

PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (<http://bmjopen.bmj.com/site/about/resources/checklist.pdf>) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

This paper was submitted to a another journal from BMJ but declined for publication following peer review. The authors addressed the reviewers' comments and submitted the revised paper to BMJ Open. The paper was subsequently accepted for publication at BMJ Open.

ARTICLE DETAILS

TITLE (PROVISIONAL)	GlideScope Video Laryngoscopy versus Direct Laryngoscopy in the Emergency Department: A Propensity Score-Matched Analysis
AUTHORS	Choi, Hyuk Joong; Kim, Young-Min; Oh, Young Min; Kang, Hyung Goo; Yim, Hyun Woo; Jeong, Seung Hee

VERSION 1 - REVIEW

REVIEWER	Rutherford, John Dumfries & Galloway Royal Infirmary, Department of Anaesthesia
REVIEW RETURNED	29-Oct-2014

GENERAL COMMENTS	Thank you for this substantial research project on a valuable topic. I had three methodological points on reading your paper, and a number of typographical errors and suggestions for clearer writing. You have done some complex adjustment and sampling of your airway registry. There were 4 primary analyses (table 2) and 20 secondary analyses (tables 3 and 4). Was allowance made for multiple testing? The significance was taken at 0.05 or one in twenty which with 20 secondary analyses would be likely to have at least one analysis at the significance level just by normal variation. You have used the Intubation Difficulty Score which may not give a reliable comparison between direct laryngoscopy and videolaryngoscopy. This probably needs addressed in the discussion. (McElwain J, Simpkin A, Newell J, Laffey JG. Determination of the utility of the Intubation Difficulty Scale for use with indirect laryngoscopes. <i>Anaesthesia</i> 2011; 66: 1127-33) Typos and clarity: Abstract, objective. "use of GVL improve first-attempt" This is your first use of the abbreviation GVL so I would write Glidescope Video Laryngoscopye and put the GVL in brackets. "improve" should be "improves". Abstract, results. "first-attempt success and intubation failure rates with a GVL compared to a MAC were 0.76 (0.56-1.04)(p=0.084) and 1.03 (0.99-1.07)(p=0.157), respectively." I had to read this a couple of times to be sure I had got it the correct way round. I would suggest rewriting "first-attempt success rates with a GVL compared to a MAC were 0.76 (0.56-1.04)(p=0.084) and the respective failure rates 1.03 (0.99-1.07)(p=0.157)." Or similar. Methods, study design and setting. 5th sentence (page 5, layout line
-------------------------	--

	14) "as trainee or instructors." should be "as trainees or instructors." Methods, methods and measurements. (page 6, layout line 8, and 55) I would capitalise the "intubation difficulty scale" to "Intubation Difficulty Scale" Page 5 data collection and figure of diagram for patient selection. You made a good effort to get the best data with daily review of data entry at your sites. Did you get everyone? You may not know, but if it is possible to record patients who failed to get entered onto the database it would be nice. Statistical Analysis, (page 6 layout line 33) Is the 10% difference between groups absolute or relative? I take it was absolute. (page 6 layout line 49). "A total of 15 covariates..." I see 11 covariates described below this. Results, main results. (page 9 layout line 8) You have said earlier that your level of significance was $p < 0.05$ with a 10% difference between groups. Yet you say that the overall first-attempt success rates were significantly better with GVL than MAC when there is less than 10% difference between groups (85.7% vs 82.3%) and the p value was greater than 0.05. 0.051 is not much greater, but it certainly is not less than 0.05. Please rewrite this paragraph. The tables have MAC values written first, and GVL values in the following column whilst the relative risk values are written GVL vs MAC. It would be easier to follow if either the GVL column was displayed first and then MAC column, or the relative risk values were MAC vs GVL. I was having to work backwards with the numbers and had a knock on effect when I read the relative risk values in the paper and went back to the tables to check. Page 13 layout lines 10-12. Reference 10 describes the view of the videoscope being impaired or obscured by fogging, mucus or blood and the challenges of the view from the videoscope not being in a direct line from the mouth, but I don't think "lens corruption" is an adequate description. Perhaps something like: "The view of the glottis (or "glottic view" not "glottis view") may be impaired by condensation of water vapour on the lens or obscured by mucus, blood or vomit."
--	---

REVIEWER	Nutbeam, Tim West Midlands Deanery, Emergency Medicine
REVIEW RETURNED	27-Oct-2014

GENERAL COMMENTS	This paper is well written (minor grammatical / language errors) and addresses an important subject. The methods and statistics are clear and well described. Concerns: - You have previously published from this same (or very similar) database (different time periods), you do not describe or explain how/ why you constrained your analysis to the dataset described in the study. - It is unclear how you have dealt with "null" values within the difficult airway assessment section. Describe how these were dealt with and how this may affect your results. - Your propensity score matching includes "degree of intubation difficulty" matching for this outcome may not be appropriate (as its outcome is likely a composite of the other data you are already matching for: practitioner experience / markers of difficult airway assessment / procedure failure etc - this may introduce a form of
-------------------------	--

	incorporation bias). - the discussion section (though containing many valid points) could be streamlined - there are minor spelling and syntax errors which can be easily corrected
--	---

VERSION 1 – AUTHOR RESPONSE

Reviewer 1

Comment 1:

You have previously published from this same (or very similar) database (different time periods), you do not describe or explain how/ why you constrained your analysis to the dataset described in the study.

Answer 1:

Our study group has previously published a descriptive study about the GlideScope use in EDs using the data from six academic hospitals from 2006 to 2008 (Choi HJ, et al. *Emerg Med J* 2010;27:380-2). In the study, the number of intubation using the GlideScope was 303 cases. The number was not sufficient to run the propensity score matched analysis. For the reason above we gathered more data to perform the analysis. The reason that data from previous two hospitals were excluded from participating in this study was that the investigators of those hospitals did not participate in this study. We have added this information to second paragraph in *Discussion* section of the revised manuscript (page 11, layout line 22 -27 and page 12, layout line 1 -2).

Comment 2:

It is unclear how you have dealt with "null" values within the difficult airway assessment section. Describe how these were dealt with and how this may affect your results.

Answer 2:

Difficult airway assessment is not easy in an emergency situation. Thus, many cases could not be completely evaluated the intubation difficulty in our registry. The null values, any data was not recorded within the difficult airway assessment section, were regarded as absence of the difficulty predictor. Since these evaluation failures could reflect the urgency of the situation indirectly, we used it as a covariate for the propensity score model. We have added this information to the second paragraph in *Statistical analysis* section of the revised manuscript (page 7, layout line 1 -3).

Comment 3:

Your propensity score matching includes "degree of intubation difficulty" matching for this outcome may not be appropriate (as its outcome is likely a composite of the other data you are already matching for: practitioner experience / markers of difficult airway assessment / procedure failure etc - this may introduce a form of incorporation bias).

Answer 3:

Although we used a popular prediction method, the predicted difficult airway could not often reflect the actual difficulty during emergency intubation. Furthermore, unpredicted factors made the intubation difficult. Although use of the Intubation Difficulty Scale or the degree of the intubation difficulty as matching covariates may introduce a form of incorporation bias, we thought that the Intubation Difficulty Scale and degree of the intubation difficulty could reflect the actual difficulty during intubation. For the reasons, we used the Intubation Difficulty Scale and the degree of intubation difficulty as matching variables for propensity score model. We have added this limitation to *Limitation* section of the revised manuscript (page 13, layout line 24-29).

Comment 4:

the discussion section (though containing many valid points) could be streamlined

Answer 4:

We have tried to streamline the discussion section according to the reviewers' comments.

Comment 5:

- there are minor spelling and syntax errors which can be easily corrected

Answer 5:

We have corrected spelling errors and typos according to the comments of the Reviewer 2

Reviewer 2

Comment 1:

You have done some complex adjustment and sampling of your airway registry. There were 4 primary analyses (table 2) and 20 secondary analyses (tables 3 and 4). Was allowance made for multiple testing? The significance was taken at 0.05 or one in twenty which with 20 secondary analyses would be likely to have at least one analysis at the significance level just by normal variation.

Answer 1:

Since the subgroup analyses of our study were exploratory analyses, we have interpreted the results according to its exploratory nature and suggested a new hypothesis on the discussion. Thus, we have not accounted the increase of family-wise type I error by running the multiple testing. We have clearly described this information of exploratory analyses in *Statistical analysis* section of the revised manuscript (page 7, layout line 15).

Comment 2:

You have used the Intubation Difficulty Score which may not give a reliable comparison between direct laryngoscopy and videolaryngoscopy. This probably needs addressed in the discussion. (McElwain J, Simpkin A, Newell J, Laffey JG. Determination of the utility of the Intubation Difficulty Scale for use with indirect laryngoscopes. Anaesthesia 2011; 66: 1127-33)

Answer 2:

We agree with the reviewer's concern regarding the utility of the Intubation Difficulty Score for the use with video laryngoscopy. Although we used a popular prediction method, the predicted difficult airway could not often reflect the actual difficulty during emergency intubation. Furthermore, unpredicted factors made the intubation difficult. Although use of the Intubation Difficulty Scale may perform less well with indirect laryngoscopes than the Macintosh laryngoscope, we thought that the Intubation Difficulty Scale can reflect the actual difficulty during intubation. For the reasons, we used the Intubation Difficulty Scale and the degree of intubation difficulty as matching variables for propensity score model. We have added this limitation to *Limitation* section of the revised manuscript (page 13, layout line 24-29).

Comment 3 :

Typos and clarity:

Abstract, objective. "use of GVL improve first-attempt" This is your first use of the abbreviation GVL so I would write Glidescope Video Laryngoscopye and put the GVL in brackets. "improve" should be "improves".

→ According to the comments, we inserted "(GVL)" after Glidescope Video Laryngoscope and corrected the typo.

Abstract, results. "first-attempt success and intubation failure rates with a GVL compared to a MAC were 0.76 (0.56-1.04)(p=0.084) and 1.03 (0.99-1.07)(p=0.157), respectively." I had to read this a couple of times to be sure I had got it the correct way round. I would suggest rewriting "first-attempt success rates with a GVL compared to a MAC were 0.76 (0.56-1.04)(p=0.084) and the respective failure rates 1.03 (0.99-1.07)(p=0.157)." Or similar.

→ According to the comments, we changed the sentence to "first-attempt success rates with a GVL compared to a MAC were 0.76 (0.56-1.04)(p=0.084) and the respective failure rates 1.03 (0.99-1.07)(p=0.157)."

Methods, study design and setting. 5th sentence (page 5, layout line 14) "as trainee or instructors." should be "as trainees or instructors."

→ According to the comments, we changed the phrase to "as trainees or instructors"

Methods, methods and measurements. (page 6, layout line 8, and 55) I would capitalise the "intubation difficulty scale" to "Intubation Difficulty Scale"

→ According to the comments, we capitalised all the "intubation difficulty scale" to "Intubation Difficulty Scale" in the manuscript.

Page 5 data collection and figure of diagram for patient selection. You made a good effort to get the best data with daily review of data entry at your sites. Did you get everyone? You may not know, but if it is possible to record patients who failed to get entered onto the database it would be nice.

→ Each ED had the case report forms for the individual patients. The site investigator compared the recorded data with the case report form of the individual patient and daily ED census to confirm all data were consecutively collected. We have added this information to *Methods* section of the revised manuscript (page 5, layout line 22-24).

Statistical Analysis, (page 6 layout line 33) Is the 10% difference between groups absolute or relative? I take it was absolute.

→ Yes, it was absolute difference.

(page 6 layout line 49). "A total of 15 covariates..." I see 11 covariates described below this.

→ Yes, we analysed 11 covariates. We fixed it.

Results, main results. (page 9 layout line 8) You have said earlier that your level of significance was p less than 0.05 with a 10% difference between groups. Yet you say that the overall first-attempt success rates were significantly better with GVL than MAC when there is less than 10% difference between groups (85.7% vs 82.3%) and the p value was greater than 0.05. 0.051 is not much greater, but it certainly is not less than 0.05. Please rewrite this paragraph.

→ According to the comments, we revised the paragraph like this: The overall first-attempt success rates were not significantly different, with 85.7% in the GVL group and 82.3% in the MAC group ($p = 0.051$); and the failure rates did not also differ between the groups (GVL vs. MAC, 8.3% vs. 10.0%; $p = 0.195$) in the crude analysis (page 9, layout line 11-13).

→ We also revised the second paragraph in discussion section like this: In the crude analysis, the GVL tended to yield a higher first-attempt success rate compare to the MAC but there was no statistically significant difference. After propensity score matching, no statistically significant difference was also founded in the first-attempt success rates between the two groups (page 11, layout line 3-5).

The tables have MAC values written first, and GVL values in the following column whilst the relative risk values are written GVL vs MAC. It would be easier to follow if either the GVL column was displayed first and then MAC column, or the relative risk values were MAC vs GVL. I was having to work backwards with the numbers and had a knock on effect when I read the relative risk values in the paper and went back to the tables to check.

→ We changed all tables according to the recommendation.

Page 13 layout lines 10-12. Reference 10 describes the view of the videoscope being impaired or obscured by fogging, mucus or blood and the challenges of the view from the videoscope not being in a direct line from the mouth, but I don't think "lens corruption" is an adequate description. Perhaps something like: "The view of the glottis (or "glottic view" not "glottis view") may be impaired by condensation of water vapour on the lens or obscured by mucus, blood or vomit."

→ According to the comments, we corrected the sentence like this: The glottic view may be impaired by condensation of water vapor on the lens or obscured by mucus, blood or vomit, which is the primary cause of failure.¹⁰ (page 13, layout line 3-5)