Table F-5. Emergency medical services/emergency department evidence table: patient characteristics

| **Author, Year**  (See Appendix C for full citation) | **Number Analyzeda** | **Population** | **Referring Providers Specialty/Type** | **Consulting Provider Specialty/Type** | **Patient Present?** | **Patient Setting** | **Modalities of Telehealth Consultation Intervention** | **Timing** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Amorim, 2013 | 2,588 A: 919 B: 1,669 | Rural patients | ED physician | Neurologists | Yes | ED/EMS | Videoconference | Real-time |
| Astarcioglu, 2015 | 108 A: 55 B: 53 | Adults, average age 62.2 in Group A and 64.6 in Group B, majority male, with expected comorbidities for STEMI patients | ED | Interventional cardiology | No | ED/EMS | WhatsApp | Real-time |
| Audebert, 2006 | 3,122  A: 1,151  B: 1,971 | Adults | Multiple (non-neurology) | Neurology | Yes | ED/EMS | Videoconference, radiological data transfer | Real-time |
| Bergrath, 2012 | 64 A: 46 B: 18 | NR | EMS physician | Hospital-based EMS physician | Yes | ED/EMS | Videoconference | Real-time |
| Bladin, 2015 | 282  A: 144  B: 138 | Adult | ED physicians (with medical registrars and nursing staff) | Neurologists/stroke specialist | Unclear - patient was present in the ED, but did not seem like the consulting specialist saw the patient directly | ED/EMS | Telephone and radiology images; video camera unclear | Real-time |
| Brennan, 1998 and 1999 | 100  A: 50  B: 50 | NR | Nurse | Emergency physician | Yes | ED/EMS | Videoconference | Real-time |
| Brokmann, 2016b | 160 A: 80 B: 80 Complete Numerical Rating Scale A: 32/80 B: 65/80 | Pediatric and adults | Paramedic | EMS physician | Yes | ED/EMS | Video | Real-time |
| Brokmann, 2016 | 78  A: 39  B: 39 | Adults | Paramedic | EMS physician | Yes | ED/EMS | Video | Real-time |
| Brunetti, 2014 | 297 A: 174 B: 123 | Adults | EMS | Cardiologist | Yes | ED/EMS | Smart phone and electronic EKG | Real-time |
| Chan, 2012 | 594 A: 427 B: 167 | Adults | Paramedic | ED physician | Yes | ED/EMS | ECG transmitted electronically | Real-time |
| Cho, 2011 | 25  A: 13  B: 12 | Adults | Emergency residents | Emergency physician | Yes | ED/EMS | Videoconference | Real-time |
| Choi, 2006 | 655 A: 327 B: 328 | Stroke | Academic medical center | Neurology | Yes | ED/EMS | Videoconference | Real-time |
| Chowdhury, 2012 | 97  A: 52  B: 45 | Adults | ED doctors and senior stroke nurse | Stroke specialist | Yes | ED/EMS | Videoconference plus S&F scans | Real-time |
| Darkins, 1996 | 16,700 A: 6,729 B: 9,972, 51 seen using TH | Emergency | Academic medical center | Emergency- orthopedic | Yes | ED/EMS | Videoconference | Real-time |
| Dayal, 2016 | 1,106  A: 524  B: 582 | Pediatric | ED physician | Pediatric critical care physician | Yes | ED/EMS | Videoconference | Real-time |
| Demaerschalk, 2010 | 54 A: 27 B: 27 | Adults | ED physician | Stroke neurologist | Yes | ED/EMS | Videoconference | Real-time |
| Dharmar, 2013 | 320  A: 199  B: 58  C: 63 | Pediatric emergencies | Academic medical center | Pediatric critical care | Yes | ED/EMS | Videoconference or telephone | Real-time |
| Dharmar, 2013 | 234 A1: 85 A2: 76 B: 73 | Children | ED physician | Pediatric Critical Care | Yes | ED/EMS | Videoconference | Real-time |
| Dharmasaroja, 2010 | 576 A: 170 B: 406 | Adults | Neurology residents | Neurology | Yes | ED/EMS | Telephone, transfer of radiological data | Real-time |
| Duchesne, 2008 | 814  A: 351  B: 463 (51 sent to trauma center) | Rural patients | Nurse practitioner | Physician | Yes | ED/EMS | Videoconference | Real-time |
| Fong, 2015 | 152 A: 102 B: 50 | Not specified | Internist | Neurologist | Yes | ED/EMS | Telephone, teleradiology | Real-time |
| Goh, 1997 | 63  A: 28  B: 35 | Not specified | Not specified | Neurologist | Unclear | ED/EMS | Telephone, teleradiology | Real-time |
| Handschu, 2008 | 151 A: 74 B: 77 | Not specified | Not specified | Neurologist | Yes | ED/EMS | Videoconference, data transfer | Real-time |
| Hashimoto, 2001 | 29  A: 17  B: 12 | Not specified | Not specified | Radiation-oncology | Yes | ED/EMS | Digital images of any scans | Unclear |
| Heffner, 2015 | 479 A: 272 B: 134 C: 73 | Not specified | Neurologist | Neurologist | Yes | ED/EMS | Not specified | Real-time |
| Hubert, 2016 | 2,691 A: 912 B: 1,779 | Adult | ED physician | Neurologist | Yes | ED/EMS | Videoconference | Real-time |
| Ickenstein, 2005 | 319 A: 155 B: 164 | Adults | ED physician | Neurologist | Yes | ED/EMS | Videoconference | Real-time |
| Ionita, 2009 | 155  A: 128  B: 27 | Not specified | Not specified | Neurology | Yes | ED/EMS | Not specified | Real-time |
| Itrat, 2016 | 156 A: 56 B: 100 | Adult | EMS | Vascular neurologist | Yes | ED/EMS | Videoconference | Real-time |
| Johansson, 2011 | 351 A: 304 B: 47 | Adults | ED physician | Stroke neurologist | Yes | ED/EMS | Videoconference | Real-time |
| Kim, 2011 | 938  A: 750  B: 188 | Suburban and urban emergency patients seen by EMS system | EMT | Public health doctors | Yes | ED/EMS | Code division multiple access for real-time information exchange, patient data monitoring via online method, and cellular phone | Real-time |
| Langabeer, 2016 and 2017 | 11,140 A: 5,570 B: 5,570 | Adults | Paramedic | EMS physician | Yes | ED/EMS | Video | Real-time |
| Macedo, 2016 | 376 A: 113 B: 263 | Adult | ED physician | Cardiologist | Yes | ED/EMS | Videoconference | Real-time |
| Machado, 2018 | 314  A: 219  B: 95 | Adults | ED clinicians | Intensivist | Yes | ED/EMS | NR | Real-time |
| Marcolino, 2013 | 2,600 A: 1,242 B: 1,358 | Adults | Hospitalist | Cardiac specialist | Yes | ED/EMS | Telephone and electronic EKG | Real-time |
| Martinez-Sanchez, 2014 | 484 A: 259 B: 225 | Adults | ED physician | Neurologist | Yes | ED/EMS | Videoconference | Mixed |
| Martinoni, 2011 | 3,901 A: 2,298 B: 1,603 | Adults | EMS | Cardiologist | Yes | ED/EMS | ECG transmission | Real-time |
| Mathews, 2008 | 191  A: 78  B: 113 | Rural emergency | Urban hospital | Multiple | Unclear | ED/EMS | Videoconference | Real-time |
| Mazighi, 2017 | 47 A: 22 B: 25 | Adults | ER physician | Stroke neurologist | Yes | ED/EMS | Video | Real-time |
| Meyer, 2008 | 222  A: 111  B: 111 | Adults at least 18 years old | Emergency nurse practitioners | NR | Unclear | ED/EMS | Videoconference | Real-time |
| Mohr, 2018 (same patients as Mohr 2017) | 2,662  A: 2,371  B: 291 | Adults | Rural ER physician | ED physician | Yes | ED/EMS | Video | Real-time |
| Mohr, 2017 (same patients as Mohr 2018) | 2,662  A: 2,371  B: 291 | Adults | Rural ER physician | ER physician and ED nurse | Yes | ED/EMS | Video | Real-time |
| Nagao, 2012 | 54 A: 30 B: 24 | Adults | Emergency physician | Neurologist | Yes | ED/EMS | Videoconference | Real-time |
| Narasimhan, 2015 | 14,522  A: 7,261  B: 7,261 | All patients seen in ED for psychiatry issues | ED doctors | Psychiatrists with at least one year experience in emergency psychiatry | Yes | ED/EMS | Videoconference | Real-time |
| Natafgi, 2017 | 173,339 A: 164,291 B: 9,048 | Not specified | Rural ER physician | Emergency medicine physician | Yes | ED/EMS | Videoconference | Real-time |
| Nguyen-Huynh, 2018 | A: 310 B: 557 | Adult | ED physician | Neurologist | Yes | ED/EMS | Videoconference | Real-time |
| Noble, 2005 | 253 A: 191 B: 62 | Not specified | Nurse | ED | Yes | ED/EMS | Unclear; pictures or video | Unclear |
| Ortolani, 2006 | 658  A: 316  B: 176  C: 166 | Adults | EMS physician | Cardiologist | Yes | ED/EMS | ECG transmission | Real-time |
| Ortolani, 2007 | 121 A: 79 B: 42 | Patients with STEMI with cardiogenic shock | Ambulance personnel (1 physician, 2 paramedics) | Cardiologists | No | ED/EMS | Records (EKG trace sent) | Asynchronous |
| Paik, 2017 | 84 A: 42 B: 42 | NR | ED clinicians | Plastic surgeon and orthopedics | Yes | ED/EMS | IPad app | Real-time |
| Patel, 2015 | 50 A: 25 B: 25 | Pediatric | Pediatric transport team | Medical command officer | Yes | ED/EMS | Videoconference | Real-time |
| Pedersen, 2009 | 1,437  A: 821  B: 616 | Adults | EMS | Cardiologist | Yes | ED/EMS | ECG transmissionmobile phone with fax | Real-time |
| Pedragosa, 2009 | 399 A: 201 B: 198 | Rural patients | ED physician | Neurologist | Yes | ED/EMS | Videoconference | Real-time |
| Pervez, 2010 | 296 A: 181 B: 115 | Adults | Emergency physician | Neurologist | Yes | ED/EMS | Video | Real-time |
| Poon, 2001 | 327  A: NR  B: NR | Neurosurgical patients | Physician | Neurosurgeon | Yes for videoconference, unclear for others | ED/EMS | Videoconference | Mixed |
| Saffle, 2009 | 98 A: 28 B: 70 | General | Physician | Physician | Yes | ED/EMS | Videoconference | Real-time |
| Sairanen, 2011 | 1,091  A: 985  B: 106, 61 received thrombolysis | Adults | Emergency physician | Neurologist | Yes | ED/EMS | Videoconference and review of images, if provided | Real-time |
| Sanchez-Ross, 2011 | 142 A: 50 B: 92 | Patients confirmed to have STEMI | ED physician | Cardiology | Yes | ED/EMS | Telephone, test results | Mixed |
| Schwab, 2007 | 302 A: 132 B: 170 | Adult | ED physician | Neurologist | Yes | ED/EMS | Videoconference | Real-time |
| Sejersten, 2008 | 257  A: 89  B: 168 | Adults | EMT | Cardiologist | Yes | ED/EMS | ECG to mobile phone | Real-time |
| Southard, 2014 | 62 A: 24 B: 38 | Rural patients | ED physician | Mental health specialists: social workers, licensed mental health counselors, and counseling psychologists | Unclear | ED/EMS | Videoconference | Real-time |
| Switzer, 2009 | 75 A: 26 B: 49 | Adult | ED physician | Neurologist | Yes | ED/EMS | Videoconference | Real-time |
| Taqui, 2017 | 153 A: 53 B: 100 | Adults | EMT mobile stroke unit | Vascular neurologist | Yes | ED/EMS | Videoconference | Real-time |
| Theiss, 2013 | 1,324  A: 168  B: 845  C: 311 | Adults | Emergency physician | Neurologist | Yes | ED/EMS | Videoconference | Real-time |
| Traub, 2013 | 302 A: 196 B: 106, 36 used telehealth |  | Nurse | Emergency physician | Yes | ED/EMS | Videoconference | Real-time |
| Tsai, 2007 | 822 A: 685 B: 137 | General | Physician | Physician | Unclear | ED/EMS | Videoconference, medical record review | Real-time |
| Wong, 2006 | 710  A: 235  B: 239  C: 236 | Consecutive patients from the district general hospital requiring emergency neurosurgical consultation (mean age 58, 60% male) | Not specified | Neurosurgeon | Yes | ED/EMS | Telephone + teleradiology or videoconference | Real-time |
| Yang, 2015 | 138 A: 64 B: 74 | Pediatric | ED physician | Pediatric critical care physician | Yes | ED/EMS | Videoconference | Real-time |
| Zaidi, 2011 | 142  A: 59  B: 83 | Adult | NR | Neurologist | Yes | ED/EMS | Videoconference | Real-time |
| Zanini, 2008 | 399 A: 263 B: 136 | Adults | Ambulance staff | Cardiologist | Yes | ED/EMS | ECG transmission Phone | Real-time |
| Zennaro, 2014 | 42 A: 42 B: 42 (same patients as A) | Pediatric patients presenting with fractures | Pediatrician | Orthopedic surgeon | No | ED/EMS | Telephone +/-sending images via iPad | Asynchronous |

ECG = electrocardiogram; ED = emergency department; EKG = electrocardiogram; EMS = emergency medical services; EMT = emergency medical technician; NR = not reported; S&F = store and forward; STEMI = ST-elevation myocardial infarction; TH = telehealth

a For definitions of interventions and comparisons (e.g., A vs. B), see Table F-4

**See Appendix C. Included Studies for full citations**