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Endotracheal tube cuff pressure in intensive care unit: the need for pressure monitoring

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Sir: Endotracheal tube cuff pressure (CP) should be in the range of 15–22 mmHg to avoid complications related to underinflation (aspiration and leakage) and overinflation (tracheal wall ischemia, stenosis and tracheo-esophageal fistulae). Cuff overinflation (CP > 22 mmHg) is frequent (40–80%), both in intensive

care unit (ICU) patients [1, 2] and in patients under general anesthesia [3, 4]. In contrast to the case in the operating room the impact of the implementation of a routine cuff pressure monitoring protocol on reducing the incidence of cuff overinflation in the ICU has not been evaluated. We therefore conducted a prospective before-after study in a 16-bed ICU to (a) evaluate the values of CP before the implementation of a cuff pressure monitoring protocol and (b) to determine the protocol's impact on reducing cuff overinflation 1 month and 3 years later. The study was conducted over three 1-month periods (P1, P2, and P3). During the first period (P1) the paramedical team was not aware of the study. At the end of P1 preliminary results were communicated to the staff during a briefing on the cuff pressure monitoring protocol. This program consisted of the nursing staff performing routine CP measurements and recording the CP values on the patient charts. Measurements were made during every

team shift or whenever there was a manipulation that could potentially modify the CP. The objective was to obtain the minimal pressure necessary to prevent an audible leak around the tube cuff without exceeding 22 mmHg. CP, diastolic (DAP), and mean (MAP) arterial pressures were measured daily. Over the three periods 293 measurements were made in 103 patients. Between the three periods there were no significant differences in demographic data or in the number of patients and CP measurements (Table 1). Both mean CP and overinflation rate were significantly higher in P1 than in P2 and P3 (Table 1). In P3 the rate of underinflation was higher than in P2. There were significantly more cases with CP > DAP and CP > MAP in P1 than in P2 and P3 (Table 1). In comparison to our first period, Spittle and Beavis [1] performed a regional telephone request in 22 UK ICUs and found that only 13% of units measured CP routinely. There was a lack of knowledge among the nursing staff

Table 1 Main admission characteristics of the patients and main results obtained during the three periods of the study: before protocol (P1), 1 month after protocol (P2), and 3 years after protocol (P3) (CP cuff pressure, BMI body mass index, SAP systolic arterial pressure, DAP diastolic arterial pressure, MAP mean arterial pressure, SAPS II Simplified Acute Physiology Score)

	P1	P2	P3	<i>p</i> : P2 vs. P1	<i>p</i> : P3 vs. P1
Number of patients	30	41	32	–	–
Number of CP measurements	93	101	99	–	–
Age (years)	53 ± 11	51 ± 14	54 ± 14	0.09	0.12
Sex ratio (M/F)	1.0	1.2	1.0	0.73	0.98
BMI	22 ± 6	22 ± 5	21 ± 6	0.76	0.36
SAPS II score	43 ± 4	45 ± 4	45 ± 6	0.48	0.56
Cause of admission				0.74	0.62
Medical	39 (42%)	40 (40%)	45 (45%)		
Surgical	54 (58%)	61 (61%)	54 (55%)		
Tube size				0.41	0.99
7.0–7.5	46 (50%)	56 (55%)	49 (50%)		
8.0–8.5	47 (50%)	45 (45%)	50 (50%)		
SAP (mmHg)	140 ± 24	127 ± 32	128 ± 24	0.11	0.21
DAP (mmHg)	67 ± 12	67 ± 14	65 ± 13	0.86	0.75
MAP (mmHg)	90 ± 14	89 ± 15	86 ± 16	0.72	0.68
Mean CP (mmHg)	42 ± 22	26 ± 3	21 ± 19	<0.001	<0.001
CP					
≤ 15 mmHg	5 (6%)	8 (8%)	40 (40%)	0.50	<0.001
15–21.9 mmHg	16 (17%)	69 (68%)	28 (28%)	<0.001	0.07
> 22 mmHg	72 (77%)	24 (24%)	31 (31%)	<0.001	<0.001
CP > DAP	22 (24%)	3 (3%)	6 (6%)	<0.001	<0.001
CP > MAP	10 (12%)	2 (2%)	2 (2%)	0.01	0.01

as well; 67% of senior nurses did not know the recommended range of intracuff pressure [1]. In another study CP was not monitored in 75% of ICUs [2]. A recent report found that 38% of nurses in 11 different ICUs believed that the only aim of the cuff is to prevent extubation by maintaining the tube in the trachea, and 50% did not consider themselves sufficiently trained to manage CP monitoring [5].

Our study confirms that, in the absence of routine monitoring of endotracheal tube CP, the overinflation rate is too high in the majority of cases (two of three patients). Routine monitoring of CP seems to be as useful and necessary in ICU as it is in the operating room in reducing the incidence of overinflation.

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