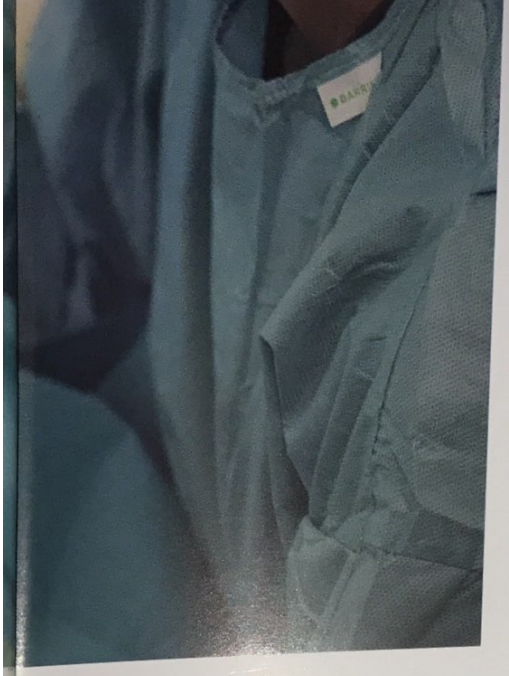

and supervision of a registered medical practitioner." However, all other stem cell therapeutic products of human origin not covered by this exclusion would be regulated as biologicals by the TGA under the Australian Regulatory Guidelines for Biologicals. Therefore, there is a loophole in the regulations.

The TGA has noted that an increased number of autologous stem cell treatments are proliferating within Australia and that these products are of unproven safety and efficacy and are often provided to patients at a high cost. Given this situation, the TGA is undertaking a review of current oversight, and is considering whether the current regulatory model needs to change.

The New Zealand environment is similar to the Australian one, with the government currently working on a new and comprehensive regulatory regime to regulate therapeutic products in New Zealand, which will replace the Medicines Act 1981, and its Regulations. Medsafe (the New Zealand Medicines and Medical Devices Safety Authority) is the body responsible for regulation of medicines and medical devices. Certain stem cell products have been approved in New Zealand by Medsafe. Clinics providing autologous stem cell treatments claim that these procedures fall under the category of physicians' practice of medicine, under which the physician and patient are free to consider their chosen course of treatment. This involves minimal manipulation of the patient's own cells.

The proliferation of unproven stem cell treatments over recent years has placed a focus on regulatory agencies to provide clear direction. From a regulatory perspective, stem cells provide difficulties for all jurisdictions due to the novel manner of this therapy and the fact that stem cells do not fit into current frameworks. These problems have led to the exploitation of loopholes, and the provision of services without clear regulatory oversight or other guidance.

It is clear that authorities are moving towards clearer and more explicit guidance around regulation of stem cell products. With increasing cooperation between regulatory agencies, governments, researchers, practitioners and industry, improvements should be seen. However, this may take some time to come to fruition.

Is there robust scientific evidence for stem cell treatments in surgery?

Bearing in mind the problems associated with stem cell therapy, a key focus of the research was to investigate what published evidence is available regarding the use of stem cells in surgery. A literature review identified 69 systematic reviews and 10 additional comparative studies regarding stem cell treatments in surgery.

All of the scientific literature identified through PubMed and Embase searches were grouped into three categories depending on the maturity of evidence base for each stem cell treatment.

We defined the categories as:

- Category A – This reflects that multiple randomised controlled trials (RCTs) are available, and their outcomes suggest superior or non-inferior safety and efficacy of the stem cell treatment for a given disease or condition compared with standard treatment. Their safety and efficacy is likely assessed by systematic reviews.
- Category B – This reflects that comparative studies with inconclusive safety or efficacy outcomes of the stem cell treatment for a given disease or condition compared with standard treatment are available. Their safety or efficacy is currently unproven or uncertain.
- Category C – This reflects that no comparative evidence on safety and efficacy of the stem cell treatment compared with standard therapy is available. These treatments are still in the process of evaluation through early, animal or pre-clinical trials.

Category A evidence was only available for Cardiothoracic Surgery. Seven of the 11 systematic reviews assessed 23 RCTs involving 1,255 participants who received intramyocardial transplantation of autologous BMSC for ischemic heart disease and congestive heart failure. These evidence syntheses provide a view of between trial consistency in outcomes, and indicate that for those indications the use of stem cells seems safe and effective.

The largest volume of evidence was for orthopaedic use; however, the evidence base for all orthopaedic indications remains unproven or investigational. Even across RCTs for orthopaedic indications, there is heterogeneity across the methods used. There is overlap of certain indications, particularly across the specialties of Orthopaedic Surgery, and Plastic and Reconstructive Surgery. Certain novel uses of stem cells are relevant ▶