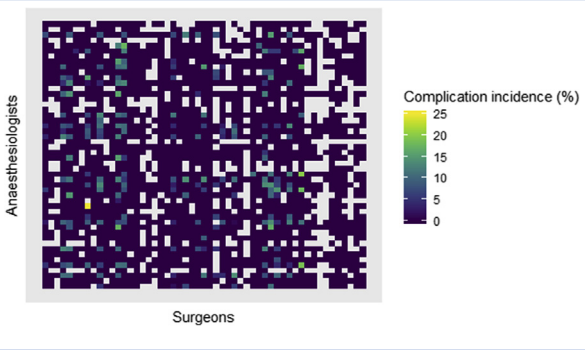

Fig 1. Heat map depicting the incidence of complications (in %) for each individual surgeon–anaesthesiologist pair (median and inter-quartile range: 5.3%; 0–14.3%), excluding pairs with <50 surgeries that may have inflated complication incidence.

Finally, despite high levels of standardisation, it is possible that there are factors that influence outcomes after TJA that are not considered here.

In conclusion, our data suggest that surgeons and anaesthesiologists performing high volumes of joint arthroplasties together are associated with reduced odds of complications and improved LOS. If these results can be validated, programmes that facilitate the establishment of high-volume teams should be supported as a means to improve outcomes.

Declarations of interest

SGM is a director on the boards of the American Society of Regional Anesthesia and Pain Medicine and the Society of Anesthesia and Sleep Medicine. He is a one-time consultant for Sandoz Inc. and Teikoku, and is currently on the medical advisory board of HATH. He has a pending US Patent application for a multi-catheter infusion system (US-2017-0361063). He is the owner of SGM Consulting, LLC and co-owner of FC Monmouth, LLC. None of the aforementioned relations influenced the conduct of the present study. All other authors declare no conflicts of interest.

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Is ethnicity associated with recruitment into perioperative care studies?

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Editor—There is increasing discussion around the under-representation of ethnic minorities in research and the implications this has on the generalisability of study findings. Ethnicity is poorly defined in the medical literature which contributes to its inconsistent use in research.[1] In health research Bhopal[2] defines it as '*a group that people belong to because of shared characteristics, including ancestral and geographical origins, cultural traditions, and languages*.' In the UK, the national census uses five broad ethnic groups with subcategories including white, Asian, black, mixed, and other ethnicities.[3] Recruitment, participation, and retention of ethnic minorities is lower than their representation; these data are also under-reported.[4] A review of published peri-operative randomised controlled

trials found 2.2% reported on ethnicity.[5] The population studied in trials may not be representative of real world patients if certain patient characteristics are being systematically under-represented (i.e. their external validity is compromised). The screening logs from multicentre perioperative trials at Birmingham Heartlands Hospital (BHH), University Hospitals Birmingham NHS Foundation Trust in the UK were reviewed to determine whether there was an association between ethnicity and recruitment into studies. This cross-sectional study tested the hypothesis that ethnic minorities are less likely to be successfully enrolled into perioperative trials based on patients screened by the BHH research unit over the past 4 yr.

Patient ethnicity data were retrieved retrospectively for 733 patients from the electronic patient records and analysed. Of these, 34 patients were successfully recruited into trials between November 2, 2015 and November 28, 2019. Data were extracted retrospectively from clinical trials between 2015 and 2019 that had recorded sufficient patient screening data to gather patient characteristics. Screening logs were reviewed for patients screened, eligibility, and enrolment. Since ethnicity is not routinely recorded on the screening log, this was sought using the hospital electronic medical record (Concerto^{TM}, Orion Systems International, Dubai, United Arab Emirates).

Data were aggregated into two categories: (i) white (n=521) including Irish, British, or other white, or (ii) ethnic minority (n=91) including Bangladeshi, Indian, Pakistani, Caribbean, African, or other ethnicity. In addition, 121 patients did not have their ethnicity recorded on the electronic patient record and were excluded from further analysis. None of the 34 patients enrolled were of a minority ethnic background (Table 1). Out of all patients screened, those from a minority-ethnic background were twice as likely to be ineligible compared with the white cohort (risk ratio 1.98, 95% confidence interval 1.71–2.30, P<0.0001).

The small sample size studied is a major limitation, confounded by the small proportion of ethnic minorities included and the significant proportion excluded as no ethnicity was recorded. Given that the proportion screened of non-white ethnicity was 91/733 (12%), the anticipated proportion of those recruited if there was equal allocation across ethnicities would only be n=4, suggesting that this sample size is unlikely to yield robust results. There is a risk of selection bias as all studies took place in the same trial unit. BHH serves an area where a much higher than national average proportion of the population are from a minority ethnic background.[6]

Each trial specified a minimum age as part of the inclusion critieria i.e. >50 or 60 yr old. A significant proportion (75%) of the screened non-white cohort who were ineligible (n=72) were excluded (n=54) as they were younger than the specified age for each study. This is in comparison to 44% (92/208) of the white cohort. Other reasons for ineligibility did not differ between the two cohorts. A contributing factor for this disproportionate exclusion may be explained by 2011 census data, which showed the largest proportion of people >60 yr old are from white ethnicity groups.[7] This association needs to be studied further. If universal criteria are affecting the representation of the study sample, do researchers need to consider different inclusion criteria for different ethnicities?

Based on these findings, albeit in a small sample, how generalisable are the findings from ongoing clinical trials when we apply this to our patient population in Britain? Whilst we did not specifically examine a particular surgical population, our findings are largely in agreement with systematic review findings by Lindsay and colleagues that perioperative trials are not representative of patient population.[5] Can we continue to practice medicine based on clinical findings for the textbook 70 kg white male in a society where patients increasingly do not fit that description? How can we address this issue from a research perspective?

Recommendations for change

By definition, 'ethnicity' is an indicator of a person's social determinants of health. To miss this criterion as part of data collection would not only contribute to poor generalisability of data, but perpetuate cultural ignorance of the nuances of healthcare.[8] Ultimately this may contribute to furthering health inequalities.

The first step towards a solution is to understand our baseline and encourage routine collection of ethnicity as part of screening log data. This is being increasingly practiced in the USA, where the US National Institutes of Health (NIH) has mandated the proportionate representation of patients by ethnic group in clinical research funded by the NIH since 1993.[9] The next step would be to make it common practice to include ethnicity bias within limitations of results and data collection in order to make it clear that there is a reduced capacity of generalisability. The final step would be to take active

Table 1 Summary of results

Ethnicity	Total	Of those who were screened		Enrolled (% of eligible)
	Screened	Ineligible	Eligible (% of screened)	
No ethnicity recorded	121	49	72 (59.5)	2 (2.7)
British/Irish/Other white	521	208	313 (60)	32 (10.2)
Bangladeshi/Indian/Pakistani/ Caribbean/African/Other	91	72	19 (20.9)	0 (0)
Total	733	329	404 (55.1)	34 (8.4)

measures to reduce the bias, for example, eliminate bias in inclusion and exclusion criteria for each study.[10] This would require change in policy at the level of the Health Research Authority. Once these changes are implemented, there is much scope for improving the quality and validity of research, leading to improved patient care.

Declarations of interest

The authors declare that they have no conflicts of interest.

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Importance of inclusion criteria in systematic reviews

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Keywords: laryngeal mask airway; manikin; pandemic; personal protective equipment; tracheal intubation; videolaryngoscope

Editor—Sorbello and colleagues[1] offer us the opportunity to further clarify the inclusion criteria of our recent review of simulated airway management whilst wearing personal protective equipment (PPE),[2] and to discuss other aspects pertinent to systematic reviews. We included in our review simulation studies comparing devices for airway management regarding the time-to-intubation, success rates, or both, conducted with participants wearing PPE.[2] The authors[1] claim that they identified six articles missing from our systematic review,[2] casting doubt on our search strategy, screening, or inclusion criteria. We thank the authors for identifying one study[3] that should have been included. This article was identified in our literature search but was excluded as result of human error (mistaken for another study with same first author/journal [Schumacher/*Anaesthesia*]). This article was added in the updated version of the table while in press (see footnotes of the original article).[2] Addition of this article to our analysis did not