previous studies to those on admission in today's report. This explanation also accounts for the shorter period of preweaning ventilation in the current study compared with previous trials (4–5 days *vs* 6–8 days).

Some issues remain unclear. 13% of patients in today's study had received non-invasive ventilation previously. Might more people have avoided invasive ventilation altogether had non-invasive ventilation been offered as their primary treatment? Similarly, how many patients reintubated despite non-invasive ventilation had a complex illness at their initial clinical presentation?

Three further points are worth making. First, all papers discussed here are of a high standard scientifically and methodologically, and show how high-quality clinical research in the intensive-care unit can affect everyday practice.[11] Second, prospective testing of the conclusion of a post-hoc analysis is the only way to avoid the pitfalls of such an analytical approach.[12] Defining a subgroup of patients—in this case, those with hypercapnia on weaning with a history of chronic respiratory disease—who were helped substantially by non-invasive ventilation moves clinical care forward. Third, although considerable therapeutic nihilism has been reported about use of invasive ventilation for management of individuals with chronic obstructive pulmonary disease in the UK,[13] these new data show that such patients spend less time in the intensive-care unit than do others receiving invasive ventilation, and when non-invasive ventilation is used they wean successfully. Hopefully, data such as these will change our perceptions of how and when aggressive treatment should be offered to the many patients with chronic obstructive pulmonary disease who still need this form of help.

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Benchmarking in surgical research

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Surgical care is an integral part of health care throughout the world. An estimated 234 million operations take place each year, a volume that now exceeds that of childbirth.[1] Surgery can effectively treat the important chronic diseases of the 21st century, including cancer, obesity, and cardiovascular disease.[2,3] Academic surgery drives innovation and improvement in surgical outcomes, although it continues to be underfunded and poorly supported.[4]

An influential editorial in *The Lancet* in 1996 justifiably questioned the future of surgical research, associating it with the term comic opera.[5] The paucity of randomised trials coupled with a lack of basic scientific research had led to an inability to achieve the highest levels of evidence.[6] This situation triggered a constructive debate in the research community to identify areas in which academic surgery requires improvement.

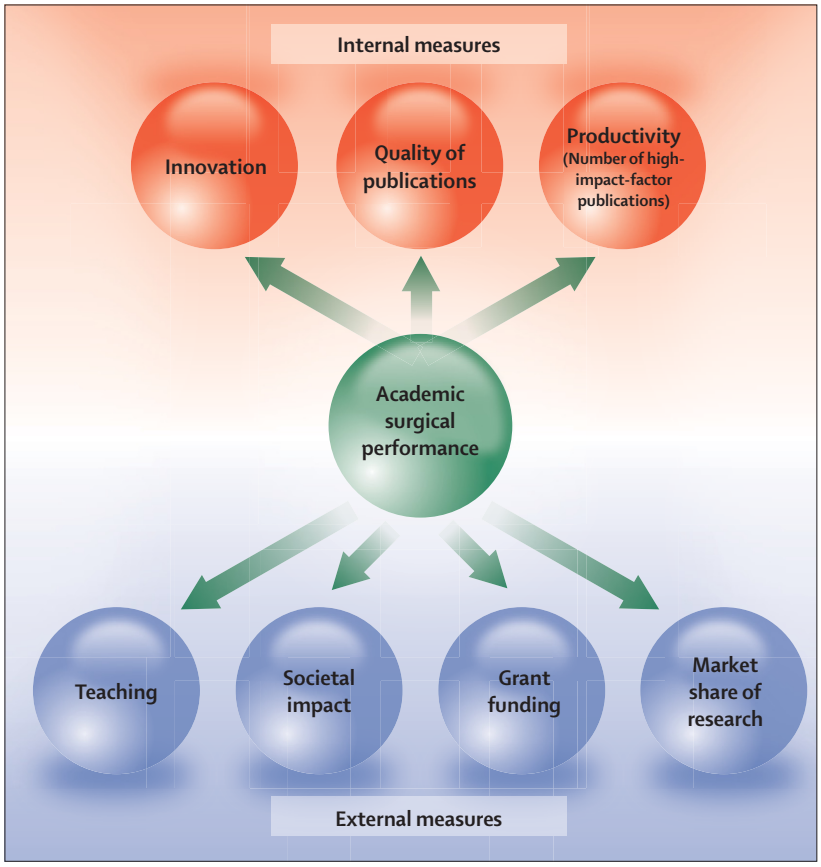

Figure: Elements of academic surgical performance

To address these shortfalls, academic surgeons and institutions need evaluation and support according to an accepted global benchmark, to allow the development of a process to improve surgical research worldwide. The assessment of academic surgery, however, remains a complex operational issue, and any benchmark should reflect the fundamental elements of the surgeon–scientist.

Contemporaneous strategies for assessing surgical research have been designed to appraise all academic research. Examples include the UK's Research Assessment Exercise and Australia's Institutional Assessment Framework. The Research Assessment Exercise was useful in identifying research quality through a peer-reviewed system and is due to be replaced by the Research Excellence Framework, which will rely heavily on bibliometrics for both qualitative and quantitative measurements.[7] The research metrics currently available include the journal impact factor and citation index. Examples of the latter include the Hirsch index and the time-factored age-weighted citation rate. These citation metrics can quantify and predict research quality, and as such they represent only one element of a surgeon–scientist's research output. There is scope to better assess surgical research quality by evaluating all the elements of an academic surgeon's output (figure).

The assessment of academic surgeons should include internal and external measures of research output.[8] Internal measures include the measurement of quality through citations (including the Hirsch index and the age-weighted citation rate), but should also account for innovation and productivity. Innovation can be represented by the novelty of an experimental design and the development of new operations or treatments, and could also include the accrual of patents. Productivity should reflect the number of high-quality research reports.

External measures include contribution to teaching, market share of research field, success in grant applications, and societal impact. The impact on society[9] is particularly important because it allows comparison between clinical research and the less tangible but potentially greater impact of basic scientific research. The market share of research can be calculated as a proportion of the number of cited papers and grants in a particular field, and represents specialty influence. This metric might be particularly useful in judging the rank and status of an academic unit or an individual academic surgeon. Whilst external measures are complicated to evaluate, they should nevertheless form an integral part of research appraisal. Grant acquisition and the optimisation of societal benefits are particularly salient in the current economic climate.

At a practical level, the development for such a benchmark would require a transparency of research data to be made available. Departmental report cards can be set up[8] and an audit cycle of research performance would allow appraisal results to be acted on. This approach would ultimately allow areas of strength to be identified and expanded, while also highlighting areas for increased research improvement.

Application of a global surgical benchmark would allow the constructive appraisal of academic surgery to achieve its future goals. These goals include the strengthening of the surgical sciences and increasing the number of higher-impact publications. Areas in which surgeons currently excel also require further consolidation, including innovation, biodesign, and the adoption of

novel health-care technologies.[10] Additionally, centres of academic surgical excellence need to be recognised and targeted as sites of significant academic recruitment and research output.

The scene has now been set, and it is incumbent on academic surgeons worldwide to transform what was once considered a comic opera into a dynamic world-class specialty and achieve a transformational change to enter the era of the opera seria.

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To cement or not in hip fracture surgery?

1·3 million hip fractures occurred globally in 1990, with predictions of numbers rising to anywhere between 7·3 and 21·3 million by 2050.[1] Mortality after a hip fracture remains substantial, being 11–23% at 6 months and increasing to 22–29% at 12 months after the injury.[2] Total hip replacement and hemiarthroplasty are the main treatment options for displaced femoral neck fractures, with broadly similar outcomes for both procedures. What is less clear, however, is whether these arthroplasties should be cemented, uncemented, or hybrid. Although to some extent an old debate, this issue has attracted renewed interest of late because of the possible risk of the potentially catastrophic bone-cement implantation syndrome in those who have undergone cementing procedures.[3]

Bone-cement implantation syndrome is associated with substantial mortality and morbidity. The syndrome is characterised by hypoxia, hypotension, and unexpected loss of consciousness; it can occur at any point from the time of cementation to the final deflation of the tourniquet in patients having cemented bone surgery.[3] Two main mechanisms have been suggested for aetiopathogenesis. The more robust theory is that of emboli being dislodged into the pulmonary vasculature because of high intramedullary pressures and raised temperatures developing during prosthesis insertion and cementation.[4] A less favoured, but nonetheless interesting theory, is that of cement monomers being formed during cementation, which in turn induce a widespread inflammatory response.

There is a paucity of evidence and hence rather predictable controversy and divergence of opinion and practice about the use of cementation. Data from national joint registries indicate that surgeons in Sweden, Denmark, the UK, and Norway tend to favour cemented total hip replacements, whereas Australian and Canadian surgeons tend to favour the use of uncemented total hip replacements. For hemiarthroplasties, Swedish and Australian surgeons favour the use of cemented implants.

National patient-safety incidents databases have been alerted to intraoperative deaths after the use of bone cement in hip arthroplasty. One such database query found five cases of severe harm, which we thought to be directly attributable to the use of bone cement. Our analysis of the Research and Learning System database at the National Patient Safety Agency, which houses the largest repository of patient-safety incidents globally, revealed that 96% (24/25) of the reported deaths related to a hip procedure (total hip replacement or arthroplasty) occurred in patients having cemented procedures, while only 4% (1/25) of deaths occurred in those receiving an uncemented prosthesis. Examples of the reports include: "Patient having cemented hip prosthesis inserted for