Peer Review File

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#Reviewer A

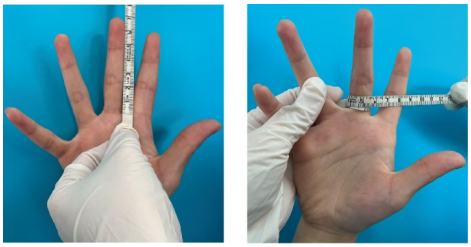
1. **Well drafted article, limitations are also quoted well. Just need to add the detailed of measurement like what instrument / caliper was used to measure the length and circumference.**

Response: Thank you for bringing up this point. We have now included the detailed of measurement. The length and circumference of the middle finger was measured by a clean, soft tape measure. Please refer to Page 6 lines 192-193 of the revised version of the manuscript: The length and circumference of the middle finger were measured using a clean, soft tape measure.

2. **Also can add pic of measurement**

Response: Thank you for your reminding, and we have added the demonstration of the measurements. Please refer to Page 6 lines 196-197 of the revised version of the manuscript: The demonstration of the measurements was shown in Figure 1.

Figure 1 The photograph illustrating the methodology for middle finger measurements from the hand of the author. (A) The length of the middle finger. (B) The circumference of the middle finger.



(A) (B)

#Reviewer B

1. **Methodology is ok and question is of high importance to the community. I would have like numbers to have a clear view of how much your proposal outperform the classical test**

Response:

Thank you for your comment regarding the need for numerical data to demonstrate the superiority of our proposal over classical tests. In our study, we employed linear regression to investigate the correlation between middle finger length, middle finger circumference, and a combination of both with cuffed tracheal tube size. The predictive performance of these models was evaluated using MAE, RMSE, and prediction accuracy, which were comprehensively presented in Table 2.

Given the complexity of the regression formula based on both middle finger length and middle finger circumference, we found it unsuitable for clinical practice. However, linear regression using individual middle finger measurements demonstrated higher predictive power than traditional age-based formulas, with the formula based on middle finger circumference exhibiting even better performance. Specific values for MAE, RMSE, and prediction accuracy are now included in the Results section of the abstract for your reference. Please refer to Page 2, Lines 63-67 of the revised manuscript: Notably, the regression equation based on the middle finger circumference obtained the higher predictive accuracy of 0.590, with an MAE of 0.259 and an RMSE of 0.333 as opposed to the predictive accuracy of 0.391, MAE of 0.349, and RMSE of 0.473 derived from conventional age-based formulas.

Furthermore, we established a simplified formula based on the regression model for middle finger circumference, designed to enhance its suitability for clinical applications. This simplified formula also demonstrated superior prediction accuracy when compared to traditional age-based formulas. Specific details and values for the simplified formula's MAE, RMSE, and prediction accuracy can be found in Table 3 for your reference.

Table 2 The prediction performance of different linear regression models

Prediction Accuracy Metrics	Single-Variable Models			Multiple-Variable Models	
	Middle finger circumference	Middle finger length	Age-based formula	Model 1	Model 2
MAE	0.259	0.279	0.349	0.226	0.221
RMSE	0.333	0.360	0.473	0.283	0.278
Prediction accuracy (95% CI)	0.590 (0.530–0.650)	0.559 (0.499–0.620)	0.391 (0.332–0.450)	0.613 (0.554–0.672)	0.642 (0.576-0.708)
Prediction accuracy within 0.5 mm (95% CI)	0.966 (0.943–0.988)	0.962 (0.938–0.985)	0.923 (0.891–0.956)	0.989 (0.976–1.000)	0.985 (0.969-1.000)

MAE, mean absolute error; RMSE, root mean square error; CI, confidence interval; Model 1, middle finger circumference + length; Model 2, Middle finger circumference + length+age+ Body Mass Index.

Table 3 The prediction performance of simplified formula

Formula	MAE	RMSE	Prediction accuracy (95% CI)	Prediction accuracy within 0.5 mm (95% CI)
Eq. [7]	0.292	0.364	0.517 (0.457–0.578)	0.973 (0.954–0.993)
Eq. [8]	0.323	0.413	0.487 (0.426–0.547)	0.935 (0.905–0.965)

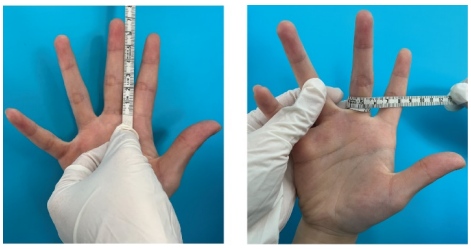
MAE, mean absolute error; RMSE, root mean square error; CI, confidence interval.
Eq. [7] Cuffed tracheal tube ID (mm)=middle finger circumference (cm)-0.2

Eq. [8] Cuffed tracheal tube ID (mm)=2+middle finger length (cm)/2

2. measuring the middle finger is simple but what do you use as a ruler? flexible ruler ?

Response: Thank you for your question. We employed a clean, soft tape measure to measure both the middle finger's length and circumference. To enhance clarity, we have included a demonstration of this measurement process which were presented in Figure 1 . Please refer to Page 6, Lines 192-193 of the revised manuscript: The length and circumference of the middle finger were measured using a clean, soft tape measure.

Figure 1 The photograph illustrating the methodology for middle finger measurements from the hand of the author. (A) The length of the middle finger. (B) The circumference of the middle finger.



(A) (B)

3. please modify the phrase The appropriate size of the cuffed tracheal tube was defined as the size when the air leak pressure was 10–25 cmH2O. that is not clear enough

Response:

Thanks for your question. In our study, we defined the appropriate size of the cuffed tracheal tube based on the following criteria:

If resistance was encountered during the insertion of the tracheal tube into the trachea or if airway pressure exceeding 25 cmH_2O was required to detect an audible leak, we replaced the tube with an internal diameter (ID) that was 0.5 mm smaller before cuff inflation. Conversely, if a audible leak occurred at a airway pressure <10 cmH_2O or if the peak pressure exceeded 25 cmH_2O, or if a cuff pressure >25 cmH_2O was required to seal, we replaced the tube with the next largest size, which had a 0.5 mm larger ID. We have modified it in the Methods section of the Abstract. Please refer to Page 2, Lines 44-47 of the revised manuscript: The appropriate cuffed tracheal tube size was determined based on specific criteria. If the tube encountered resistance during insertion or required an airway pressure > 25 cmH_2O to detect an audible leak, it was replaced with a tube 0.5 mm smaller. Conversely, if an audible leak occurred at an airway pressure <10 cmH_2O, or peak pressure >25 cmH_2O, or the cuff pressure > 25 cmH_2O to achieve a seal, the tube was exchanged for one with a 0.5 mm larger.

#Reviewer C

1. First of all, my major concern for this study is the unclear external validity of the

linear prediction model of cuffed tracheal tube size. The authors also did not consider multiple factors in the prediction model such as the addition of age and BMI since the R2 is still lower than 0.8.

Response:

Thank you for your valuable feedback. We appreciate your concern regarding the external validity of our linear prediction model for cuffed tracheal tube size. We acknowledge this concern and have stated in the limitations section of our manuscript that this was a single-center study. To address this limitation, we plan to conduct further studies and validation experiments to assess the model's performance across diverse patient populations and clinical settings. Please refer to Page 12, Lines 368-370 of the revised manuscript: Consequently, further researches are needed to assess the applicability of the proposed formulas across diverse patient populations and clinical settings.

We initially performed linear regression separately on middle finger length and middle finger circumference, resulting in R^2 values below 0.8. Despite this, these models demonstrated superior predictive performance compared to traditional age-based formulas, evidenced by lower MAE and RMSE, along with higher prediction accuracy.

Subsequently, we combined middle finger length and middle finger circumference, achieving an R^2 of 0.83. However, we found that this regression formula was overly complex and not suitable for clinical promotion. In response to your suggestion, we introduced the two simplest baseline indicators, age and BMI, into our linear regression model. This resulted in an R^2 value of 0.82, and the model's predictive performance did not see significant improvement. Additionally, the complexity of the model increased. The specific MAE, RMSE, and prediction accuracy values for these models were presented in Table 2, providing a comprehensive assessment of their performance

In consideration of clinical utility, we recommend using a formula based on middle finger circumference, which outperformed traditional age-based formulas in terms of prediction accuracy.

Please refer to Page 9, Lines 273-276 of the revised manuscript: When incorporating the most basic demographic information of age and BMI, the model did not show further improvement, with an R^2 value of 0.82 ($P < 0.001$). The regression equation can be expressed as follows:

$$\begin{aligned}\text{Cuffed tracheal tube ID}(mm) = {} & 0.1350 \times \text{middle finger length}(cm) \\ & +0.4908 \times \text{middle finger circumference}(cm) + 0.0703 \times \text{age}(years) \\ & -0.0045 \times \text{BMI}(kg/m^2)\end{aligned} \quad [6]$$

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Please refer to Page 9, Lines 284-287 of the revised manuscript: While the linear regression models combining middle finger circumference, middle finger length, and a model including age and BMI demonstrated superior predictive performance, their complexity presented challenges in terms of practical clinical application.

Table 2 The prediction performance of different linear regression models

Prediction Accuracy Metrics	Single-Variable Models			Multiple-Variable Models	
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Prediction accuracy within 0.5 mm (95% CI)	0.966 (0.943–0.988)	0.962 (0.938–0.985)	0.923 (0.891–0.956)	0.989 (0.976–1.000)	0.985 (0.969-1.000)

MAE, mean absolute error; RMSE, root mean square error; CI, confidence interval; Model 1, middle finger circumference + length; Model 2, Middle finger circumference + length+age+ Body Mass Index.

2. **Second, the title needs to indicate the research focuses of this study, the development a prediction model and its predictive accuracy.**

Response: Thanks for your suggestion, we have changed the title of the article. Please refer to Page 1, Lines 3-4 of the revised manuscript: The Development of Prediction model for cuffed tracheal tube size from the middle finger in pediatrics: a concise and feasible approach

3. **Third, the abstract needs some revisions. The background should be correctly described the research focuses of this study, not the correlation between cuffed tracheal tube size and middle finger measurements. The methods need to describe the inclusion of subjects, the assessment of potential factors including middle finger measurements, and the measurement of cuffed tracheal tube size. The results need to briefly describe the clinical characteristics of the study sample and the predictive accuracy parameters.**

Response:

Thanks for your suggestion. We have modified the background section of the abstract. Please refer to Page 2, Lines 37-40 of the revised manuscript: The aim of this prospective study was to investigate whether middle finger measurements correlate with cuffed tracheal tube size and to further develop a prediction model based on these measurements.

In the methods section of the abstract, we enrolled the patients under 12 years of age scheduled for elective surgery involving tracheal intubation. Middle finger measurements were taken using a soft tape measure, with middle finger length measured from the tip of the distal metacarpal to the palm's root on the palm side, and circumference measured at the base of the palm using a soft tape measure. Please refer to Page 2, Lines 41-44 of the revised manuscript: Patients under 12 years of age scheduled for elective surgery involving tracheal intubation were enrolled in the study. The length was determined from the tip of the distal metacarpal to the palm's root on the palm side, while the circumference was measured at the base of the palm using a soft tape measure.

The appropriate size of the cuffed tracheal tube was defined based on the following criteria: If resistance was encountered during the insertion of the tracheal tube into the trachea or if a positive airway pressure exceeding 25 cmH_2O was required to detect an audible leak, we replaced the tube with an internal diameter (ID) that was 0.5 mm smaller before cuff inflation. Conversely, if an audible leak around the tube occurred at a positive airway pressure <10

cmH_2O or if the peak pressure > 25 cmH_2O, or if a cuff pressure >25 cmH_2O was required to seal, we replaced the tube with the next largest size, which had a 0.5 mm larger ID. We have modified it in the Methods section of the Abstract. Please refer to Page 2, Lines 44-50 of the revised manuscript: The appropriate cuffed tracheal tube size was determined based on specific criteria. If the tube encountered resistance during insertion or required an airway pressure > 25 cmH_2O to detect an audible leak, it was replaced with a tube 0.5 mm smaller. Conversely, if an audible leak occurred at an airway pressure <10 cmH_2O, or peak pressure >25 cmH_2O, or the cuff pressure > 25 cmH_2O to achieve a seal, the tube was exchanged for one with a 0.5 mm larger.

We appreciate the reviewer's suggestion to provide a brief overview of the clinical characteristics of our study sample and the predictive accuracy parameters. In response to this comment, we have included the following information in the revised manuscript. Please refer to Page 2, Lines 57-58 of the revised manuscript: A total of 261 patients were analyzed in our study. The mean age of the patients was 46.19+35.83 months.

Please refer to Page 2, Lines 63-67 of the revised manuscript: Notably, the regression equation based on the middle finger circumference obtained the higher predictive accuracy of 0.590, with an MAE of 0.259 and an RMSE of 0.333 as opposed to the predictive accuracy of 0.391, MAE of 0.349, and RMSE of 0.473 derived from conventional age-based formulas.

4. **Fourth, in the introduction of the main text, please explain why the middle finger measurements are potentially accurate for the prediction of cuffed tracheal tube size since high correlation cannot guarantee the satisfactory prediction accuracy. The authors did not review known factors influencing cuffed tracheal tube size, which may inform the development of the prediction model.**

Response:

Thank you for your feedback. We appreciate your concerns and suggestions. We found that past studies have shown that the width of finger was correlated to the tracheal tube size. Indeed, the high correlation cannot guarantee the satisfactory prediction accuracy. However, we were encouraged by a previous study that demonstrated the effectiveness of a simple formula based on middle finger length in predicting uncuffed tracheal tube size, surpassing traditional age-based formulas. Please refer to Page 4, Lines 122-127 of the revised manuscript: The fingers could be a simple indicator for the selection of the tracheal tube size. The width of the fifth finger has been proved to be related to the tracheal tube size. In a recent study, a simple formula based on middle finger measurements demonstrated significantly superior predictive accuracy for uncuffed tracheal tube size when compared to age-based formulas.

In response to your reminder, we have reviewed various known factors that influence cuffed tracheal tube size. A study used machine learning approach that incorporated multiple data points such as age, sex, BMI, and chest radiographs. Additionally, alternative imaging techniques, such as ultrasound, have gradually been incorporated into prediction strategies. These methods have demonstrated improved accuracy compared to conventional age-based formulas; however, their complexity and the requirement for advanced tools pose challenges to their widespread clinical adoption. In light of your suggestions, we introduced age and BMI as the two simplest baseline indicators into our regression model. However, we found that this addition did not significantly improve the model's predictive performance, and it increased the

complexity of the regression formula when combined with middle finger length and middle finger circumference. We have revised the Introduction of the main text, please refer to Page 4, Lines 116-122 of the revised manuscript: Machine learning has also been introduced to prediction using multiple data, encompassing age, sex, height, weight, BMI, BMI classification, ideal BMI, and chest radiographs (1). Additionally, alternative imaging techniques, such as ultrasound, have gradually been incorporated into prediction strategies (2). However, despite their improved accuracy compared to age-based formulas, the complexity of these alternative methods and the requirement for advanced tools present obstacles to their widespread clinical adoption.

(1) Zhou M, Xu WY, Xu S et al. Prediction of endotracheal tube size in pediatric patients: Development and validation of machine learning models. Front Pediatr. 2022;10:970646.
(2) Park S, Shin S-W, Kim H-J et al. Choice of the correct size of endotracheal tube in pediatric patients. Anesth Pain Med (Seoul). 2022;17:352–60.

5. **Fifth, in the methodology of the main text, please accurately describe the clinical research design of this study, since an observational study is not accurate. The authors need to explain why the authors did not consider more factors in the prediction model, which may improve the predictive accuracy. In statistics, please describe the calculation of predictive accuracy parameters.**

Response:

Thank you for your comments. We have updated the research design from an observational study to a prospective study, ensuring a more accurate description of our clinical research design.

Please refer to Page 5, Lines 147-149 of the revised manuscript for further details: This prospective study was conducted between April 2023 and July 2023 after obtaining approval from the Ethics Committee of Shanghai Ninth People's Hospital (SH9H-2022-T414-1).

Page 5, Lines 153-154 of the revised manuscript for further details: This prospective study was conducted at a single center, specifically, at Shanghai Ninth People's Hospital.

In response to your suggestion, we incorporated age and BMI, two simplest baseline characteristics, into our prediction model. However, this addition did not yield a significant improvement in the model's predictive accuracy. Moreover, it increased the complexity of the regression equation, which could pose challenges for clinical application. Please refer to Page 9, Lines 273-276 of the revised manuscript: When incorporating the most basic demographic information of age and BMI, the model did not show further improvement, with an R^2 value of 0.82 ($P < 0.001$). The regression equation can be expressed as follows:

$$\begin{aligned}&\text{Cuffed tracheal tube ID}\left(mm\right)=0.1350\times\text{middle finger length}\left(cm\right)\\&+0.4908\times\text{middle finger circumference}\left(cm\right)+0.0703\times\text{age}\left(years\right)\\&-0.0045\times\text{BMI}\left(kg/m^2\right)\end{aligned}\quad[6]$$

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Please refer to Page 9, Lines 284-287 of the revised manuscript: While the linear regression models combining middle finger circumference, middle finger length, and a model including age and BMI demonstrated superior predictive performance, their complexity presented challenges in terms of practical clinical application.

In the statistical methods section, we have included explanations for predictive accuracy parameters. Specifically, MAE (Mean Absolute Error) represents the mean of the absolute differences between the predicted values generated by our regression model and the actual values of the variable. RMSE (Root Mean Square Error) is the square root of the mean of the squared errors, where errors are the differences between predicted values and actual values. Additionally, prediction accuracy is calculated as the ratio of correct predictions to the total number of predictions. Specific descriptions and calculation formulas for these parameters are now included in the methods section. Please refer to Page 7, Lines 218-224 of the revised manuscript for further details: MAE and RMSE were calculated as follows:

$$MAE = \frac{|y_i - y_p|}{n} \quad [1]$$

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$$RMSE = \sqrt{\frac{\sum (y_i - y_p)^2}{n}} \quad [2]$$

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Where "y_i" represents actual value, "y_p" stands for the predicted value predicted value and "n" was number of observations. The prediction accuracy was the ratio of correct predictions to total number.