



Trends in incidence and prevalence of hospitalization for atrial fibrillation and associated mortality in Western Australia, 1995–2010☆



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ABSTRACT

Objective: Hospitalization for atrial fibrillation (AF) is a large and growing public health problem. We examined current trends in the incidence, prevalence, and associated mortality of first-ever hospitalization for AF.

Methods: Linked hospital admission data were used to identify all Western Australia residents aged 35–84 years with prevalent AF and incident (first-ever) hospitalization for AF as a principal or secondary diagnosis during 1995–2010.

Results: There were 57,552 incident hospitalizations, mean age 69.8 years, with 41.4% women. Over the calendar periods, age- and sex-standardized incidence of hospitalization for AF as any diagnosis declined annually by 1.1% (95% CI; 0.93, 1.29), while incident AF as a principal diagnosis increased annually by 1.2% (95% CI; 0.84, 1.50). Incident AF hospitalization was higher among men than women, and 15-fold higher in the 75–84 compared with 35–64 year age group. The age- and sex-standardized prevalence of AF increased annually by 2.0% (95% CI; 1.88, 2.03) over the same period. Comorbidity trends were mixed with diabetes and valvular heart disease increasing, and hypertension, coronary artery disease, heart failure, cerebrovascular disease, and chronic kidney disease decreasing. The 1-year all-cause mortality after incident AF hospitalization declined from 17.6% to 14.6% (trend $P < 0.001$), with an adjusted hazard ratio of 0.86 (95% CI; 0.81, 0.91).

Conclusion: This contemporary study shows that incident AF hospitalization is not increasing except for AF as a principal diagnosis, while population prevalence of hospitalized AF has risen substantially. The high 1-year mortality following incident AF hospitalization has improved only modestly over the recent period.

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1. Introduction

Atrial fibrillation (AF) is the most common chronic arrhythmia and is associated with substantial morbidity and mortality [1–3]. The increasing prevalence of AF has been attributed to a combination of

population aging, changing pattern of risk factors, and improved survival from contributory cardiovascular and non-cardiovascular diseases [1–3]. Accurate estimates of trends in the incidence of AF, disease burden in the population and its effect on mortality are necessary to effectively manage this significant and growing public health problem. Notably hospitalizations account for most of the costs (over 50%) associated with AF [4–6].

Studies conducted from the 1980s to 1990s from North America and Western Europe have reported substantial increases in the prevalence and incidence of hospitalizations for AF either as a principal diagnosis or any diagnosis [7–12]. However, a recent retrospective cohort study of Medicare beneficiaries in North America, aged 65 years and older, reported that the incidence of AF has in fact remained steady between 1993 and 2007 [13]. Hence, it is unclear if the observed rise in AF

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Table 1
Characteristics of patients hospitalized with incident atrial fibrillation as any discharge diagnosis stratified by calendar period from 1995 to 2010 in Western Australia.

Characteristic, n (%) unless specified	Overall n = 57,552	1995 to 1998 n = 13,205	1999 to 2002 n = 13,502	2003 to 2006 n = 14,352	2007 to 2010 n = 16,493	Trend P value
Age, years, mean ± SD	69.8 (10.8)	70.3 (10.3)	69.9 (10.7)	69.9 (10.8)	69.3 (11.1)	<.0001
Age groups						
35–64 years	15,823 (27.5)	3232 (24.5)	3577 (26.5)	3980 (27.7)	5034 (30.5)	
65–74	18,078 (31.4)	4552 (34.5)	4366 (32.3)	4308 (30.0)	4852 (29.4)	
75–84	23,651 (41.1)	5421 (41.1)	5559 (41.2)	6064 (42.3)	6607 (40.1)	<.0001
Women	23,808 (41.4)	5605 (42.4)	5547 (41.1)	5959 (41.5)	6697 (40.6)	0.012
Principal discharge diagnosis	17,660 (30.7)	3375 (25.6)	4206 (31.2)	4449 (31.0)	5630 (34.1)	<.0001
Emergency admission	37,258 (64.7)	8213 (62.2)	8755 (64.8)	9462 (65.9)	10,828 (65.6)	<.0001
Comorbidities						
Coronary heart disease	22,143 (38.5)	5722 (43.3)	5416 (40.1)	5485 (38.2)	5520 (33.5)	<.0001
Cerebrovascular disease	7629 (13.3)	2045 (15.5)	1913(14.2)	1839 (12.8)	1832 (11.1)	<.0001
Peripheral arterial disease	6712 (11.7)	1789 (13.6)	1643 (12.2)	1630 (11.4)	1650 (10.0)	<.0001
Heart failure	14,560 (25.3)	4046 (30.6)	3592 (26.6)	3521 (24.5)	3401 (20.6)	<.0001
Valvular heart disease	12,031 (20.9)	1819 (13.8)	2981 (22.1)	3465 (24.1)	3766 (22.8)	<.0001
Hypertension	28,739 (49.9)	6749 (51.1)	6695 (49.6)	7219 (50.3)	8076 (49.0)	0.002
Diabetes	11,195 (19.4)	2139 (16.2)	2601 (19.3)	2983 (20.8)	3472 (21.1)	<.0001
Chronic kidney disease	5929 (10.3)	1693 (12.8)	1336 (9.9)	1378 (9.6)	1522 (9.2)	<.0001
Cancer	18,767 (32.6)	3411 (25.8)	4131 (30.6)	4927 (34.3)	6298 (38.2)	<.0001
Chronic obstructive pulmonary disease	10,574 (18.4)	3048 (23.1)	2759 (20.4)	2433 (17.0)	2334 (14.2)	<.0001
CHA ₂ DS ₂ -VASC score, mean ± SD	3.1 (1.9)	3.2 (1.9)	3.1 (1.9)	3.1 (1.9)	2.9 (1.9)	<.0001
CHA ₂ DS ₂ -VASC score categories						
0 points	7055 (12.3)	1236 (9.4)	1522 (11.3)	1775 (12.4)	2522 (15.3)	<.0001
1	5315 (9.2)	1102 (8.3)	1276 (9.4)	1336 (9.3)	1601 (9.7)	
2 or more	45,182 (78.5)	10,867 (82.3)	10,704 (79.3)	11,241 (78.3)	12,370 (75.0)	

prevalence is due to an increase in incident (de novo) AF, increasing survival after new AF diagnosis or can be largely attributed to population aging. Furthermore, there is significant uncertainty regarding projected increases in AF incidence and prevalence over the ensuing decades which undermines proper healthcare planning [14]. We therefore examined trends in the incidence of first-ever hospitalization for AF as a discharge diagnosis, and population prevalence of people with prior AF admission, among residents of Western Australia (WA), aged 35 to 84 years, from 1995 through 2010. We also assessed trends in antecedent risk factors, comorbid diseases, and all-cause mortality among incident AF cases.

2. Methods

2.1. Data sources

Hospital admissions and mortality data were obtained from 1 January 1980 to 31 December 2012 from the WA Data Linkage System for residents in Western Australia [15]. An individual's administrative records are linked with a > 99% accuracy using probabilistic matching on key personal identifiers [15]. All records include dates of care, principal diagnosis, and up to 20 secondary discharge diagnosis codes from the International Classification of Diseases, versions nine (ICD-9), nine-

Table 2
Incidence of hospitalization for atrial fibrillation as a discharge diagnosis stratified by calendar periods from 1995 to 2010 in Western Australia.

Characteristic, n (rate/1000)	No. of persons with atrial fibrillation as any discharge diagnosis (Incidence rate per 1000 person-years in each period ^a)				Mean annual % change (95% confidence interval) ^λ	P value
	1995 to 1998	1999 to 2002	2003 to 2006	2007 to 2010		
Overall	n = 13,205 (4.39)	n = 13,502 (3.99)	n = 14,352 (3.73)	n = 16,493 (3.83)	−1.1 (−0.93, −1.29)	<.0001
Gender						
Men	7604 (5.56)	7955 (5.10)	8393 (4.66)	9797 (4.79)	−1.21 (−0.98, −1.44)	<.0001
Women	5606 (3.30)	5547 (2.97)	5959 (2.86)	6696 (2.92)	−0.87 (−0.60, −1.15)	<.0001
Age-specific						
35–64 years	3235 (1.46)	3577 (1.38)	3980 (1.33)	5033 (1.46)	0.19 (−0.15, 0.54)	0.27
65–74	4554 (10.88)	4366 (9.85)	4308 (8.95)	4851 (8.88)	−1.66 (−1.35, −1.97)	<.0001
75–84	5421 (26.39)	5559 (23.52)	6064 (22.07)	6609 (22.08)	−1.44 (−1.17, −1.72)	<.0001
Characteristic, n (rate/1000)	No. of persons with atrial fibrillation as a principal discharge diagnosis (Incidence rate per 1000 person-years ^a)				Mean annual % change (95% confidence interval) ^λ	P value
	1995 to 1998	1999 to 2002	2003 to 2006	2007 to 2010		
Overall	n = 3375 (1.11)	n = 4206 (1.24)	n = 4449 (1.16)	n = 5630 (1.31)	1.17 (0.84, 1.50)	<.0001
Gender						
Men	1870 (1.31)	2486 (1.55)	2623 (1.43)	3317 (1.59)	1.33 (0.90, 1.57)	<.0001
Women	1506 (0.92)	1720 (0.94)	1826 (0.90)	2313 (1.02)	1.05 (0.55, 1.55)	<.0001
Age-specific						
35–64 years	1293 (0.57)	1632 (0.62)	1811 (0.60)	2397 (0.69)	1.66 (1.14, 2.18)	<.0001
65–74	1122 (2.68)	1332 (3.02)	1343 (2.79)	1641 (2.99)	0.84 (0.27, 1.43)	0.0042
75–84	961 (4.47)	1242 (5.16)	1295 (4.68)	1592 (5.30)	1.02 (0.41, 1.64)	0.0010

^a Overall rates are age and sex standardized to the AF-free WA population aged 35 to 84 years in 2010; rates for men and women are age standardized; age-specific rates are sex standardized.

^λ Poisson models adjusted for 5-year age group and gender.

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