

Table 2

Summarization of the Effects of Telehealth on Hospitalization Indicators in Studies Included in the Systematic Review

Study Authors	Intervention Device (Modality)	Sample Size	Follow-up in Months	Statistically Significant Outcomes	
				Hospitalization	Length of Stay
Wakefield et al. ^a	1. Telephone (R) 2. Patient station consisting of television monitor and video camera kit with a microphone (R) 3. Combined tools (R)	Intervention 1: 47 Intervention 2: 52 Intervention 3: 99 Control: 49	12	Intervention 3: all-cause, SD	None
Morguet et al. ^b	Telephone and the telemonitoring equipment (R)	Intervention: 32 Control: 96	11	All-cause, SD Other noncardiac reasons, SD	All-cause, SD Other cardiac reasons, SD
Scherr et al. ^c	Weight scale, sphygmomanometer, mobile phone, and client-server communication through Internet (A)	Intervention: 54 Control: 54	6	None	Heart failure, SD
Dinesen et al. ^d	Telehealth monitor system using wireless technology (A, R)	Intervention: 57 Control: 48	10	All-cause, SD	None
Bowles et al. ^e	1. Telephone (R) 2. Physiological monitor equipped with a blood pressure cuff, body weight scale, glucometer, pulse oximeter, digital stethoscope, and videoconferencing devices (R)	Intervention 1: 93 Intervention 2: 98 Control: 112	2	None	None
Steventon et al. ^f	Telephone (R)	Intervention: 2,698 Control: 2,698	12	None	None
Dang et al. ^g	Computerized, Internet-based, and in-home messaging and monitoring device for automating the daily monitoring of the enrolled patients by a care coordinator (A)	Congestive heart failure 17, control 17		Heart failure, SD	None
		Chronic obstructive pulmonary disease 17, control 17		None	None
		Diabetes mellitus 23, control 23		None	None
Steventon	Remote, automatic,	Intervention:	12	All-cause, SD	All-cause, SD

et al. ^h	and passive monitoring system in addition to peripheral devices including a pulse oximeter, a glucometer, and weighing scales (A)	1,570 Control: 1,584			
Soran et al. ⁱ	Electronic scale and an individualized symptom response system linked via standard phone line to a computerized database (A)	Intervention: 160 Control: 155	6	None	None
Ferrante et al. ^j	Telephone (R)	Intervention: 760 Control: 758	12–48	Heart failure, SD	None
Jia et al. ^k	Home telehealth device (messaging device) and telephone (R)	Intervention: 387 Control: 387	48	None	None
Chen et al. ^l	Telephone (R)	Intervention: 275 Control: 275	6	All-cause, SD Heart failure, SD	All-cause, SD Heart failure, SD
Weintraub et al. ^m	Tele-measurement devices and an interactive communication device (A)	Intervention: 95 Control: 93	3	None	None
Steventon et al. ^m	Tele-care base unit along with a pendant alarm and up to 27 various peripheral devices (R)	Intervention: 1,236 Control: 1,190	12	None	None
Giordano et al. ⁿ	Portable measurement devices transferring data by a fixed or mobile telephone; one lead trace to a receiving station where health professional was available (A)	Intervention: 226 Control: 229	12	All-cause, SD Heart failure, SD	None
Webb et al. ^o	Interactive system along with store and forward system (A)	Intervention: 337 Control: 337	36	None	All-cause, SD
Dendale et al. ^p	Electronic weight scale, a blood pressure monitoring device along with a cell-phone, central computer (A)	Intervention: 80 Control: 80	6	None	None
Domingo et al. ^q	Interactive platform, automated self-monitoring equipment, Internet connection,	Intervention: 92 Control: 92	12	Heart failure, SD Other cardiac reasons, SD	Heart failure, SD Other cardiac reasons, SD

	and television used as monitor (A)				
Schofield et al. ^f	In-home messaging device, a secure Internet site, and telephone (A)	Intervention: 73 Control: 73	6	All-cause, SD	All-cause, SD
Koehler et al. ^s	Portable measuring devices connected to a personal digital assistant for transferring information via cell phone to telemedicine centers (A)	Intervention: 354 Control: 356	26	None	None
Cleland et al. ^t	1. Telephone (A, R) 2. An electronic weighing scale, an automated sphygmomanometer, single-lead electrocardiogram using wristband electrodes, all communicated to a hub connected to patient's phone line and central web server and then workstations via secure Internet connection (A, R)	Intervention 1: 170 Intervention 2: 163 Control: 85	8	None	None
Dansky et al. ^u	Tele-home-care system: telephone-based communication system with medical peripherals (A, R)	Intervention: 174 Control: 112	2, 4	At 2 months: SD (not significant at 4 months)	None

Abbreviations: A, asynchronous; R, real-time; SD, significant decrease.

^a Wakefield, B., M. Ward, et al. "Evaluation of Home Telehealth Following Hospitalization for Heart Failure: A Randomized Trial." *Telemedicine and e-Health* 14, no. 8 (2008): 753–61.

^b Morguet, A., P. Kühnelt, et al. "Impact of Telemedical Care and Monitoring on Morbidity in Mild to Moderate Chronic Heart Failure." *Cardiology* 111, no. 2 (2008): 134–39.

^c Scherr, D., P. Kastner, et al. "Effect of Home-based Telemonitoring Using Mobile Phone Technology on the Outcome of Heart Failure Patients after an Episode of Acute Decompensation: Randomized Controlled Trial." *Journal of Medical Internet Research* 11, no. 3 (2009): e34.

^d Dinesen, B., L. Haesum, et al. "Using Preventive Home Monitoring to Reduce Hospital Admission Rates and Reduce Costs: A Case Study of Telehealth among Chronic Obstructive Pulmonary Disease Patients." *Journal of Telemedicine and Telecare* 18, no. 4 (2012): 221–25.

^e Bowles, K., D. Holland, and D. A. Horowitz. "A Comparison of In-person Home Care, Home Care with Telephone Contact and Home Care with Telemonitoring for Disease Management." *Journal of Telemedicine and Telecare* 15, no. 7 (2009): 344–50.

^f Steventon, A., S. Tunkel, et al. "Effect of Telephone Health Coaching (Birmingham OwnHealth) on Hospital Use and Associated Costs: Cohort Study with Matched Controls." *British Medical Journal* 347 (2013): f4585.

- ^g Dang, S., F. Ma, et al. “Differential Resource Utilization Benefits with Internet-based Care Coordination in Elderly Veterans with Chronic Diseases Associated with High Resource Utilization.” *Telemedicine and e-Health* 12, no. 1 (2006): 14–23.
- ^h Steventon, A., M. Bardsley, et al. “Effect of Telehealth on Use of Secondary Care and Mortality: Findings from the Whole System Demonstrator Cluster Randomised Trial.” *British Medical Journal* 344 (2012): e3874.
- ⁱ Soran, O., I. Pina, et al. “A Randomized Clinical Trial of the Clinical Effects of Enhanced Heart Failure Monitoring Using a Computer-based Telephonic Monitoring System in Older Minorities and Women.” *Journal of Cardiac Failure* 14, no. 9 (2008): 711–17.
- ^j Ferrante, D., S. Varini, et al. “Long-Term Results after a Telephone Intervention in Chronic Heart Failure: DIAL (Randomized Trial of Phone Intervention in Chronic Heart Failure) Follow-up.” *Journal of the American College of Cardiology* 56, no. 5 (2010): 372–78.
- ^k Jia, H., H. Feng, et al. “A Longitudinal Study of Health Service Utilization for Diabetes Patients in a Care Coordination Home-Telehealth Programme.” *Journal of Telemedicine and Telecare* 17, no. 3 (2011): 123–26.
- ^l Chen, Y., Y. Ho, et al. “Assessment of the Clinical Outcomes and Cost-effectiveness of the Management of Systolic Heart Failure in Chinese Patients Using a Home-based Intervention.” *Journal of International Medical Research* 38, no. 1 (2010): 242–52.
- ^m Weintraub, A., D. Gregory, et al. “A Multicenter Randomized Controlled Evaluation of Automated Home Monitoring and Telephonic Disease Management in Patients Recently Hospitalized for Congestive Heart Failure: The SPAN-CHF II Trial.” *Journal of Cardiac Failure* 16, no. 4 (2010): 285–92.
- ⁿ Steventon, A., M. Bardsley, et al. “Effect of Telecare on Use of Health and Social Care Services: Findings from the Whole Systems Demonstrator Cluster Randomised Trial.” *Age and Ageing* 42, no. 4 (2013): 501–8.
- ^o Giordano, A., S. Scalvini, et al. “Multicenter Randomised Trial on Home-based Telemanagement to Prevent Hospital Readmission of Patients with Chronic Heart Failure.” *International Journal of Cardiology* 131, no. 2 (2009): 192–99.
- ^p Webb, C., C. Waugh, et al. “Impact of Telemedicine on Hospital Transport, Length of Stay, and Medical Outcomes in Infants with Suspected Heart Disease: A Multicenter Study.” *Journal of the American Society of Echocardiography* 26 no. 9 (2013): 1090–98.
- ^q Dendale, P., G. De Keulenaer, et al. “Effect of a Telemonitoring-facilitated Collaboration between General Practitioner and Heart Failure Clinic on Mortality and Rehospitalization Rates in Severe Heart Failure: The TEMA-HF 1 (TElemonitoring in the MAnagement of Heart Failure) Study.” *European Journal of Heart Failure* 14, no. 3 (2012): 333–40.
- ^r Domingo, M., J. Lupon, et al. “Noninvasive Remote Telemonitoring for Ambulatory Patients with Heart Failure: Effect on Number of Hospitalizations, Days in Hospital, and Quality of Life. CARME (Catalan Remote Management Evaluation) Study.” *Revista Espanola de Cardiologia* 64, no. 4 (2011): 277–85.
- ^s Schofield, R., S. Kline, et al. “Early Outcomes of a Care Coordination-enhanced Telehome Care Program for Elderly Veterans with Chronic Heart Failure.” *Telemedicine and e-Health* 11, no. 1 (2005): 20–27.
- ^t Koehler, F., S. Winkler, et al. “Impact of Remote Telemedical Management on Mortality and Hospitalizations in Ambulatory Patients with Chronic Heart Failure: The Telemedical Interventional Monitoring in Heart Failure Study.” *Circulation* 123, no. 17 (2011): 1873–80.
- ^u Cleland, J., A. Louis, et al. “Noninvasive Home Telemonitoring for Patients with Heart Failure at High Risk of Recurrent Admission and Death: The Trans-European Network–Home-Care Management System (TEN-HMS) Study.” *Journal of the American College of Cardiology* 45, no. 10 (2005): 1654–64.
- ^v Dansky, K., J. Vasey, and K. Bowles. “Impact of Telehealth on Clinical Outcomes in Patients with Heart Failure.” *Clinical Nursing Research* 17, no. 3 (2008): 182–99.