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**Atrial Fibrillation Epidemic & Hospitalizations:
How to Turn the Rising Tide?**

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Numerous countries worldwide are facing the major challenge of rising healthcare expenditure, a concern driven particularly by advancing medical treatments and ageing population structures. In the United States (US) over the last 50 years, increasing national healthcare expenditure has consistently outpaced growth in real gross domestic product (GDP) per capita, exceeding every other country to peak at 18% of GDP in 2012.¹ Given that hospitals are the largest contributor to each dollar spent on healthcare, the characterization of hospitalization trends is a logical first step in identifying possible opportunities to intervene and slow the rising demands on healthcare systems.

It is in this context that Patel and colleagues describe contemporary trends of hospitalizations for atrial fibrillation (AF) in the current issue of *Circulation*.² An increasing number of recent studies have highlighted the emergence of AF as a growing epidemic.^{3, 4} While the morbidity and mortality associated with this most common arrhythmia has been increasingly well characterized, few studies have comprehensively described the effect of rising AF rates on hospital utilization on a national scale. Using data from the Nationwide Inpatient Sample, Patel and colleagues therefore characterized the trend of hospitalization rates for AF in the US from 2000 to 2010. They found an overall 23% growth in AF hospitalizations, importantly noting that the increase was particularly prominent in elderly patients. More than two third of the patients were over 65 years of age, and those over 80 years of age had an exponential increase in hospitalization rates (9361 per million in 2001 to 11045 per million in 2010). Furthermore, despite a static mean length of stay and declining in-hospital mortality associated with AF hospitalizations, inflation-adjusted costs from these hospitalizations

rose from \$6,410 in 2001 to \$8,439 in 2010. As a result, the annual national cost of AF hospitalizations rose from 2.15 billion dollars in 2001 to 3.46 billion dollars in 2010. Similar to US healthcare expenditure patterns in general, most of the annual healthcare costs associated with AF has been linked to inpatient care.⁵ The increasing hospitalization trends seen in this contemporary analysis thus confirm that the economic and public health burden of hospitalizations as a component of total AF healthcare costs continues to grow. It also is in agreement with other data suggesting that the rate of increase in AF may be overtaking other common conditions, such as myocardial infarction and heart failure, as the dominant reason for cardiovascular hospitalizations.⁶ Furthermore, the present analysis did not include emergency department presentations and AF complicating hospitalizations where a different primary diagnosis was listed; these figures may therefore be an underestimate of both the total scale and cost of AF-related hospital utilization.

The increasing global burden of AF has been recently likened to a rising tide in this journal.⁷ The pertinent question, therefore, is how to turn this tide, if it is indeed a tide? While tides recede, data to date suggest that the burden of AF shows no sign of abating and a more appropriate metaphor may therefore be “rising sea levels”. It is in this regard that subtleties from the present and prior reports provide important insights and implications. These provide multiple possible reasons for the “rising sea levels”. The increasing incidence of AF with age is an obvious contributor given the ageing population; however, the confirmation that the age-specific rate of AF hospitalizations is also increasing is noteworthy.⁸ While the reasons for this age-specific increase is not clear, comorbid conditions, symptom severity and atrial remodeling have amongst other

factors been identified as predictors of AF hospitalizations; it is possible that worsening risk factor profiles independent of the ageing population are driving these predictors.⁹ Some have suggested the emergence of electrophysiology procedures may be a significant contributor but this has not been confirmed in other reports.^{8, 10} Regardless of the reasons, however, the increase in age-specific hospitalization rates has significant implications for healthcare planning given the multiplicative effects of continually ageing population structures.¹¹

Patel and colleagues also describe how the prevalence of numerous comorbidities increased over the study period; these included hypertension, diabetes mellitus, chronic obstructive pulmonary disease, obesity and renal failure. While other major AF risk factors such as ischemic heart disease and obstructive sleep apnea were not reported, it was interesting to note that the rates of heart failure and valvular disease did not increase over the study period. While heart failure was associated with greater in-patient mortality, these data are nevertheless consistent with the trend that other AF risk factors are increasingly more prevalent at a population level than heart failure and valvular disease and therefore relevant to the current AF epidemic. It is most likely that the increasing prevalence of these risk factors is fuelling the underlying atrial substrates that predispose to the development of AF. Public health interventions to reduce the burden of AF on both patients and healthcare systems should thus be centered on the prevention and management of risk factors as this approach is likely to have the greatest population impact. Given age is not modifiable, closer and more aggressive attention is warranted towards the treatable, predisposing risk factors mentioned above that are increasingly prevalent in our ageing society. Supporting the likely potential for

this strategy to be effective is the fact that Patel and colleagues found that hospitals in the Southern region where the 'stroke belt' and excess comorbidities are found constituted the greatest percentage of AF hospitalizations. The importance of aggressive risk factor modification in the management of AF is highlighted by the profound impact on AF symptom burden and thus possibly healthcare utilization.¹² Indeed, a focus on risk factor management may assist in the primary prevention of AF. Likewise, it is important to identify unrecognized and under treated risk factors that may contribute to poorer rhythm control in AF patients and resulting in greater healthcare utilization.¹³

Patel and colleagues also describe how increasing dispositions to another facility contribute to overall costs; this is particularly significant for those patients suffering consequent stroke in whom one-quarter required transfer to a long-term institution. It has been consistently recognized that a significant percentage of patients with AF do not receive guideline-recommended antithrombotic therapy; this reflects not only under-anticoagulation in those at high risk of ischemic stroke, but also, over-anticoagulation in those at low risk.¹⁴ Others have similarly highlighted that suboptimal management of antithrombotic medication in those with AF may predict hospitalizations.⁹ Better antithrombotic management of patients with established AF is therefore is an area worth targeting to reduce healthcare utilization from ischemic strokes or bleeding complications. The recent emergence of novel anticoagulants also promises to cost-effectively reduce healthcare utilization though this requires further confirmatory study.¹⁵

Finally, it may be possible to reduce hospitalizations by implementing processes that shift management from an inpatient to outpatient setting. Optimizing rate and

rhythm management strategies for those with established AF, including continual advancements in and application of ablation techniques, may assist in this regard.¹⁶ Systems approaches to streamline the complex management of AF are also highly effective. One US hospital has previously described how implementation of AF practice guidelines at their institution significantly reduced hospitalization rates without increase in adverse events, preventing avoidable inpatient management and leading to significant economic savings.¹⁷ Specialized clinics staffed with experienced teams, comprehensive management programs and electronic support systems are also promising approaches to reduce hospitalizations and possibly cardiovascular mortality.¹⁸

In conclusion, Patel and colleagues have highlighted that the AF epidemic is having a continual and significant impact on hospital utilization in the US. Their report contributes to the growing body of evidence that AF represents a major public health concern worldwide and cements the need for us to do better – in preventing AF, in treating individuals with established AF and in implementing better system approaches to AF management – lest our hospitals and wider healthcare systems be engulfed by the “rising sea levels” of the AF epidemic.

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