

# Emergency Video Telemedicine Consultation for Newborn Resuscitations: The Mayo Clinic Experience



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## Abstract

**Objective:** To describe the Mayo Clinic experience with emergency video telemedicine consultations for high-risk newborn deliveries.

**Patients and Methods:** From March 26, 2013, through December 31, 2015, the Division of Neonatal Medicine offered newborn telemedicine consultations to 6 health system sites. A wireless tablet running secure video conferencing software was used by the local care teams. Descriptive data were collected on all consultations. After each telemedicine consult, a survey was sent to the neonatologist and referring provider to assess the technology, teamwork, and user satisfaction.

**Results:** During the study, neonatologists conducted 84 telemedicine consultations, and 64 surveys were completed. Prematurity was the most frequent indication for consultation (n=32), followed by respiratory distress (n=15) and need for advanced resuscitation (n=14). After the consult, nearly one-third of the infants were able to remain in the local hospital. User assessment of the technology revealed that audio and video quality were poor or unusable in 16 (25%) and 12 (18.8%) of cases, respectively. Providers failed to establish a video connection in 8 consults (9.5%). Despite technical issues, providers responded positively to multiple questions assessing teamwork (86.0% [n=37 of 43] to 100.0% [n=17 of 17] positive responses per question). In 93.3% (n=14 of 15) of surveyed cases, the local provider agreed that the telemedicine consult improved patient safety, quality of care, or both.

**Conclusion:** Telemedicine consultation for neonatal resuscitation improves patient access to neonatology expertise and prevents unnecessary transfers to a higher level of care. A highly reliable technology infrastructure that provides high-quality audio and video should be considered for any emergency telemedicine service.

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Approximately 10% of newborns will require some assistance to begin breathing after birth, and 1 in 1000 newborns will require extensive resuscitation after delivery.<sup>1,2</sup> In the United States, infants born at hospitals with lower-level neonatal intensive care units (NICUs) have poorer outcomes.<sup>3-6</sup> This disparity may reflect a difference in the level of preparedness to respond to newborn emergencies. At higher-volume referral centers, multidisciplinary teams are available to respond immediately to neonatal emergencies. Team members are likely exposed to sufficient volume and mentorship to maintain competency in emergency airway

management, assisted ventilation, and central line placement. However, when an infrequent high-risk delivery occurs at a hospital with lower delivery volumes, providers may have knowledge and procedural skill decay, limiting their ability to respond to these emergencies.<sup>7,8</sup> These factors can negatively affect the quality of the resuscitation and ultimately the infant's clinical outcome.

Few studies have reported the value of telemedicine in pediatric and neonatal critical care.<sup>9,10</sup> In 2013, Kim et al<sup>10</sup> found that an infrastructure for perinatal telemedicine consultation and collaboration decreased very low-birth-weight deliveries at hospitals



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without a NICU and was associated with decreased statewide infant mortality. When general pediatric providers had real-time audiovisual communication with a neonatologist during simulated neonatal resuscitations, the time to effective ventilation (the most important intervention in newborn resuscitation) was significantly reduced.<sup>11</sup> This study also reported improved adherence to the Neonatal Resuscitation Program guidelines. Yet, very little is known about the role of video telemedicine in guiding actual high-risk neonatal resuscitations.<sup>12</sup> The objective of this study was to describe the Mayo Clinic experience with emergency video telemedicine consultations for high-risk newborn deliveries.

## METHODS

The study met the exempt criteria of the Mayo Clinic Institutional Review Board. From March 26, 2013, to December 1, 2015, the Division of Neonatal Medicine provided emergency video telemedicine consults for newborn resuscitations to 6 Mayo Clinic Health System sites. The local hospitals ranged from 40 to 120 miles from Mayo Clinic Hospital in Rochester, Minnesota. Two of the participating health system hospitals have a level II newborn nursery, and the other 4 hospitals have a level I nursery. The NICU at Mayo Clinic Hospital is a 26-bed, level IV referral

center with approximately 350 admissions annually.

The local providers at the health system sites activated the video telemedicine process by calling the institutional admission and transfer center (ATC). The ATC nurse then paged the on-call neonatologist. The local provider and consulting neonatologist briefly discussed the clinical case via telephone. The neonatologist initiated the synchronous video consultation if a video telemedicine consult was indicated. Patients were managed collaboratively, and appropriate disposition was determined. A high-level process map is shown in Figure 1.

Video telemedicine consultations were performed using Vidyio, a Health Insurance Portability and Accountability Act–compliant video conferencing software. The consulting neonatologists used a variety of hardware end points, including wired desktop, wireless laptop, and wireless mobile devices. Consultations were provided both on the hospital campus using the Mayo Clinic network and off campus using the consultant's home internet connection or mobile cellular service. The local providers ran the video conferencing software on the Apple iPad 2, a consumer-grade wireless mobile device.

A log of all neonatal telemedicine consults was maintained and included the case

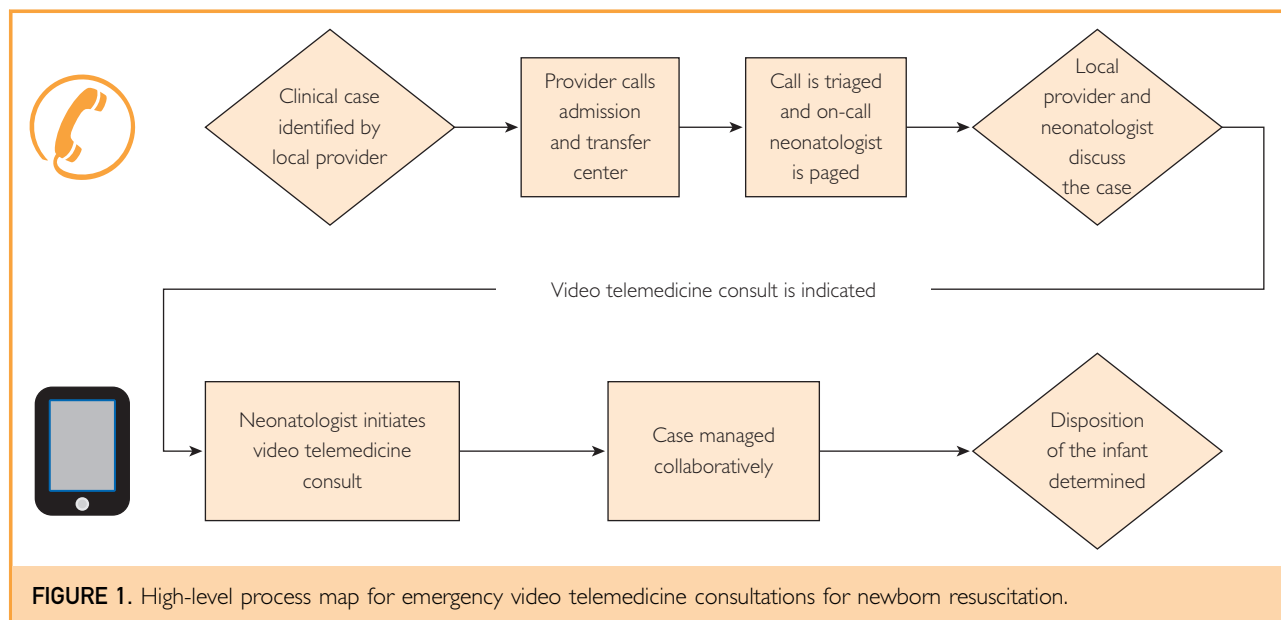


FIGURE 1. High-level process map for emergency video telemedicine consultations for newborn resuscitation.

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