Rejoinder

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We thank Professor Heitjan for his concise overview of our paper[1] and stimulating commentary.[2] We agree that none of the methods designed to address this problem is completely satisfactory. The approach we advocate recognises that, when presented with findings from trials that have missing data, experts readily come to a view about the relative benefits of the intervention. In doing so they incorporate (often implicitly) an opinion about the missing data, but these opinions are not made transparent, nor are they subject to scrutiny. Therefore, we believe it is useful to capture and quantify these views, so all those with an interest in the research can review and critique them. By making the use of expert opinion transparent, our approach helps facilitate a more informed interpretation of a study with missing data. We now turn to the specific points raised, before proposing a route forward.

First, do the experts understand the questions? This is clearly crucial. We therefore went to considerable lengths to pilot and refine our approach, in order to make it accessible and accurate. To engage the experts, we asked them to consider typical patients who did and did not have missing data. We sought to elicit information about differences between those with and without missing data in the mean outcome. To provide insights into why the experts gave the responses that they did, we also collected qualitative information, which suggested that they had indeed understood the questions. However, it is possible that not all experts fully understood what we were asking. It is also unclear whether all those using findings from an empirical study with missing data fully understand the assumptions behind the analyses undertaken. We do not accept that it follows that because experts' views differ markedly they did not understand the question. More likely, it represents markedly different, but quite strong, opinions.

Second, why do doctors and nurses give different answers? Doctors and nurses have different perspectives. Thus, the finding that they give somewhat different answers could reflect alternative viewpoints and training. The suggestion of a follow-up study to explore this issue further is a good one; in the meantime, we note that doctors involved in surgery are possibly more prone to optimism bias for the less invasive endovascular strategy versus open repair, whereas nurses, who are more closely involved helping patients recover post-surgery, are not.

Third, how much should we credit individual priors? Our anecdotal experience is that 'true believers' tend to be forthright and assertive. In our approach, their view (and that of the 'sceptic') is diluted, as it is combined with 'mainstream' views prior to analysis. Moreover, by analysing the data with, and without, the 'true believers' views, we can quantify their impact. An alternative approach would be to perform a Delphi elicitation process, where outlying views would be challenged and resolved. However, such processes are unduly burdensome and costly in most settings, and might not reflect the full range of views seen in practice – hence our approach.

Fourth, was the sample of experts adequate? We agree the study would have been improved by collecting requisite background information that would have enabled us to fully assess the representativeness of our experts. Our defence is that this is an initial attempt at developing this approach. We did partly address this concern in presenting results according to a predefined subgroup (doctor versus nurse), and also we had good site coverage with responding experts from 18 out of the 30 IMPROVE trial sites.

Fifth, were the priors correct? The proposal for an empirical study to calibrate the views of experts to some observations on the patients with missing data, while challenging, is an excellent idea.

We believe this field could be moved forward by: A study of the kind proposed above; greater use of the approach, which will raise awareness of the issues and how to address them, and stimulate; further research on the best way to elicit information.

In summary, while we support Prof Heitjan's proposal that experts should be encouraged to suggest alternative data that can shed light on these questions, we believe this is only a part of the solution. The views of experts are used to make decisions at all levels by individual patients and clinicians, through to regulatory, policy-making and grant-funding committees. Formalising such views, combining them

consistently with the data, and making the process transparent is surely an advance. This approach of making the use of expert views transparent, goes way beyond missing data, and to the core issue of how evidence can best be used to inform decisions.[3]

References

1. Mason AJ, Gomes M, Grieve R, et al. Development of a practical approach to expert elicitation for randomised controlled trials with missing health outcomes: Application to the IMPROVE Trial. *Clin Trials*, in press.
2. Heitjan DF. Commentary on Mason et al. *Clin Trials*, in press.
3. Gelman A and Hennig C. Beyond subjective and objective in statistics. *J R Stat Soc Ser A* 2017; 180: 1-31.