Can J Anesth/J Can Anesth (2019) 66:241–242
https://doi.org/10.1007/s12630-018-1236-6

CORRESPONDENCE

Canada: over-pressurized

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Received: 4 June 2018 / Revised: 14 August 2018 / Accepted: 19 September 2018 / Published online: 17 October 2018

To the Editor,

In reference to the article published by Miao *et al.*,[1] we would like to provide further insight into the practices of cuff pressure manometry in the context of the Canadian Anesthesiologists' Society (CAS) guidelines.[2] Miao demonstrated that 33/113 (29%) of endotracheal tube (ETT) cuffs and 8/14 (57%) of supraglottic airway (SGA) cuffs exceeded the recommended maximum pressures of 30 cmH_2O and 60 cmH_2O, respectively.[3,4] Palpation of the pilot balloon was reported as the most common method to determine appropriate ETT cuff pressure. Fifty of 66 respondents (76%) reported using cuff manometry less than once per month.

We conducted a two-part study: 1) a prospective evaluation of intraoperative ETT and SGA cuff pressures at four Saskatchewan hospitals, and 2) a Canada-wide survey of anesthesiologists' airway cuff management practices (see eAppendix, available as Electronic Supplementary Material). Research ethics board approval for both projects was obtained from the Regina Qu'Appelle Health Region and was exempted by the University of Saskatchewan Biomedical Research Ethics Board. Airway cuff pressures were measured in 101 patients aged 18 yr or older between April 2017 and January 2018. The primary study outcome was median ETT and SGA cuff pressures using a cuff manometer (VBM Medizintechnik GmbH, Sulz, Germany). We designed a survey regarding cuff pressure monitoring practices according to standardized recommendations for survey development including pre-testing, pilot testing, and clinical sensibility testing amongst anesthesia residents and staff anesthesiologists at our centre. The survey was then distributed to 1,661 CAS members.

Results from our practice audit found that the median [interquartile range (IQR)] SGA cuff pressure was 110 [62-120] cmH_2O, markedly above the recommended safe upper limit of 60 cmH_20 ($P < 0.001$).[4] The median [IQR] ETT cuff pressure was 48 [25-65] cmH_2O, also well above the recommended safe upper limit of 30 cmH_20 ($P < 0.001$).[3] ETT cuff pressures were within the proposed safe range (20–30 cmH_2O) in only 7/60 (12%) cases.[3] Supraglottic airway cuff pressures were below the recommended maximum in 10/41 (24%) cases, while 17/41 (41%) had cuff pressures above the measurable limit (120 cmH_2O).[4]

Our survey had a response rate of 215/1661 (13%). Pilot balloon palpation was reported by 109 of 215 respondents (51%) as the technique used to estimate cuff pressure, while 101/215 (47%) reported using cuff manometry. This reported use may be an overestimate considering only 60% of centres had cuff manometers immediately available and only 24% and 42% of respondents could identify the recommended safe SGA and ETT cuff pressures (Table).[3,4] Common reported barriers to cuff manometry use are the lack of availability, perceived lack of clinical evidence, and "laziness".

In summary, knowledge translation regarding the importance and implementation of airway cuff pressure management is limited. Airway cuff pressures in clinical practice often exceed recommended safe limits and are underestimated by anesthesiologists. Manometers should

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s12630-018-1236-6) contains supplementary material, which is available to authorized users.

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Table Responses to survey questions

Cuff measurement technique (n = 215)	Palpation 51% (109)	Manometry 47% (101)	MLT 24% (52)	MOV 22% (47)	None 16% (35)
Who inflates cuff (n = 215)	Anesthesiologist 80% (173)	Nurse 44% (95)	Anesthesia assistant 29% (61)	Other 7% (16)	
Frequency of manometer use with ETT (n = 211)	Not used 78 (37%)	1–25% of cases 50 (24%)	26–50% of cases 7 (3%)	51–75% of cases 0 (0%)	76–100% of cases 61 (29%)
Frequency of manometer use with SGA (n = 210)	Not used 123 (59%)	1–25% of cases 31 (15%)	26–50% of cases 9 (4%)	51–75% of cases 6 (3%)	76–100% of cases 41 (20%)
Cuff manometers "immediately available"? (n = 210)	No 82 (39%)	Yes 128 (61%)			
Recommended maximum ETT cuff pressure (n = 204)	Unsure 58 (28%)	10 cmH_20 22 (11%)	20 cmH_20 83 (41%)	30 cmH_20 90 (44%)	40 cmH_20 9 (4%)
Recommended maximum LMA 4 classic cuff pressure (n = 203)	20 cmH_20 52 (26%)	40 cmH_20 37 (18%)	60 cmH_20 52 (26%)	80 cmH_20 0 (0%)	

* Responses are in % (n); participants may have selected more than one response; thus, percentages do not sum across responses to 100%. ETT = endotracheal tube; LMA = laryngeal mask airway; MLT = minimal leak technique; MOV = minimal occlusive volume; SGA = supraglottic airway

be used routinely as cuff pressures inflated using other methods are typically outside the recommended range. Our study adds to Miao's results by demonstrating that current clinical practice does not meet current guidelines and potentially exposes patients to harm.[3-5] Our study offers some insight into the barriers to the regular use of cuff manometry, notably a common lack of availability.

Acknowledgements The researchers gratefully acknowledge the assistance of the Saskatoon Health Region and the Regina Qu'Appelle Health Region. We also acknowledge the support of Dr. David Campbell and Dr. Theo LeRoux as the anesthesiology department heads in Saskatoon and Regina.

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Editorial responsibility This submission was handled by Dr. Gregory L. Bryson, Deputy Editor-in-Chief, *Canadian Journal of Anesthesia.*

Funding sources Funding provided by the Department of Anesthesiology, Perioperative Medicine and Pain Management at the University of Saskatchewan for survey distribution to Canadian Anesthesiologists' Society members.

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