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Stable coronary disease-Cinderella must go to the ball

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TITLE PAGE

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Stable coronary disease-Cinderella must go to the ball

Coronary artery disease (CAD), both in the UK and globally, has provided mixed news in the last few decades. The good news is that mortality rates for acute myocardial infarction (MI) have fallen in the UK and many other countries due to medical and public health advances (1-4). The bad news is that CAD is still responsible for the greatest burden of disease worldwide, and the same is true for the UK(5, 6). Stable CAD (SCAD) is more common than MI and yet remains the "Cinderella" of CAD(7), whether in terms of research and development of novel therapies or focus of clinical care, public health and policy.

Improvements in the surveillance of SCAD will hopefully focus energies on the challenges of its management. The Global Burden of Disease Study (GBD) has addressed knowledge gaps at the macro-level and has succeeded in showing that CAD is the largest cause of death globally(8, 9). However, national and regional analyses using more representative data, particularly for angina, are required in order to highlight areas of greatest cost and utilisation to health systems, to direct future treatment and prevention, and for health service planning. For example, a collaboration between Public Health England and GBD, has used GBD methods and detailed data in England to investigate causes of mortality and morbidity, showing that progress in reducing mortality has not been matched by progress in tackling morbidity(5).

The current paradigm judges clinical and public health interventions largely through the lens of the randomised clinical trial and metrics of cost-effectiveness. One of the major omissions remains the estimation of "real-world" cost of disease and associated healthcare. A second issue is the availability of data across diseases and different parts of the health system. A third problem is the gap between therapeutic effectiveness and estimation of comparative effectiveness at population level. "Big data" linked across healthcare sectors and electronic health records (EHRs) together have the potential to address these three hurdles to at least some extent(10-12).

In this issue, Walker and colleagues use linked EHRs in England to study cost and utilisation of healthcare in 94,966 patients with SCAD in England from 2001 until 2010(13). Although this cohort is six years old, it represents an impressive linkage of data across primary and secondary health care, as well as disease-specific registries and national mortality data. The authors make three major observations. First, SCAD represents a very significant burden of cost and use of healthcare services over 5 years and over the lifetime. Second, first year predictors of cost included sex, SCAD diagnosis and co-morbidities. Third, whilst high risk patients incur substantially higher costs over the short term (five years), low risk patients incur higher lifetime costs as a result of greater life expectancy.

The cost of SCAD is high, when compared with MI, but also other chronic diseases such as stroke(13). Whereas, dedicated quality improvement programmes have been instituted with great success for acute stroke and MI in the last two decades, SCAD remains relatively neglected. In the year after a non-fatal event during follow

up, the authors found that patients with SCAD were frequently hospitalised for CAD (66%), had a mean of 11 primary care appointments, and 88.2% of patients were taking cardiovascular medication. The far-reaching clinical, healthcare utilisation and cost implications for individuals, healthcare providers and policymakers make SCAD a policy priority.

Sex differences in outcomes for SCAD have been demonstrated previously(14), even though women may derive greater benefit than men from intervention(15). The new analyses by Walker and colleagues add that NSTEMI leading to SCAD and comorbidities are associated with worse outcomes, by highlighting the increased cost and service utilisation. Importantly, “non-CVD related comorbidities had the largest impact on costs, with a history of renal disease associated with the largest increment of £1,998 per patient (95% CI £1,715 to £2,297)”. The increased cost and utilisation not only makes the case for prevention efforts in these subgroups, but also illustrates the deficiencies of a disease-specific model where non-CVD comorbidities and non-CVD outcomes are ignored, including under-estimation of the true burden of a disease. EHR methods with linkage across datasets provide a robust method of looking across risk factors and outcomes.

Third, whilst high risk patients had substantially higher costs over five years (£23,393 vs. £9,335), their lifetime costs were lower (£43,020 vs. £116,888) than low risk patients as a result of reduced life expectancy. As noted, “increased survivorship as well as an increasingly co-morbid and older population will result in significant future health care costs”. The authors refer to five years as “short term” but this period of follow-up is longer than the vast majority of cardiovascular outcome trials. Short trial follow-up periods and inattention to burden of disease over an individual’s lifetime are likely to lead to skewed estimates of cost and health service utilisation projections, as well as models of cost effectiveness. In a companion publication for the same cohort, the authors have estimated that “a new treatment with a hazard reduction of 20% for myocardial infarction, stroke and cardiovascular disease death and no side-effects would be cost-effective if priced below £72 per year for the lowest risk patients and £646 per year for the highest risk patients”(11). It is difficult to imagine a feasible method of large-scale, long-term follow-up data collection to enable this type of cost-effectiveness analysis without better use of EHR data.

The strengths of the current study are the linked data across most of the patient pathway (where prior studies have often focused on initial hospital stay), its representative national population, long-term follow-up and sample size. There are four limitations. First, this is an EHR study using disease coding from the component databases, rather than prospective ascertainment. Reassuringly, the CALIBER dataset has proven validity of disease phenotypes across cardiovascular outcomes (16-18). Second, as noted by the authors, the inability to include outpatient data means that the whole patient pathway and the full impact of SCAD are not wholly documented. Third, as well as the lack of outpatient data, the estimates of cost are likely to be underestimates due to lack of social care data, which is becoming possible in the UK(19). However, this study still represents the most comprehensive population-level effort to-date to document the cost and healthcare utilisation implications of SCAD. Finally, non-CVD deaths were the only non-CVD outcome

considered, and in future analyses, it is important to include morbidity due to non-CVD to give a truly holistic picture of health and disease in the SCAD population.

In the case of CAD, the improvements in acute care of MI have led to substantial reductions in mortality, but the focus must shift to the high morbidity associated with SCAD. The case of SCAD emphasises that over-specialised healthcare models focusing on acute care may not align resources with burden or need. In the UK, due to universal healthcare, there are many opportunities to improve the quality and linkage of routinely collected clinical data. The benefits of prospectively available EHR for real-time decision-making by clinicians and policymakers alike, make their provision a necessity for health systems.

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