The role of simulators in surgical training: A bibliometric analysis from 1993–2012

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INTRODUCTION & OBJECTIVES: There has been a dramatic change in surgical training over the past 20 years with the abolition of the traditional apprenticeship model. Surgical simulation has become an integral adjunct of surgical training. This paper aims to provide an in-depth evaluation of research yield in role of simulators in surgical training from 1983 to 2012 using large-scale data analysis and the employment of bibliometric indicators of production and quality.

MATERIAL & METHODS: All the relevant data was retrieved from the Web of Science (WOS) citation expanded database. The relevant MESH headings were used to extract data. Only original articles published in English were included as part of the search criteria. The retrieved articles were categorised by year of publication, author, number of citations, country of origin, academic institution, and the journal in which they were published. The funding agency and grant numbers were also identified if applicable. The journals were ranked according to their Impact factor and Eigenfactor score and changes assessed over time.

RESULTS: A total of 1,264 papers relating to the role of simulators in surgical training were published over the 20 year period resulting in 20,494 citations. The United States had the highest research output, accounting for 41.1% (n =520) of total output. Other prolific countries included England (n=170) and Canada (n=133). European countries were present in 7 out of the top 10 countries.
Of the Top Institutions, the Imperial College London ranked highest (n=69), followed by the University of Toronto (n=53) and the University of California (n=38).
The top funding agencies were The Natural Sciences and Engineering Research Council of Canada (n=6), Ethicon Endosurgery (n=5) and The National Institutes of Health (n=5). There were a total of 121 Grants responsible for 136 publications.
The year 2012 had the highest output with 175 publications (13.8%). The top 3 ranking journals were “Surgical Endoscopy And Other Interventional Techniques” (n=144), “American Journal of Surgery” (n=52) and “Lecture Notes in Computer Science” (n=43). The top ranking authors were Darzi (n=34), Aggarwal (n=30) and Scott (n=29) respectively.

CONCLUSIONS: This represents an attempt to provide a quantitative and qualitative analysis of research into the role of simulators in surgical training. The publication pattern has changed significantly over the past 20 years. With the implementation of European working time directive, reduced working hours for clinicians and the increasing role in the use of simulators in surgical training, further research is necessary to assess the precise role simulators need to play in the training of a modern surgeon.