

outgoing flow of surgeons reaching retirement age during this time is limited to 5 per annum for an arrival of 10–11 trained senior residents. The situation improves after 2020 for the finishing trainees.

Surgery is certainly now performed more and more within highly coordinated teams, which at one time or another seek new collaborators that can open opportunities.

Young surgeons in training, far from worrying about this situation must consider quality education, which brings something to the team that they join, coupled with the capacity for teamwork in contrast to our slightly oversized egos, will enable them to practice this exciting profession with as much pleasure as the majority of us.

**Conflict of interest:** none declared.

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## APPENDIX. CONFERENCE DISCUSSION

**Dr M. Siepe (Freiburg, Germany):** This elegant study affirms that the French Society seems to be healthy in terms of manpower planning. I think that this type of study is needed throughout Europe in different countries because the figures in other countries might differ extensively from the figures you can show from France.

My first question concerns the methods. How did you arrive at these numbers? It seems difficult to count all the surgeons when you ask the departments. Is there a certain database where you have to register in France, and no way that you can do cardiac surgery without being in the database?

The second question relates to some simplification in your study. You say that a surgeon's career ends after the age of 65, and the need for surgeons in the Society remains the same as does the workload per surgeon. We all know that is a simplification of a more complex situation, and I ask you to comment on that.

**Dr Laskar:** First question, how was the database built? It is a very long story which started ten years ago. In France everybody was saying that we were going to run out of surgeons, we were going to run out of doctors, and my feeling was that this was not true, especially in our specialty. And then I thought, well, cardiac surgery is a very small specialty in which you can easily count who is doing the work and who is not doing the work. So I started looking at all the centres, and I asked everybody who was operating, who was not, who was training, and I started to build the database from this data over the course of three to four years. Then we shifted the database to the French Society. Now, each time our secretary has someone on the phone they are asked, "Where are you working? Where have you been? Who has taken your place?" Let's say a senior resident says "Now I have a position here", the secretary will ask "Who has taken your place as senior resident in your previous centre?" The database has been implemented like this.

All the people who know me here know that I always have my computer, and each time I meet someone I go and say, "What is the situation in this city and this city?" French cardiac surgery is organized by the Ministry of Health. You cannot do cardiac surgery just anywhere. You have to do it in an official place where there is cardiac surgery. So there are 60 teams doing cardiac surgery. Out of this, you can easily ask who is working in each team.

**Dr Siepe:** So it is your self-validation system?

**Dr Laskar:** Yes. Now, at the age of 65, of course you do not absolutely have to finish at 65, but the official age for retirement is 65. What I have seen during these ten years working on this, is that when I started ten years ago, there were a lot of surgeons working after 65, sometimes working up to 74, 76. And it looks like now there is a strong drop here after 65, 66, and it seems to me that the working conditions have been so difficult now that everybody is fed up after 65. So it is coming strongly to be true.

And to finish with the other aspect, if the workloads remain as they are for each surgeon, of course it seems that some teams will perhaps be able to get new surgeons to increase the team, divide the work. But you see what is coming out here is that in the next five years there is going to be a drop in the people going out, and it is not going to be that in the next five years each team is going to increase by two.

**Dr J. Kluin (Utrecht, Netherlands):** One short question, short answer. Are there enough residents in France wanting to become cardiac surgeons?

**Dr Laskar:** Yes, of course there are, yes.

**Dr Kluin:** Yes? So that is not a problem?

**Dr Laskar:** There is a big number, yes.

**Dr Kluin:** I do not know if there is anybody from the United States in here?

**Dr Laskar:** The green part of the drawing on this slide represents the residents. You can see here that for each year of age, we have more than ten residents per year. So we have more residents than senior cardiac surgeons.

**Dr Kluin:** Because I think in the United States that is a problem at the moment; there are not enough young doctors anymore that want to become cardiothoracic surgeons.

**Dr Laskar:** So I would send our senior residents to the States. They will find a job there.

### eComment. Is the USA running out of cardiothoracic surgeons?

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doi: 10.1093/icvts/ivt041

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We have read with great interest the article by Laskar *et al.* on the demography of thoracic and cardiac surgeons in France [1]. According to the authors, France is not in danger of having a deficiency of cardiothoracic surgeons in the near future, as the number of current residents can cover the number of senior surgeons that will retire. It is clear that France, as well as other European countries, has a distinct advantage over the USA in this specific field.

Currently, the median age of US American cardiothoracic surgeons is 52.9 years, with women being the minority (3.4% of adult cardiac surgeons, 5.2% of congenital heart surgeons, and 7.9% of general thoracic surgeons) [2]. Despite the fact that the number of patients with cardiovascular diseases in the USA is increasing as the population ages, the number of practicing cardiothoracic surgeons has started to fall. Grover *et al.* predicted that by 2025 the demand for cardiothoracic surgeons could increase by 46% on the basis of population growth. In the same time period, the authors predicted a 21% decrease in the number of new cardiothoracic surgeons that graduate from training programmes across the country [3].

Possible factors that make less medical students and general surgery residents to apply for thoracic surgery can be the lengthy training (average 8.7 years), the educational depth (average \$56 000), the steady increase of malpractice premiums over the last few years (from \$55 947 to \$59 673), and the fact that the operative volume has decreased over the past 12 months for 30% of the practicing surgeons. Thus, it is with no surprise that only 46% of the practicing cardiothoracic surgeons in the US are satisfied with their career [2].

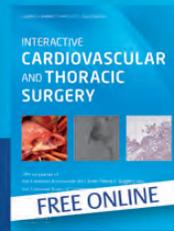
In order to prevent the danger to society from a possible shortage of cardiothoracic surgeons, we have to make the specialty attractive again to the young students and doctors. Recently, integrated programmes have started to evolve, cutting the training period down to only 6 years. New techniques driven by technology and integrating minimally invasive methods with the traditional surgery have been developed, with the purpose of making the cardiothoracic surgeon of the future a versatile instrument for the treatment of the cardiovascular diseases. Hybrid operations, such as transcatheter valve insertion, offer the opportunity to increase the procedure numbers and give the opportunity to develop new set of skills. It is imperative that many strategies to improve training and the specialty's work environment must be explored in order to avert the possible future crisis.

**Conflict of interest:** none declared.

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