ORIGINAL ARTICLE

Nasogastric Aspiration as an Indicator for Feed Absorption in Model-Based Glycemic Control in Neonatal Intensive Care

Cameron A. Gunn, B.E.(Hons.),[1] Jennifer L. Dickson, B.E.(Hons.),[1] James N. Hewett, B.E.(Hons.),[1]
Adrienne Lynn, M.B.Ch.B.,[2] Hamish J. Rose, B.E.(Hons.),[1] Sooji H. Clarkson, B.E.(Hons.),[1]
Geoffrey M. Shaw, M.B.Ch.B., FRACP, FFICANZCA, FJFICM,[3]
and J. Geoffrey Chase, B.Sc., M.S., Ph.D.[1]

Abstract

Background:

STAR (stochastic targeted) is a glycemic control model-based framework for critically ill neonates that has shown benefits in reducing hypoglycemia and hyperglycemia. STAR uses a stochastic matrix method to forecast future changes in a patient's insulin sensitivity and then applies this result to a physiological model to select an optimal insulin treatment. Nasogastric aspiration may be used as an indicator to suggest periods of care when enteral feed absorption is compromised, improving the performance of glycemic control. An analysis has been carried out to investigate the effect of poorly absorbed feeds on glycemic control.

Method:

Clinical data were collected from eight patients on insulin therapy and enteral feed, which included large or significantly milky aspirates. Patients had a median gestational age of 25 weeks and postnatal age of 5.5 days. Virtual patients were created using the NICING model, and insulin sensitivity (S_I) profiles were fit. Alternative feed profiles were generated whereby enteral feed absorption was redistributed with time to account for poor feed absorption. The effect of poor feed absorption, as indicated by aspirates, is investigated.

Results:

The average percentage change of S_I 4 h before a significant aspirate was 1.16%, and 1.49% in the 4 h following the aspirate. No distinct relationship was found between the fractional change in S_I and the volume of the aspirate. Accounting for aspirates had a clinically negligible impact on glycemic control in virtual trials.

Conclusion:

Accounting for aspirates by manipulating enteral feed profiles had a minimal influence on both modeling and controlling glycemia in neonates. The impact of this method is clinically insignificant, suggesting that a population constant for the rate of glucose absorption in the gut adequately models feed absorption within the STAR framework.

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Author Affiliations: [1]Department of Mechanical Engineering, University of Canterbury, Christchurch, New Zealand; [2]Neonatal Department, Christchurch Women's Hospital, Christchurch, New Zealand; and [3]Intensive Care Department, Christchurch Hospital, Christchurch, New Zealand

Abbreviations: (BG) blood glucose, (NICU) neonatal intensive care unit

Keywords: computer methods, glycemic control, nasogastric aspiration, neonate, physiological modeling

Corresponding Author: Cameron A. Gunn, B.E.(Hons.), Department of Mechanical Engineering, University of Canterbury, Private Bag 4800, Christchurch, New Zealand; email address *cameron.gunn@canterbury.ac.nz*