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## Pharyngeal and esophageal pressure measurements to evaluate respiratory mechanics in infants on high flow nasal cannula: A feasibility study

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### Abstract:

High-flow humidified nasal cannula (HFNC) is often used to relieve respiratory distress in children with acute pulmonary disease, although its effects on respiratory mechanics have not been objectively studied. The purpose of this study was to test the feasibility of measuring pharyngeal (PP) and esophageal (Pes) pressures of young children on HFNC oxygen therapy through a specifically designed new monitoring, acquisition, and elaboration system (MAES). Through MAES we recorded and elaborated Pes and PP tracings obtained through esophageal and pharyngeal catheters in a group of young children hospitalized in a Pediatric Intensive Care Unit because of respiratory distress. All traces were recorded during spontaneous breathing and on HFNC 1 and 2 L/kg/min. To determine the onset and the end of inspiration, the Pes and PP signals were synchronized with the inspiratory flow obtained by a flow transducer placed in the HFNC circuit. Direct measurement of inspiratory flow by a face mask pneumotachograph also allowed for inspiratory tidal volume (TV) measurement which was used together with Pes curve to build Campbell's diagram as well as the static lung and chest wall recoil curves required for pressure time product (PTP) evaluation. Using MAES we were able to obtain: time interval between the beginning of inspiratory effort and inspiration (Tdelay), TV, intrinsic positive end expiratory pressure (PEEPi), total inspiratory Pes variation ( $\Delta$ Pes), transpulmonary pressure at end of inspiration (Ptp<sub>ei</sub>), dynamic lung compliance (CL<sub>dyn</sub>), total lung resistance (RL<sub>tot</sub>) along with all the relevant components of the inspiratory work of breathing (WOB) and PTP. We believe that this new system will allow clinicians for a bedside monitoring of respiratory distress in infants treated with HFNC and to modify flow rates accordingly.

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