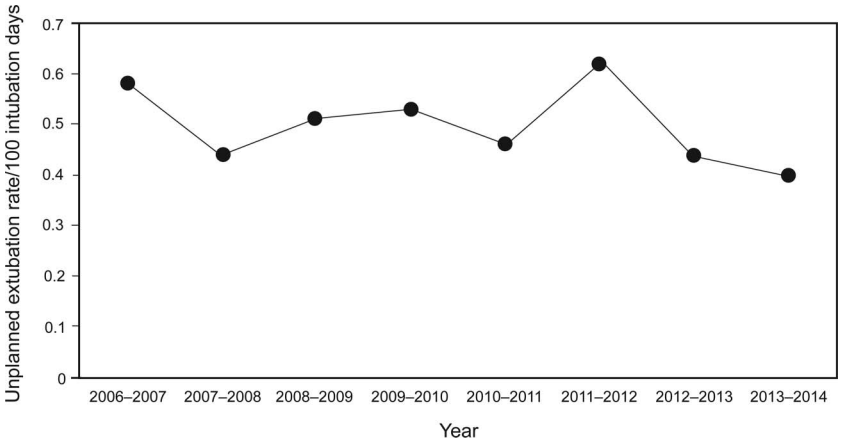

Fig. 1. Unplanned extubation rates in the pediatric ICU.

mained successful in decreasing unplanned extubations.

There was not, until recently, a multicenter study analyzing unplanned extubation risk factors. This year, Fitzgerald et al[12] published a multi-center study involving 11 centers that found in children <6 y old (0.83 for < 6 y vs 0.45/100 intubation days for ≥6 y, $P = .001$), inadequate sedation (odds ratio 9.1), loose or slimy endotracheal tube (odds ratio 10.4), a planned extubation in the next 12 h (odds ratio 2.3), and a floating nurse from another unit (odds ratio 3.8) were all risk factors for unplanned extubations.[12]

We have previously suggested a bundle approach to prevent unplanned extubation including both structure and process interventions.[10] Nurse/patient ratios of 1:1 and the formation of a continuous quality-improvement team comprise the structural interventions. The process interventions include auditing practice, staff education and training, and standardization of routines as well as sedation protocols comprising routine sedation assessment and the use of targeted sedation. Although the efficacy and cost-effectiveness of such a bundle approach need to be determined, we believe that adopting one or more of these components may be helpful in decreasing the rate of unplanned extubations to a more acceptable level.

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Reducing Unplanned Extubations in the Pediatric ICU: Are We Seeing the Whole Picture?—Reply

In Reply:

We would like to thank Dr Da Silva and colleagues for their interest in our project report on interventions to reduce unplanned extubation in our pediatric ICU.[1] We note with great interest their significant body of work in this important area of ICU safety.

The authors correctly note that the distinction between self-extubation and accidental extubation can be difficult in the pediatric population and, as a result, is not very widely reported in the literature. However, we believe that this distinction is important because different risk factors contribute to self-extubation and accidental extubation, and different interventions are needed to mitigate these risks. The authors are also correct in stating that the description of self-extubation[2] comes from adult

medicine and may not directly apply to pediatrics. For the purpose of this study, an unplanned extubation was noted as self-extubation if it did not occur during an identifiable nursing or medical intervention. Self-extubation can be prevented by optimizing sedation and possibly executing a daily extubation readiness policy, whereas accidental extubation can be prevented by staff education, clear guidelines for patient care during medical and nursing procedures, and possibly additional sedation. As demonstrated in our project, accidental extubation carries a higher risk to patients and should be targeted early in a quality-improvement intervention. It is not surprising to us that self-extubation occurred more frequently in a population of which the majority of subjects were surgical. We hypothesize that these subjects were ready earlier and would potentially benefit from a more aggressive early extubation policy.

We also agree that a 24–72-h window for re-intubation is ideal and is most frequently used for assessing extubation failure after planned extubation.[3,4] An unplanned extubation, however, requires a more rapid decision-making process. The emphasis in our report is on patient safety rather than on success of the extubation. We believe that a patient who required re-intubation within 1 h was at risk for uncontrolled and emergent intubation. Due to sample size limitations, we were unable to document significant differences in the 2 groups. We have presented these data to initiate a conversation and possibly encourage further study of this patient population. A comparison of patients who required re-intubation within 1 h versus those who required re-intubation within 48–72 h is interesting; however, this, as Da Silva et al pointed out, is beyond the scope of our paper. The authors correctly note that patient illness severity would impact the risk of re-intubation. Unfortunately, we had not implemented routine disease severity scoring at the time of this project, and these data were not available. We agree with their assessment that our rate of reduction of unplanned extubation from 3.55 to 2.59 per 100 intubation days is not substantial. This difference was not statistically significant, and the Hawthorne effect cannot be excluded. A statistical process control measure, such as a control chart, would be an ideal representation of the process improvement to document change and to differentiate common cause from special cause variation. This was a limitation of the pre- and post-intervention study design with no washout period. Although accounting for Hawthorne effect is important in research studies, quality improvement is essentially a continuous process, and any improvement, even if it is the result of the measurement itself rather than the effect of any intervention, is welcome.

Finally, we believe that although it is appropriate and helpful to have a benchmark value for the unplanned extubation rate, actual rates depend on a multitude of factors, including patient population, staffing, and policies. A real benchmark that is generalizable across a broad range of pediatric ICU types and sizes is a welcome addition and will be a great help in working within our institutions to improve patient safety and outcomes.

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