Low signal quality pulse oximetry measurements in newborn infants are reliable for oxygen saturation but underestimate heart rate.

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AIM: We assessed the influence of system messages (SyMs) on oxygen saturation (SpO2) and heart rate measurements after birth to see if clinical decision-making changed if clinicians included SyM data.

METHODS: The heart rate and SpO2 of term infants were recorded using Masimo pulse oximeters. Differences in means and standard deviations (SD) were calculated. Permutation corrected the non-random distribution and inter-subject variation. SpO2 and heart rate centile charts were computed with, and without, SyMs.

RESULTS: Pulse oximetry measurements from 117 neonates provided 28,477 data points. SyMs occurred in 46% of measurements. Low signal quality accounted for 99.9% of SyMs. The mean SpO2 was lower with SyMs ($p<0.001$), while the SpO2 SD was similar to data without SyMs. The SpO2 centile charts were approximately 2% lower with SyMs included, but they were not more dispersed. Mean heart rate was lower ($p<0.001$) and more dispersed ($p<0.001$) when a SyM occurred. The heart rate centile charts were lower, with increased variability, when SyMs were included.

CONCLUSION: A SyM occurred frequently during pulse oximetry in term infants after birth. SpO2 measurements with low signal quality proved reliable for monitoring an infant's clinical condition. However, heart rate could be underestimated by low signal quality measurements.