

Feasibility of Helmet-delivered Continuous Positive Airway Pressure in Very Low Birthweight Infants

We describe our experience with helmet-delivered continuous positive airway pressure in five preterm newborns. We analyzed oxygen requirement, arterial oxygen saturation, respiratory rate, medium arterial pressure, heart rate, apneic spells and patient's comfort. The patients' vital signs or pain scale were not different before and after treatment.

Keywords: CPAP, Noninvasive ventilation, Prematurity, Respiratory distress syndrome.

Helmet-delivered continuous positive airway pressure (CPAP) is a different interface for the delivery of CPAP when nasal CPAP (nCPAP) is contraindicated as in cleft lip or palate, or in patients with nasal lesions. The Gregory box, developed in the late Sixties, is clearly the forerunner of this helmet [1]. The purpose of this paper is to describe our experience with helmet-delivered CPAP in five very low birth weight (VLBW) infants.

The Infant-Low helmet (CaStar; Starmed, Mirandola, Italy) is made of a clear latex-free flexible material. It is fastened by a harness called 'baby-body' that is connected to an elastic collar ensuring a good seal without compression of the patient's body; in preterm infants, this collar surrounds the body next to the armpits. The input port is connected to an air-oxygen mixer that enables the determination of the desired flow and fraction of inspired oxygen and the output port is connected to a positive end-expiratory pressure valve that allows the regulation of the CPAP level. According to manufacturer's recommendations, we used an input flow of >20 Lpm to avoid CO₂ rebreathing [2,3]. We used a mean CPAP of 7 cmH₂O (95% CI 5.5-8.5 cmH₂O). We measured transcutaneous oxygen saturation, heart rate, non-invasive mean blood pressure, respiratory rate and the Neonatal Infant Pain Scale (NIPS) score [4], nine hours before helmet-delivered CPAP and nine hours after. All parents consented to inclusion of their children's data in the study.

All patients were neonates born at 32 weeks of gestational age or less, and VLBW at birth; none of them showed signs of pain or discomfort. All responded well to treatment, which enabled CPAP discontinuation in 48-72

hours. The median age at initiation of Helmet device was 4.5 weeks. All patients survived till discharge; none of them developed intraventricular hemorrhage (IVH) or white matter disease, and just one was diagnosed as grade II retinopathy of prematurity. Hearing tests were normal in all patients at discharge.

Helmet devices have been tested previously in preterm infants [5], but has not been used in VLBW infants. An earlier study in preterm infants suggested that use of Helmet CPAP reduces cerebral blood flow in the immature brain and could potentially increase the risk of IVH [6]; that is why we used it only after the acute phase of respiratory instability, when the risk for IVH is very low. High noise levels are also a concern in preterm patients, but as published earlier, noise levels are in an acceptable range using earmuffs and filters [7]. The principal limitations of the device are the difficulty to access infants for suction or manipulation, and that it lacks an alarm system when there is loss of pressure inside the chamber.

In conclusion, Helmet CPAP could be an option in newborns when nCPAP is contraindicated.

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Recall Type vs Problem-based Tests for Formative Assessment in Undergraduate Medical Students

We studied two types of formative assessment: recall type, and problem-based questions, with summative scores and previous grades in 77 fourth-year medical students. We found that the formative scores did not correlate well with the summative scores, but were associated with the Grade point average in the preclinical period.

Keywords: *Feedback, Prediction, Summative assessment.*

During undergraduate training of medical students, there should be in-course formative assessment (FA) to provide feedback on performance, so as to promote better learning outcomes [1]. By contrast, summative assessment (SA) is an end-of-course assessment; it is predominantly used for grading and certification at the end of a study period, often without feedback to students on their performance [2,3].

However, the reliability and standardization of FAs is still uncertain [4]. So far, no studies have been undertaken on the impact of FA or type of questions used during FA [5]. Usually one type of MCQs is of recall-type questions, which are short questions about theory. The second type involves problem-based questions, which require critical thinking. Although, feedback on the performance is more important in formative assessment, rather than type of questions. The purpose of the present study was to compare the two types of FA with the final examination results and previous grade.

We studied fourth-year medical students who enrolled in the Department of Medicine at our university from April 2015 to March 2016. There were four groups, each with 19 or 20 students. The students took a formative examination, which consisted of 50 recall-type and 50 problem-based MCQs. At the end of the course, all the students underwent an SA with 50 recall-type and 50 problem-based

MCQs. For the MCQs, we had two sets of questions (*i.e.*, two sets of recall-type and two sets of problem-based questions) and alternated the questions that appeared between the groups. We did not return the examination papers to the students, thereby eliminating the risk of the content being circulated among students who had yet to take an examination.

We observed that the FA scores (either recall or problem-based) significantly correlated with Grade Point Average (GPA) for years 1–3 ($r=0.33$, $P=0.003$). The final examination scores (SA) also correlated significantly with GPA ($r=0.42$, $P<0.001$); the recall type of FA showed significant correlations with the summative score ($r=0.24$, $P=0.036$); though, the degree of correlation was not high. The problem-based type of examination displayed no significant correlation with the final examination scores ($r=0.15$, $P=0.18$). The total FA score evidenced a low correlation ($r=0.24$) with SA. The students obtained better scores at the end of the course. The mean formative and summative scores are represented in **Table I**.

We found that the GPA during the first three years of study also correlated with the FA and SA scores. This result indicates that most students who achieved good academic marks during their preclinical studies also obtained favorable results in their clinical years.

We conclude that FA using recall-type questions is associated with summative achievement. The formative

TABLE I FORMATIVE ASSESSMENT AND SUMMATIVE ASSESSMENT SCORES IN FOURTH-YEAR MEDICAL STUDENTS ($N=77$)

	<i>Mean (SD)</i>
Summative assessment	56.5 (7.84)
Recall, Formative assessment	49.1 (8.36)
Problem-based, Formative assessment	42.8 (7.73)
Total (recall+problem-based)	45.9 (6.52)

$P<0.001$ for all comparisons; Recall: percentage score of recall-type questions; Problem-based: percentage score of problem-based questions.