ≥ 65 years (6), the estimated additional future health care burden is impressive. Given the expected increase in the elderly population in Germany (60 years and older) until 2050 (11), another 30,000 to 60,000 CAP cases will require hospitalization per year. Similar numbers are to be expected in other aging European and American countries (16, 17). Any future estimation of the health care burden of CAP will have to realize that CAP essentially is mainly a condition of the elderly.

Most surveys including patients with hospitalized CAP reported a mortality of 10% or lower (5-7, 12, 17-19). In this analysis, mortality was considerably higher. It seems reasonable to assume that this difference can be explained mainly by the exclusion of many high-risk patients in most clinical studies. Accordingly, mortality in our analysis for patients admitted from nursing homes was similar to the figures recently provided for health-care related pneumonia (HCAP) in two recent studies (19.8% versus 10% (20) and 24.6 versus 9.1% (21) as compared to 24.94% versus 11.18% in our study).

When looking at the time of death in nonsurvivors, there was a striking excess of risk of death in the first seven days, with highest proportions during the first day after admission. This is in line with a previous report in patients aged ≥ 65 years (6), and fits well with many studies indicating that the rapid initiation of appropriate antimicrobial treatment is crucial for the outcome (22, 23). Moreover, this trend was consistently evident throughout all CRB-65 risk classes, implying that even patients at lowest risk for lethal outcome are at their relatively highest risk mainly within the first days after admission. Interestingly, others could demonstrate that the distribution of hospital deaths over time is also true for the subgroup managed aggressively (6).

All studies assessing severity assessment scores have unanimously reported a substantial number of patients hospitalized despite a low risk of death according to the score evaluated (24-26). Although we don´t have any information on the reasons for hospitalization of a large proportion of patients at low risk according to CRB-65 severity assessment in the database underlying this analysis (16-17%), the finding of an increased risk of early death across all CRB-65 classes supports the clinical notion that increased clinical attention is mandatory at least during the first two days after admission.

European authors were able to show that simple scores such as the CURB, CURB-65 or CRB-65 score are at least not inferior to the more complex PSI score (26, 27,28). Our data show that the simple CRB-65 score which is based exclusively on three clinical signs and age predicts death from CAP in a three-class pattern. The results are comparable to those of the PSI score that predicts death in the range of 0.1-3% in risk classes I-III, 8-13% in class IV, and 29-31% in class V (5). Although the database underlying this analysis does not allow a comparison of CRB-65 and PSI in the same patients, the performance of CRB-65 presented here adds strong evidence to the usefulness of this score in the assessment of pneumonia severity in real life and emphasizes the preference for this simple score as recently advocated (29).

An intriguing finding was the low number of patients who died having previously received ventilatory support. Although there are no nationwide recognized standard criteria for ventilatory support, it can be regarded as surrogate parameter for intensive or at least intermediate care. The low proportion of ventilated patients may therefore hint at a considerable number of patients in whom a decision against ICU admission was made. This view is supported by the decreasing proportions of mechanical ventilation in the eighth and ninth age decade. Our findings are in contrast to American data reporting admission to ICU in 22.4% of cases aged ≥ 65 years and mechanical ventilation in 7.2% (6).

The current guidelines on the management of adult CAP do not mention the issue of care for patients with CAP as terminal event (1-4). This is true despite a traditional notion of CAP as “the old man´s friend”, and despite some recent data reporting a high frequency of DNR orders (22%) in patients with hospitalized CAP (30). The ignorance of CAP frequently representing a terminal disease seems no longer acceptable. In selected chronically debilitated patients it may be more appropriate to treat these patients under the special considerations of terminal care. However, such considerations must not exclusively rely on decisions to withhold antimicrobial treatment (31) or on DNR orders (30) but should be aware of a range of potentially applicable restrictions.

It might be argued that the population studied may have included an uncertain proportion of patients with health-care related pneumonia (HCAP) with specific etiologic and microbial resistance patterns bearing an excess mortality beyond age and nursing home pneumonia (20,21,32). In our view, the presence, incidence and characteristics of HCAP directly reflect national and regional structures and policies of health care in the chronically ill (33). Thus, it seems premature and potentially misleading to apply the concept of HCAP in an indiscriminate way.

The main limitation of the present analysis and its underlying database is the case definition of CAP. Since a case of CAP was identified encoding pneumonia as the principal cause of hospital admission, some cases may have been missed, mainly in case of CAP with severe sepsis or septic shock when the latter was encoded as principal cause of hospital admission. On the other hand, according to impreciseness of the ICD-10 Code (ref. IDC-10-GM), it was not possible to exclude all cases with

nosocomial pneumonia. However, this would concern at most 4% of the whole data set. Comparable previous large studies have also been based on ICD-codes (6, 7). We were not able to externally validate the database. However, biases from data validity are estimated to be limited since the data evaluated here mainly included patient characteristics and most simple clinical baseline data. This does not fully apply to the reporting of comorbidity, and these data must be regarded with caution. A nationwide study, on the other hand, with the inclusion of all patients hospitalized with CAP, i.e. virtually no selection bias, is unique.
This analysis allows several conclusions. Hospitalized CAP is mainly a condition of the elderly. Hospitalized CAP is a condition with a considerable risk of early mortality after admission, requiring rapid decisions about treatment settings and modalities. Special attention may be worth also in patients at low risk during this time frame. CRB-65 is a simple and powerful tool for the assessment of CAP severity which may be of help in routine clinical decision making. Obviously, CAP is a frequent terminal event in chronic debilitated patients, and a limitation of treatment escalation is frequently applied.

COMPETING INTERESTS

Authors have no competing interests.

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APPENDIX 1.

Since there is no ICD-10-GM-code for CAP, the coding was based on codes for pneumonia with or without identified pathogens of CAP and on exclusion codes for conditions indicating pneumonia associated with severe immunosuppression.
Thus, the following surrogate codes for community-acquired pneumonia (CAP) were used for inclusion (based on ICD-10-GM):
ICD A48.1, B01.2, J10.0, J11.0, J 12.0-2, J 12.8-9, J13, J14, J15.0-9, J16.0, J16.8, J18.0-2, J18.8-9, J69.0, J85.1.
The following codes were used for exclusion of patients with other types of pneumonia:
ICD B20-22, B23.0, B23.8, B24, C81.0-3, C81.7, B81.9, C82.0-2, C82.7, C82.9, C83.0-9, C84.0-5, C85.0-1, C85.7, C85.9, C88.00-30, C88.70, C88.90, C90.00-20, C91.00-50, C.70, C.90, C92.00-50, C92.70, C92.90, C93.00-50, C93.70, C93.90, C94.00-50, C94.70, C95.00-20, C95.70, C95.90, C96.0-3, C96.7, C96.9, D70.0 D70.10-12, D70.18-19, D70.3, D70.5-7, D71, D72, D76.0-3, D80.0-1, D81.0-9, D82.0-3, D82.8-9, D83.0-2, D83.8-9, D84.0-1, D90, T86.00-04, T86.09-12, T86.19, T86.2-3, T86.40-419, T86.81-82, Z94.0-4, Z94.80-81, Z94.88.

Figure 1: Distribution of incidence of hospitalized CAP per 1,000 inhabitants and year according to age classes

Incidences in 2005, 2006 and both. Indicated incidence numbers refer to the mean incidence of an age class

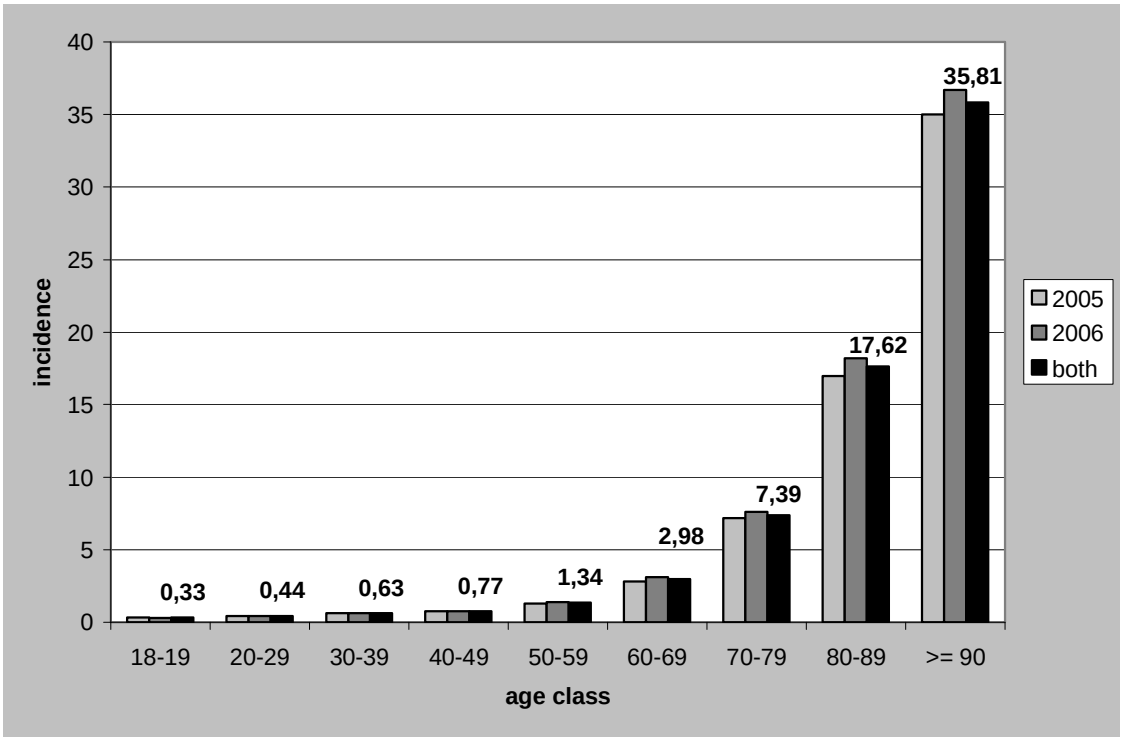

Figure 2: Distribution of incidence of hospitalized CAP per 1,000 inhabitants and year according to age classes

Incidences for sex (overall 2005 and 2006) compared to overall incidence. Indicated incidence numbers refer to the mean incidence of an age class.

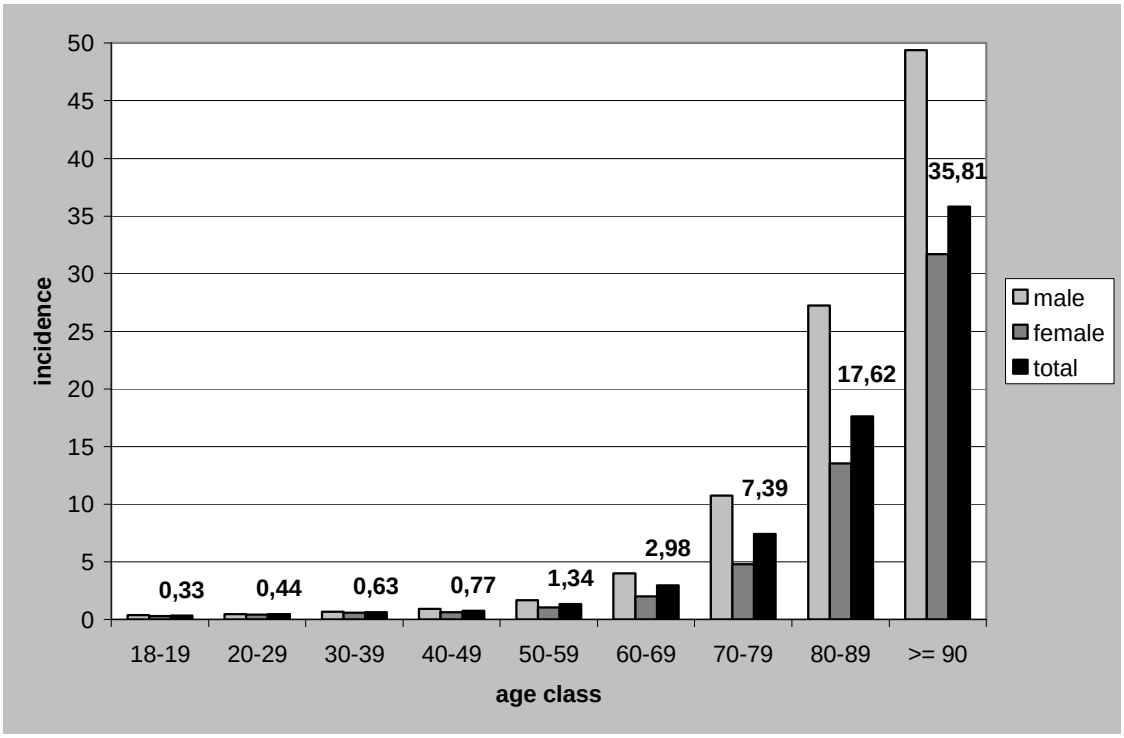

Figure 3: Age and sex distribution of patients hospitalized with CAP (total population in 2005 and 2006)

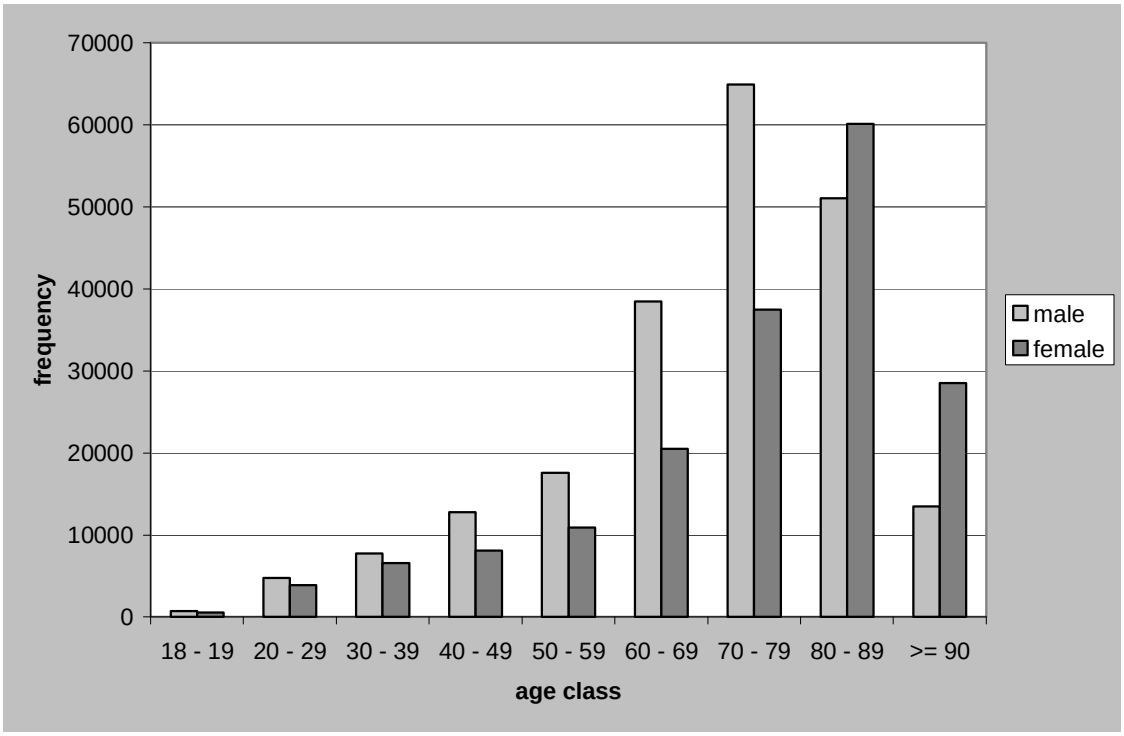

Figure 4: Distribution of in-hospital death proportions of patients hospitalized with CAP according to age classes (total population in 2005 and 2006)

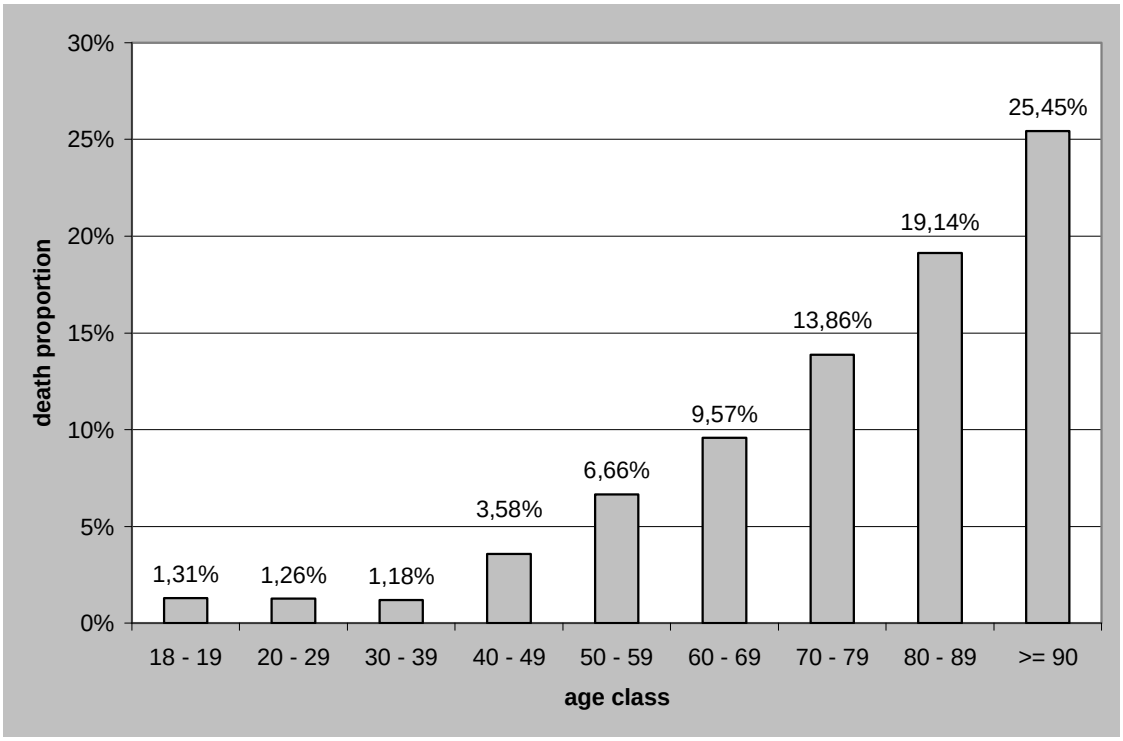

Figure 5a: Crude number of deaths during hospitalization, stratified for CRB-65 scores. Data refer to the whole population in 2005 and 2006

Day 0 was not calculated because it is not a complete day.

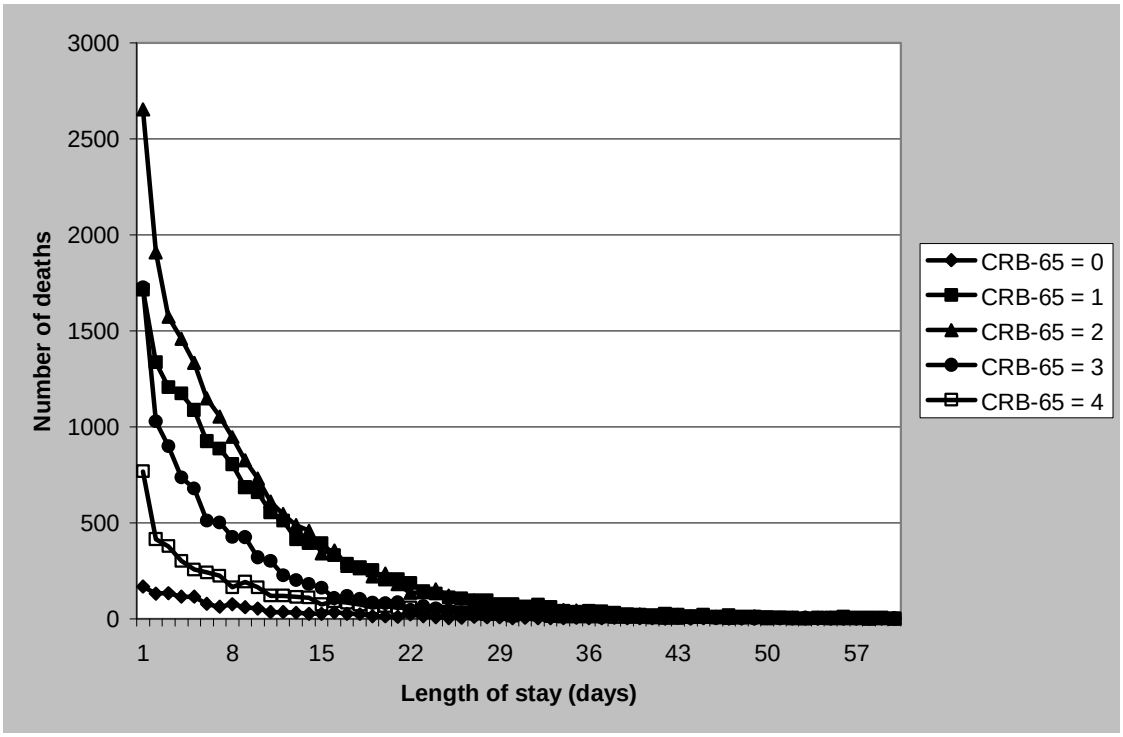

Figure 5b. Cumulative proportion of deaths, stratified for CRB-65 scores.

Note that the highest mortality is observed during the first days in all risk classes, even in the lowest (CRB-65 = 0).

Day 0 was not calculated because it is not a complete day.