Feeding as a Developmental Process:

Development of the Oral Motor System

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Feeding Fundamentals

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Part I

Anatomy and Oral Phase

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Objectives

- List the two kinds of sensory receptors in/around the larynx
- List at least one anatomical difference between infants and adults
- Describe the difference between compression and suction

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What do we Need to Know About Swallowing?

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Sensory Receptors in/Around Larynx

- Mechanoreceptors
  - Sensitive to touch
  - Sensitive to pressure
- Chemoreceptors
  - Sensitive to chemical irritants within the larynx
- Less effective in infants, where 80-97% of aspiration is silent

Gosa, 2013; Arvedson, et al., 1994; Weir, et al., 2011

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Anatomical Differences

- Oral space is filled by the tongue, supporting compression/suction of breast or bottle nipple
- Oral structures are vertically compressed
- Buccal pads provide stability
- Reduced length of pharynx
- Distance from oral cavity to upper esophageal sphincter is shorter
- Epiglottis has more contact with base of tongue

Tutor & Gosa, 2012; Gosa 2013

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Anatomical Differences

- Larynx ≈ 1/3 size of adult, and is more "funnel" shaped
- More elastic cartilage, with greater pliability
- Arytenoid and Cuneiform are larger by proportion
  - Easily compromised by edema, secretions, abnormal neuromuscular tone, smaller diameter
- Higher metabolic & oxygen demands = higher respiratory rates

Evans, 2018

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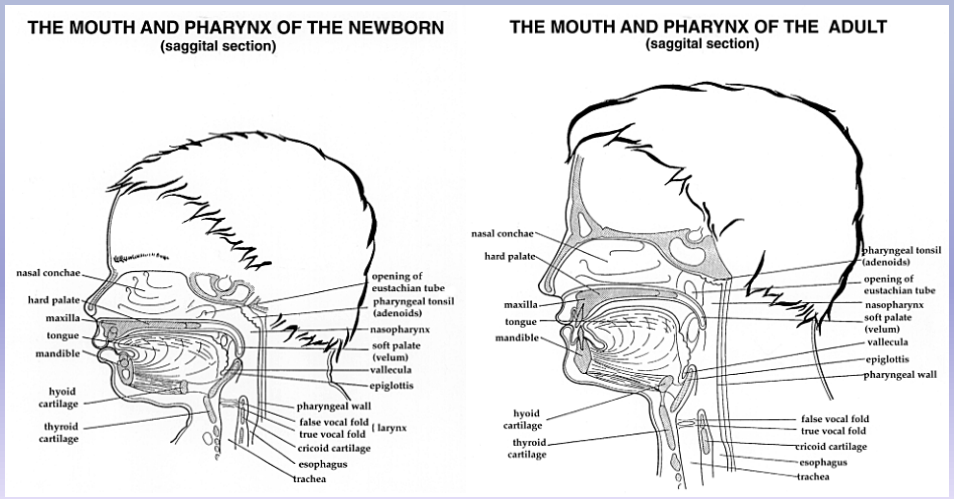
Anatomical Differences



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Phases of Swallowing

- Oral phase
- Triggering of the swallowing reflex
- Pharyngeal phase
- Esophageal phase

Dodrill and Gosa, 2015

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Infants Compared to Children

- In young infants:
  - Oral phase is involuntary
  - Tongue movements are unidirectional
  - Suckling movement is mediated by a central pattern generator
- In children:
  - Oral phase is voluntary
  - Tongue movements are multidirectional
  - Cortical control required to coordinate complex movements

Dodrill & Gosa, 2015

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Oral phase

- Expression of milk (or non-nutritive sucking)
- Transfer of milk from the posterior oral cavity to the pharynx in a bolus, using
  - Positive pressure (compression)
  - Negative pressure (suction)
- Includes jaw, tongue, and soft and hard palate

Tamura, et al., 1998

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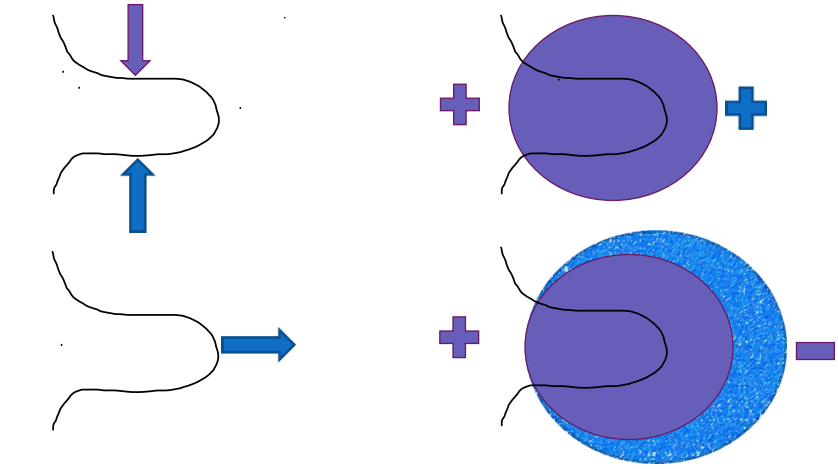
Two components of sucking



POSITIVE PRESSURE **NEGATIVE PRESSURE**

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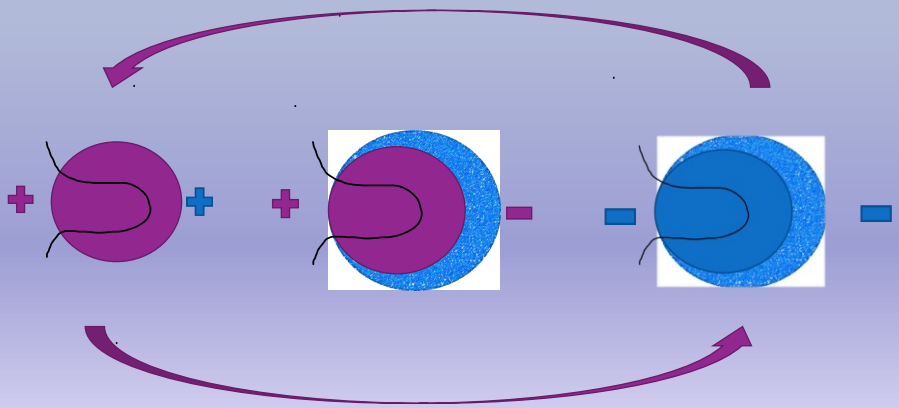
Vacuum effect (hard-sided bottles)



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Non-Nutritive Sucking (NNS)

- Quieting
- Deeper, regular respirations
- Increases in oxygen saturations
- Gastric retention decreased;
- Stimulation of gastric motor function, facilitating the digestive process

Pinelli & Symington, 2005

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Rhythm of NNS/NS

- Typically NNS= 2 sucks/second
- Typically nutritive suck (NS) = 1 suck/second
- Change in rhythm between NNS and NS is due in part to the need to swallow a bolus

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