Operational Evaluation of Pulse Oximetry in NICU Patients with Arterial Access.
Gerstmann D., Berg R., Haskell R., Brower C., Wood K., Yoder B., Greenway L., Lassen G., Ogden R., Stoddard R., Minton S. *J Perinatol.* 2003 Jul-Aug;23(5):378-83.

Introduction
To investigate pulse oximetry in neonates who require arterial access as represented by the clinical data recorded to manage their care.

Methods
Analysis of simultaneous SpO_2 and SaO_2 from: 7-year historical NICU data (N=31905); 4-month prospective NICU data (N=566); verification data using two hemoximeters (N=52); and NICU data from two collaborating centers (N=95 and 168). The bias function (SpO_2-SaO_2) was regressed against the measured "gold" standard, SaO_2.

Results
A significant negative correlation was found for each of the data sets between the bias function and SaO_2. This bias was similar for devices from several manufacturers (Datex-Ohmeda, Masimo, Nellcor, and Spacelabs). Maximum operational performance occurred with peaks between 92 and 97% SaO_2, but declined markedly above and below this narrow range. In all, 71 to 95% of patients exhibited data with significant bias.

Conclusion
These operational data suggest that with the methodology and devices currently in use, SpO_2 values in most all neonates who require arterial lines inaccurately correlate with measured arterial saturation.