

Initiation breast pump technology: Integrating clinical scholarship and basic science research

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During the first 24 hours post-birth, the healthy infant breastfeeds approximately 11 times, but consumes only a total of 15 mLs of colostrum, which at first glance appears to be inefficient milk removal. However, available milk volume is limited, and milk flow is slow, so the infant uses a sucking rate and rhythm that is distinct from that used during established lactation. These differences are attributable to the fact that swallowing is less frequent and less protracted when milk volume and flow rate are limited. Frequent swallowing interrupts breathing, which in turn, directly affects sucking rate and rhythm. This uniquely human sucking pattern occurs during secretory activation--or the initiation of lactation, and there is evidence that it provides the breast with time-critical stimulation that may impact both short- and long-term milk synthesis. This decades-old science was the driver for the invention of the initiation pattern in the Symphony Breast pump, and reflects a back-and-forth endeavor between clinical researchers at Rush University Medical Center (Rush), basic science partners at University of Western Australia (UWA) and Medela researchers/engineers.

Similarly, the two-phase Symphony breast pump suction pattern (BPSP), developed and tested at UWA with healthy breastfeeding populations, was subjected to a blinded, randomized clinical trial with 105 mothers of premature infants in the Rush NICU and 3 affiliate sites. These studies demonstrated both the 1) feasibility of measuring percent of available milk removed (PAMR) in breast pump-dependent NICU mothers and 2) the two-phase BPSP PAMR data were comparable to those for a term breastfeeding infant. This study also revealed the first reported conditioning effect of BPSPs on maternal milk ejection.

Most recently, the Rush, UWA and Medela collaboration has spearheaded the use of milk biomarkers and pumped milk volume to measure secretory activation in mothers with premature infants in the NICU, with the goal of developing point of care testing and targeted interventions for at-risk mothers. Thus, this series of studies has been the catalyst for evidence-based protocols that “make pumping better” for NICU mothers, and can inform subsequent collaborative clinical science /basic science/industry-sponsored research initiatives.

References

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