		Statistical Summary				Participants		Interventions							Measurement Classifications		Measurement Classifications (2nd study if any)	
ID	Citation	Source	Publication Year	Study Location (Continent)	Sample Scale (User)	Target Audience	Data collection method	Intervention type	Visualization Type	Unit Visualized	Interactive?	Comparators	Outcomes	Study Design	Evaluation Settings	Evaluation Measurements	Evaluation Settings	Evaluation Measurements
1	Hans P, Grant AJ, Laitt RD, et al. Comparison of three-dimensional visualization techniques for depicting the scala vestibuli and scala tympani of the cochlea by using high-resolution MR imaging. AJNR Am J Neuroradiol 1999;20:1197–206.https://www.ncbi.nlm.nih.gov/pubmed/10472972	PubMed	1999	Europe	16-30	Providers	Observation	Pre-Operative Imaging Tool	3D Image Of Body Part	Single Patient	No	Other System/Vis	Subjective Image Quality (Satisfaction)	Analytic; Experimental; Non-Randomized	B	D		
4	Foldy SL, Biedrzycki PA, Baker BK, et al. The public health dashboard: a surveillance model for bioterrorism preparedness. J Public Health Manag Pract 2004;10:234–40. https://www.ncbi.nlm.nih.gov/pubmed/15253519	PubMed	2004	North America	UNKNOWN	Local Government And Emergency Response Teams	Survey; Interview	Dashboard; Regional ED	Bar Graphs; Line Graph	Aggregate	No	None	Count Of Visits (Clinical Care); User Satisfaction (Satisfaction)	Descriptive; Qualitative	C	DF		
9	Morgan MB, Branstetter BF 4th, Lionetti DM, et al. The radiology digital dashboard: effects on report turnaround time. J Digit Imaging 2008;21:50–8. doi:10.1007/s10278-007-9008-9	PubMed	2008	North America	31-100	Radiologists And Clinical Administrators	Useage	Dashboard; Provider Performance	Tabular With Color Coding Indicating Pending Reports	Aggregate	No	None	Time (Efficiency)	Analytic; Observational	C	CE		
10	Stone G, Lekht A, Burris N, et al. Data collection and communications in the public health response to a disaster: rapid population estimate surveys and the Daily Dashboard in post-Katrina New Orleans. J Public Health Manag Pract 2007;13:453–60. doi:10.1097/01.PHH.0000285196.16308.7d	PubMed	2007	North America	31-100	Local Government And Nonprofit Healthcare Providers	Survey	Website	Maps	Regional And Aggregate	No	None	Usefulness (Satisfaction)	Descriptive; Survey	D	B		
14	Jalote-Parmar A, Badke-Schaub P, Ali W, et al. Cognitive processes as integrative component for developing expert decision-making systems: a workflow centered framework. J Biomed Inform 2010;43:60–74. doi:10.1016/j.jbi.2009.07.001	PubMed	2010	Europe	16-30	Providers	Observation; Survey	Pre-Operative Imaging Tool	Imaging	Single Patient	No	Crossover Design; Current Practice	Time (Efficiency); User Satisfaction (Satisfaction)	Analytic; Experimental; Non-Randomized	B	CE		
15	Zayiftudim V, Dossett LA, Starmer JM, et al. Implementation of a real-time compliance dashboard to help reduce SICU ventilator-associated pneumonia with the ventilator bundle. Arch Surg 2009;144:656–62. doi:10.1001/archsurg.2009.117	PubMed	2009	North America	UNKNOWN	Providers	EHR Database; Patient Outcome	Dashboard Single Patient	Time Series Line Graph	Single Patient	No	Self-Controls Pre-Implemintation	VAP Rates (Patient Outcome); Compliance With Ventilator Bundle Parameters (Clinical Care)	Analytic; Observational	C	EF		
20	Klimov D, Shahar Y, Taieb-Maimon M. Intelligent visualization and exploration of time-oriented data of multiple patients. Artif Intell Med 2010;49:11–31. doi:10.1016/j.artmed.2010.02.001	PubMed	2010	Asia	1-15	Providers	Observation; Survey	Multi-Patient Dashboard	Bar Graphs; Time Series Line Graph	Multi-Patient	Yes	None	Functionality (Task-Based); Time (Efficiency); Accuracy (Effectiveness); General Usability Assessment (Satisfaction)	Analytic; Experimental; Non-Randomized	B	CE		
21	Batley NJ, Osman HO, Kazzi AA, et al. Implementation of an emergency department computer system: design features that users value. J Emerg Med 2011;41:693–700. doi:10.1016/j.jemermed.2010.05.014	PubMed	2011	Asia	101-500	ED Staff; Full	Survey	EHR Interface	Physical Layout Of ER With Color Coding Indicating New Tests Results	Multi-Patient	No	None	Ease Of Use (Satisfaction)	Descriptive; Qualitative	D	D		
23	McLeod B, Zaver F, Avery C, et al. Matching capacity to demand: a regional dashboard reduces ambulance avoidance and improves accessibility of receiving hospitals. Acad Emerg Med 2010;17:1383–9. doi:10.1111/j.1553-2712.2010.00928.x	PubMed	2010	North America	UNKNOWN	ED Staff; Full Care Staff	Extract From System	ED Regional Dashboard	Tabular With Color Coding Indicating EHR Capacity	Multi-ER	No	Self-Controls Pre-Implemintation	Time That Hospitals Could Accept Patients (Clinical Care)	Analytic; Observational	D	F		
25	Linder JA, Schnipper JL, Tsurikova R, et al. Electronic health record feedback to improve antibiotic prescribing for acute respiratory infections. Am J Manag Care 2010; 16:e311–9.https://www.ncbi.nlm.nih.gov/pubmed/21322301	PubMed	2010	North America	16-30	Providers	EHR	Dashboard; Provider Performance	Bar Graphs	Single-Provider vs National	No	Concurrent External Controls With No Visual	Rates Of Prescribing (Patient Outcome); Usage (Clinical Care)	Analytic; Experimental; Randomized	C	F		
27	Waltman LR, Phillips IE, McCoy AB, et al. Adopting real-time surveillance dashboards as a component of an enterprisewide medication safety strategy. Jt Comm J Qual Patient Saf 2011;37:326–32.https://www.ncbi.nlm.nih.gov/pubmed/21819031	PubMed	2011	North America	31-100	Pharmacists	Useage	Dashboard; Multi Patient Survailliance	Tabular With Color Coding Indicating Last Viewed; Time Series Line Graph	Aggregate; Multi-And Single Patient	No	None	Usage (Clinical Care)	Descriptive; Qualitative	A	E		
28	Koopman RJ, Kochendorfer KM, Moore JL, et al. A diabetes dashboard and physician efficiency and accuracy in accessing data needed for high-quality diabetes care. Ann Fam Med 2011;9:398–405. doi:10.1370/afm.1286	PubMed	2011	North America	1-15	Providers	Observation	Dashboard; Single Patient	Tabular With Color Coding Indicating Normal Ranges	Single Patient	No	Crossover Design; EHR	Time (Efficiency); Mouse Clicks (Efficiency); Accuracy (Effectiveness); (Satisfaction)	Analytic; Experimental; Non-Randomized	B	BE		
30	McMenamin J, Nicholson R, Leech K. Patient Dashboard: the use of a colour-coded computerised clinical reminder in Whanganui regional general practices. J Prim Health Care 2011;3:307–10.https://www.ncbi.nlm.nih.gov/pubmed/22132384	PubMed	2011	Oceania	UNKNOWN	Providers	EHR Database; Rate Of Screening	Single Patient Dashboard	Item List With Color Coding Indicating Care Program	Single Patient	No	Self-Controls Pre-Implemintation	Screening Rates (Patient Outcome); Treatment Choice (Patient Outcome)	Analytic; Observational	D	E		
31	Salazar A, Tyroch AH, Smead DG. Electronic trauma patient outcomes assessment tool: performance improvement in the trauma intensive care unit. J Trauma Nurs 2011; 18:197–201. doi:10.1097/JTN.0b013e31823a49ff	PubMed	2011	North America	UNKNOWN	Providers	Useage And EHR Database	Dashboard; Multi Patient Survailliance	Tabular With Icons Indicating Status And Change	Multi-Patient	No	Self-Controls Pre-Implemintation	Usage (Clinical Care); Compliance (Clinical Care)	Analytic; Observational	D	F		
36	Lee S, Kim B, Lee B, et al. FaceReview: supporting interactive exploration of linked heterogeneous datasets for unilateral cleft lip and palate. AMIA Annu Symp Proc 2012; 2012:485–94.https://www.ncbi.nlm.nih.gov/pubmed/23304320	PubMed	2012	North America	UNKNOWN	Researchers	Interviews	Analysis Tool	Bar Graphs; Line Graph; Network Graph	Single Patient And Multi-Patient	Yes	None	(Research)	Descriptive; Qualitative	B	A		
38	Le T, Reeder B, Thompson H, et al. Health providers' perceptions of novel approaches to visualizing integrated health information. Methods Inf Med 2013;52:250–8. doi:10.3414/ME12-01-0073	PubMed	2013	North America	1-15	Providers	Interview	Visualization	Bar Graphs; Temporal	Single Patient	No	Other System/Vis	Trust (Satisfaction); Perceived Level Of Detail (Satisfaction); Cognitive Load (Satisfaction)	Descriptive; Qualitative	B	B		
39	Dolan JG, Veazie PJ, Russ AJ. Development and initial evaluation of a treatment decision dashboard. BMC Med Inform Decis Mak 2013;13:51. doi:10.1186/1472-6947-13-51	PubMed	2013	North America	16-30	Patients	Observation; Survey	Patient Facing Dashboard	Bar Graphs	Single Patient	No	None	Time (Efficiency); Ease Of Use (Satisfaction); Decisional Conflict (Satisfaction)	Descriptive; Qualitative	B	CE		
40	Farri O, Rahman A, Monsen KA, et al. Impact of a prototype visualization tool for new information in EHR clinical documents. Appl Clin Inform 2012;3:404–18. doi:10.4338/ACI-2012-05-RA-0017	PubMed	2012	North America	1-15	Providers	Observation	EHR Interface	Textual Data With Color Coding Indicating Changes From Previous Encounter And Type Of Information	Single Patient	No	Concurrent External Controls With No Visual	Time (Efficiency); Accuracy (Effectiveness)	Analytic; Experimental; Non-Randomized	A	AE		
42	Meijers JMM, Halfens RJG, Mijnarends DM, et al. A feedback system to improve the quality of nutritional care. Nutrition 2013;29:1037–41. doi:10.1016/j.nut.2013.02.007	PubMed	2013	Europe	101-500	Home Care Professionals	Survey	Dashboard; Provider Performance	Bar Graphs; Time Series Line Graph	Aggregate	No	None	Feasibility; Facilitators Of Implementation; Barriers Of Implementation; Usability; (Clinical Care)	Descriptive; Qualitative	C	C		
43	Fox BI, Hollingsworth JC, Gray MD, et al. Developing an expert panel process to refine health outcome definitions in observational data. J Biomed Inform 2013;46:795–804. doi:10.1016/j.jbi.2013.05.006	PubMed	2013	North America	1-15	Researchers	User Feedback	Dashboard; Single Patient	Tabular	Single Patient	No	None	Case Review (Research)	Descriptive; Qualitative	C	A		
46	Rajwan YG, Barclay PW, Lee T, et al. Visualizing Central Line -Associated Blood Stream Infection (CLABSI) Outcome Data for Decision Making by Health Care Consumers and Practitioners-An Evaluation Study. Online J Public Health Inform 2013; 5:218. doi:10.5210/ojphi.v5i2.4364	PubMed	2013	North America	16-30	Epidemiologists; Hospital Managers	Survey	Dashboard; Unit Performance	Tabular; Box Plot; Quality Graph; Heat Map; Tree Map;	Aggregate	No	Other System/Vis	User Preference (Satisfaction)	Descriptive; Qualitative	B	D		
48	Forsman J, Anani N, Eghdam A, et al. Integrated information visualization to support decision making for use of antibiotics in intensive care: design and usability evaluation. Inform Health Soc Care 2013;38:330–53. doi:10.3109/17538157.2013.812649	PubMed	2013	Europe	1-15	ICU Providers	Observation	Dashboard; Provider Performance	Tabular With Color Coding; Time Series Line Graphs	Single-Provider vs National	Yes	Different Users	Time (Efficiency); Mouse Clicks (Efficiency); General Usability Assessment (Satisfaction)	Descriptive; Qualitative	B	CE		
50	Little A, Medhanyie A, Yebyo H, et al. Meeting community health worker needs for maternal health care service delivery using appropriate mobile technologies in Ethiopia. PLoS One 2013;8:e77563. doi:10.1371/journal.pone.0077563	PubMed	2013	Africa	31-100	Health Extension Workers; Midwives; And Admin	Useage Data; Survey	Stand Alone Tool; Data Entry Tool; Case Management	Time Series Line Graph; Tabular With Color Coding Indicating Change From Previous	Single Patient; Multi-Patient; Aggregate	No	None	General Usability Assessment (Satisfaction); Usage (Clinical Care); Learnability (Effectiveness)	Descriptive; Survey	C	BE		
51	Pageler NM, Longhurst CA, Wood M, et al. Use of electronic medical record-enhanced checklist and electronic dashboard to decrease CLABSIs. Pediatrics 2014;133:e738–46. doi:10.1542/peds.2013-2249	PubMed	2014	North America	UNKNOWN	Providers	Survey; EHR Database; Patient Outcome	Single Patient Dashboard	Tabular With Color Coding Indicating Compliance	Aggregate And Single Patient	No	Self-Controls Pre-Implemintation	Time (Efficiency); Rates Of Clabsi Decreased (Patient Outcome)	Analytic; Observational	D	CF		
53	Jing X, Cimino JJ. A complementary graphical method for reducing and analyzing large data sets. Case studies demonstrating thresholds setting and selection. Methods Inf Med 2014;53:173–85. doi:10.3414/ME13-01-0075	PubMed	2014	North America	UNKNOWN	Researchers	Observation	Data Reduction And Visualization Technique	Directed Node Graphs	Multi-Patient; Multi-Citations	No	None	(Research)	Descriptive; Qualitative	A	A		
54	Hugine AL, Guerlain SA, Turrentine FE. Visualizing surgical quality data with treemaps. J Surg Res 2014;191:74–83. doi:10.1016/j.jss.2014.03.046	PubMed	2014	North America	101-500	Surgeons And Hospital Admin Quality Personnel; Providers	Survey	Visualization	Tree Map With Color Coding Indicating Alive Or Dead Size Of Rectangle Represents Length Of Stay	Multi-Provider	No	Other System/Vis	Accuracy (Effectiveness)	Analytic; Experimental; Randomized	A	E		
55	Izard J, Hartzler A, Avery DI, et al. User-centered design of quality of life reports for clinical care of patients with prostate cancer. Surgery 2014;155:789–96. doi:10.1016/j.surg.2013.12.007	PubMed	2014	North America	31-100	Patients; Providers	Survey; Interview	Dashboard; Single Patient	Bar Graph; Line Graph; Tabular; And Facial Expression Pictographs	Single Patient	No	Other System/Vis	Comprehension (Effectiveness); Helpfulness (Satisfaction); Confidence (Satisfaction); User Preference (Satisfaction)	Descriptive; Qualitative	B	CE		
57	Forman DE, LaFond K, Panch T, et al. Utility and efficacy of a smartphone application to enhance the learning and behavior goals of traditional cardiac rehabilitation: a feasibility study. J Cardiopulm Rehabil Prev 2014;34:327–34. doi:10.1097/HCR.0000000000000058	PubMed	2014	North America	16-30	Patient; Coach	Useage; Survey	Mobile App For Patients And Activity Tracking For Coach	Tabular With Color Coding	Single Patient And Multi-Patient	No	None	Patient Engagement (Satisfaction); Task Completion (Effectiveness); Retention (Patient Outcome)	Descriptive; Qualitative	C	B		
60	Dickson R, Nedelcut A, Seupaul R, et al. STOP STEMI0-a novel medical application to improve the coordination of STEMI care: a brief report on door-to-balloon times after initiating the application. Crit Pathw Cardiol 2014;13:85–8. doi:10.1097/HPC.0000000000000019	PubMed	2014	North America	UNKNOWN	Full Care Team	EHR	Mobile App For Care Coordination; Data Entry Tool	Tabular; Horizontal Bar Graphs	Aggregate And Single Patient	No	Self-Controls Pre-Implemintation	Door-To-Balloon Time (Patient Outcome)	Analytic; Observational	C	E		
61	Lo Y-S, Lee W-S, Chen G-B, et al. Improving the work efficiency of healthcare-associated infection surveillance using electronic medical records. Comput Methods Programs Biomed 2014;117:351–9. doi:10.1016/j.cmpb.2014.07.006	PubMed	2014	Asia	1-15	Providers	Observation	Multi-Patient Survailliance System; Dashboard	Tabular With Color Coding Indicating Risk	Multi-Patient	Yes	Other System/Vis	Time Spent On Each Patient State (Patient Outcome)	Analytic; Experimental; Non-Randomized	C	D		
62	Jeffs L, Beswick S, Lo J, et al. Insights from staff nurses and managers on unit-specific nursing performance dashboards: a qualitative study. BMJ Qual Saf 2014;23:1001–6. doi:10.1136/bmjqs-2013-002595	PubMed	2014	North America	31-100	Nursing Unit Manager; Quality Control Admin	Interview	Unit Performance Dashboard	Bar Graphs	Aggregate	No	None	(Clinical Care)	Descriptive; Qualitative	D	B		
64	Simpao AF, Ahumada LM, Desai BR, et al. Optimization of drug-drug interaction alert rules in a pediatric hospital's electronic health record system using a visual analytics dashboard. J Am Med Inform Assoc 2015;22:361–9. doi:10.1136/amiajnl-2013-002538	PubMed	2015	North America	UNKNOWN	Hospital Admin	EHR And Reporting	Dashboard; Hospital Performance	Tabular; Time Series Line Graph	Aggregate	Yes	Self-Controls Pre-Implemintation	Number Of Alerts And Overrides (Clinical Care)	Analytic; Experimental; Non-Randomized	D	F		
65	Peterson JF, Kripalani S, Danciu I, et al. Electronic surveillance and pharmacist intervention for vulnerable older inpatients on high-risk medication regimens. J Am Geriatr Soc 2014;62:2148–52. doi:10.1111/jgs.13057	PubMed	2014	North America	1-15	Providers; Pharamcists	User Feedback	Dashboard; Multi-Patient Survailliance	Tabular With Some Color Coding Indicating View Time Of Data	Multi-Patient	No	None	Flagged Action (Patient Outcome)	Descriptive; Qualitative	C	E		
66	Anderson D, Zlateva I, Khatri K, et al. Using health information technology to improve adherence to opioid prescribing guidelines in primary care. Clin J Pain 2015;31:573–9. doi:10.1097/AJP.0000000000000177	PubMed	2015	North America	1-15	Providers	EHR Database; Cot Compliance; Survey	Multi-Patient Dashboard	Tabular	Multi-Patient	No	None	Use Of Opioid Treatment Agreements (Patient Outcome); Urine Drug Testing (Patient Outcome); Behavioral Health Visits (Patient Outcome); Percentage Of Adult Patients Receiving Cot (Patient Outcome)	Analytic; Observational	C	CF		
67	Michtalik HJ, Carolan HT, Haut ER, et al. Use of provider-level dashboards and pay-for-performance in venous thromboembolism prophylaxis. J Hosp Med 2015;10:172–8. doi:10.1002/jhm.2303	PubMed	2015	North America	UNKNOWN	Providers	EHR Database; Compliance	Dashboard; Provider Performance	Radar Chart; Time Series Line Graph	Single-Provider vs Aggregate	No	Concurrent External Controls With No Visual	Compliance Of Risk-Appropriate Vte Prophylaxis (Clinical Care)	Analytic; Observational	D	F		
68	Tilahun B, Kauppinen T, Keßler C, et al. Design and development of a linked open data-based health information representation and visualization system: potentials and preliminary evaluation. JMIR Med Inform 2014;2:e31. doi:10.2196/medinform.3531	PubMed	2014	Europe	UNKNOWN	Public Health Officials; Government	Survey	Visualization System Tool (?)	Time Series Line Graph Overlay On Map; Scatter Plot	Aggregate	No	None	General Usability Assessment (Satisfaction)	Descriptive; Qualitative	B	C		
69	Dolan JG, Veazie PJ. Balance Sheets Versus Decision Dashboards to Support Patient Treatment Choices: A Comparative Analysis. Patient 2015;8:499–505. doi:10.1007/s40271-015-0111-6	PubMed	2015	North America	101-500	Patients	Survey	Patient Facing Dashboard	Horizontal Bar Graphs	Single Patient	No	Concurrent External Controls With No Visual	Time (Efficiency); Decisional Conflict (Satisfaction)	Analytic; Experimental; Non-Randomized	A	DE		
70	Welch G, Zagarins SE, Santiago-Kelly P, et al. An internet-based diabetes management platform improves team care and outcomes in an urban Latino population. Diabetes Care 2015;38:561–7. doi:10.2337/dc14-1412	PubMed	2015	North America	UNKNOWN	Diabetes Nurses; Diabetes Dieticians; Providers	EHR Database; Patient Outcome	Dashboard; Single Patient	Tabular With Color Coding Indicating Risk	Single Patient	No	Concurrent External Controls With No Visual	Hba1C (Patient Outcome); Lower Diabetes Distress (Patient Outcome); Lower Social Distress (Patient Outcome)	Analytic; Experimental; Randomized	C	F		
71	Pickering BW, Dong Y, Ahmed A, et al. The implementation of clinician designed, human-centered electronic medical record viewer in the intensive care unit: a pilot step-wedge cluster randomized trial. Int J Med Inform 2015;84:299–307. doi:10.1016/j.ijmedinf.2015.01.017	PubMed	2015	North America	UNKNOWN	Providers	Observation; Survey	Single Patient Dashboard	Tabular With Color Coding By Data Type	Single Patient	No	Self-Controls Pre-Implemintation	Time Spent On Pre-Round Data Gathering (Clinical Care); Intention To Use (Satisfaction); General Usability Assessment (Satisfaction)	Analytic; Experimental; Randomized	D	CEF		
73	Gomez AT, Quinn JG, Doiron DJ, et al. Implementation of a novel real-time platelet inventory management system at a multi-site transfusion service. Transfusion 2015;55:2070–5. doi:10.1111/trf.13081	PubMed	2015	North America	UNKNOWN	Blood Transfusion Service	Extract From System Database	Dashboard; Inventory Management	Tabular With Color Coding Indicating Experation Status	Multi-Products	No	Self-Controls Pre-Implemintation	Platelet-Related Stats (Clinical Care)	Analytic; Observational	D	F		
75	Kopanitsa G, Veseli H, Yampolsky V. Development, implementation and evaluation of an information model for archetype based user responsive medical data visualization. J Biomed Inform 2015;55:196–205. doi:10.1016/j.jbi.2015.04.009	PubMed	2015	Mixed	31-100	Patients; Providers	Observation; User Feedback	EHR Interface	Tabular With Color Coding Indicating Normal Ranges; Time Series Trend Line	Single Patient	No	Self Controls; After Number Of Experiments; Paper Based Record	Time (Efficiency); Number Of Operations Needed (Task-Based); Errors (Effectiveness); User Satisfaction (Satisfaction)	Analytic; Experimental; Non-Randomized	B	E		

		Statistical Summary				Participants		Interventions							Measurement Classifications		Measurement Classifications (2nd study if any)	
ID	Citation	Source	Publication Year	Study Location (Continent)	Sample Scale (User)	Target Audience	Data collection method	Intervention type	Visualization Type	Unit Visualized	Interactive?	Comparators	Outcomes	Study Design	Evaluation Settings	Evaluation Measurements	Evaluation Settings	Evaluation Measurements
76	Galligioni E, Piras EM, Galvagni M, et al. Integrating mHealth in Oncology: Experience in the Province of Trento. J Med Internet Res 2015;17:e114. doi:10.2196/jmir.3743	PubMed	2015	Europe	31-100	Patients; Providers	Survey	Patient App; Data Entry; Single Patient Dashboard	Calendar With Symptoms And Medication Regiment Includes Pictures And Color Coding	Single Patient	Yes	None	Acceptance (Satisfaction); Quality Of Working Life (Usability); Ease Of Use (Satisfaction)	Descriptive; Qualitative	C	D		
79	Perer A, Wang F, Hu J. Mining and exploring care pathways from electronic medical records with visual analytics. J Biomed Inform 2015;56:369–78. doi:10.1016/j.jbi.2015.06.020	PubMed	2015	North America	1-15	Providers	Interview	Analysis Tool	Bubble Chart; Flow Charts	Aggregate	Yes	None	(Research)	Descriptive; Qualitative	B	A		
80	Kopanitsa G. Evaluation Study for an ISO 13606 Archetype Based Medical Data Visualization Method. J Med Syst 2015;39:82. doi:10.1007/s10916-015-0270-y	PubMed	2015	Mixed	31-100	Patients; Providers	Observation; Survey;User Feedback	Patient Level Dashboard; Patient Facing	Tabular With Color Coding Indicating Change In Value And Out Of Normal Ranges; Time Series Line Graph	Single Patient	No	Self Controls; After Number Of Experiments; Paper Based Record	Time (Efficiency); Errors (Effectiveness); Usage (Efficiency); User Satisfaction (Satisfaction); Key Presses (Efficiency)	Analytic; Experimental; Non-Randomized	C	CE		
81	Lee S, Kim E, Monsen KA. Public health nurse perceptions of Omaha System data visualization. Int J Med Inform 2015;84:826–34. doi:10.1016/j.ijmedinf.2015.06.010	PubMed	2015	North America	1-15	Nurses	Survey	Single Patient Dashboard	Time Series Graphs With Color Coding For Status; Tabular	Single Patient	Yes	Different Users	Visual Validity (Satisfaction); Helpfulness (Satisfaction); Usefulness (Satisfaction); Importance (Satisfaction)	Descriptive; Survey	B	D		
82	Talbot TR, Carr D, Parmley CL, et al. Sustained Reduction of Ventilator-Associated Pneumonia Rates Using Real-Time Course Correction With a Ventilator Bundle Compliance Dashboard. Infect Control Hosp Epidemiol 2015;36:1261–7. doi:10.1017/ice.2015.180	PubMed	2015	North America	UNKNOWN	Nurses; Respiratory Therapists; And Physicians	EHR Database; Compliance	Single Patient Dashboard	Tabular With Color Coding Indicating Compliance	Single Patient	No	Self-Controls Pre-Implemintation	VAP Rate (Patient Outcome)	Analytic; Observational	D	F		
84	Segagni D, Sacchi L, Dagliati A, et al. Improving Clinical Decisions on T2DM Patients Integrating Clinical, Administrative and Environmental Data. Stud Health Technol Inform 2015;216:682–6.https://www.ncbi.nlm.nih.gov/pubmed/26262138	PubMed	2015	Europe	UNKNOWN	Patients; Providers	EHR Database And Outside Data	Single Patient Dashboard; Analysis Tool	Pie Charts; Time Series Line Graphs	Aggregate And Single Patient	No	None	(Research)	Descriptive; Qualitative	C	F		
87	Stolper CD, Perer A, Gotz D. Progressive Visual Analytics: User-Driven Visual Exploration of In-Progress Analytics. IEEE Trans Vis Comput Graph 2014;20:1653–62. doi:10.1109/TVCG.2014.2346574	PubMed	2014	Europe	1-15	Researchers	Interview	Analysis Tool	Scatter Plot	Multi-Patient	Yes	None	Temporal Pattern Analysis (Research)	Descriptive; Qualitative	B	A		
96	Dickson RL, Sumathipala D, Reeves J. Stop Stroke© Acute Care Coordination Medical Application: A Brief Report on Postimplementation Performance at a Primary Stroke Center. J Stroke Cerebrovasc Dis 2016;25:1275–9. doi:10.1016/j.jstrokecerebrovasdis.2015.12.001	PubMed	2016	North America	UNKNOWN	Providers	EHR Database	Provider Mobile App	Bar Graph; Picture Of Patient	Single Patient	Yes	Different Users;	Door-To-Needle Time (Clinical Care)	Analytic; Experimental; Non-Randomized	D	F		
101	Houts PS, Witmer JT, Egeth HE, et al. Using pictographs to enhance recall of spoken medical instructions II. Patient Educ Couns 2001;43:231–42.https://www.ncbi.nlm.nih.gov/pubmed/11384821	PubMed	2001	North America	16-30	Patients	Interview	Visualization	Animated Pictures	Single Patient	No	None	Recall (Effectiveness)	Analytic; Experimental; Non-Randomized	B	E		
102	Galesic M, Garcia-Retamero R. Graph literacy: a cross-cultural comparison. Med Decis Making 2011;31:444–57. doi:10.1177/0272989X10373805	PubMed	2011	Mixed	501+	Patients	Survey	Visualization	Bar Graph; Pie Chart; Line Graph; Bar Graph	Aggregate	No	None	Accuracy (Effectiveness); Graph Literacy (Population Description)	Descriptive; Survey	B	E		
103	Feldman-Stewart D, Brundage MD, Zotov V. Further insight into the perception of quantitative information: judgments of gist in treatment decisions. Med Decis Making 2007;27:34–43. doi:10.1177/0272989X06297101	PubMed	2007	North America	101-500	Patients	Observation; Computer Based Questionnaire	Visualization	Bar Graphs; Pie Charts; Block Graph	Aggregate	No	Concurent Controls; Between And Within Subject	Time (Efficiency); Accuracy (Effectiveness); User Preference (Satisfaction)	Analytic; Experimental; Randomized	B	E		
104	Brundage M, Feldman-Stewart D, Leis A, et al. Communicating quality of life information to cancer patients: a study of six presentation formats. J Clin Oncol 2005;23:6949–56. doi:10.1200/JCO.2005.12.514	PubMed	2005	North America	101-500	Patients	Interview	Visualization	Line Charts; Bar Graphs; Textual	Aggregate	No	None	Accuracy (Effectiveness); Sociodemographic Factors In User Performance (Research)	Analytic; Experimental; Randomized	B	DE		
105	McCaffery KJ, Dixon A, Hayen A, et al. The influence of graphic display format on the interpretations of quantitative risk information among adults with lower education and literacy: a randomized experimental study. Med Decis Making 2012;32:532–44. doi:10.1177/0272989X11424926	PubMed	2012	Oceania	101-500	Patients	Survey	Visualization	Block Graphs; Bar Graphs	Aggregate	No	Crossover Design	Time (Efficiency); Accuracy (Effectiveness)	Analytic; Experimental; Randomized	B	DE		
106	Hawley ST, Zikmund-Fisher B, Ubel P, et al. The impact of the format of graphical presentation on health-related knowledge and treatment choices. Patient Educ Couns 2008;73:448–55. doi:10.1016/j.pec.2008.07.023	PubMed	2008	North America	501+	Patients	Survey	Visualization	Block Graphs; Bar Graphs; Tabular; Pie Chart	Aggregate	No	Concurent Controls	Knowledge (Effectiveness); Treatment Choice (Patient Outcome); User Rating Of Pictograph (Satisfaction)	Analytic; Experimental; Randomized	A	DE		
108	Malik S, Du F, Monroe M, et al. Cohort Comparison of Event Sequences with Balanced Integration of Visual Analytics and Statistics. In: Proceedings of the 20th International Conference on Intelligent User Interfaces. ACM 2015. 38–49. doi:10.1145/2678025.2701407	ACM Digital	2015	North America	UNKNOWN	Researchers	Interview; Observation; User Feedback	Analysis Tool	Tabular With Color; Range Graph	Aggregate	Yes	None	(Research)	Descriptive; Qualitative	B	A		
109	Perer A, Shneiderman B. Integrating statistics and visualization: case studies of gaining clarity during exploratory data analysis. In: Proceeding of the twenty-sixth annual CHI conference on Human factors in computing systems - CHI '08. New York, New York, USA: - ACM Press 2008. 265. doi:10.1145/1357054.1357101	ACM Digital	2008	North America	UNKNOWN	Researchers	Interview	Analysis Tool	Network Graph; Scatter Plot	Multi- Units	Yes	None	(Research)	Descriptive; Qualitative	C	A		
111	Wongsuphasawat K, Gotz D. Exploring Flow, Factors, and Outcomes of Temporal Event Sequences with the Outflow Visualization. IEEE Trans Vis Comput Graph 2012; 18:2659–68. doi:10.1109/TVCG.2012.225	IEEE Xplore	2012	North America	1-15	Providers; Researchers	Observation; Survey	Analysis Tool	Flow Diagram	Aggregate	Yes	None	Learnability (Effectiveness); Accuracy (Effectiveness); Time (Efficiency)	Descriptive; Qualitative	A	DE		
112	Wongsuphasawat K, Guerra Gómez JA, Plaisant C, et al. LifeFlow: visualizing an overview of event sequences. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. ACM 2011. 1747–56. doi:10.1145/1978942.1979196	ACM Digital	2011	North America	1-15	Providers; Hospital Admin	Observation	Analysis Tool	Tree Of Sequences	Aggregate	Yes	None	Learnability (Effectiveness); (Research)	Descriptive; Qualitative	A	E		
113	Gschwandtner T, Aigner W, Kaiser K, et al. CareCruiser: Exploring and visualizing plans, events, and effects interactively. In: 2011 IEEE Pacific Visualization Symposium. 2011. 43–50. doi:10.1109/PACIFICVIS.2011.5742371	IEEE Xplore	2011	Oceania	1-15	Providers; Researchers	Observation; User Feedback	Analysis Tool	Temporal Line Graph	Multi-Patient	Yes	None	Heuristics (Usability); General Usability Assessment (Satisfaction)	Descriptive; Qualitative	B	AB		
115	Shahar Y, Goren-Bar D, Boaz D, et al. Distributed, intelligent, interactive visualization and exploration of time-oriented clinical data and their abstractions. Artif Intell Med 2006;38:115–35. doi:10.1016/j.artmed.2005.03.001	PubMed	2006	North America	1-15	Providers	Observation	Analysis Tool	Temporal Graphs	Multi-Patient	Yes	Crossover Design	General Usability Assessment (Satisfaction); Time (Efficiency); Accuracy (Effectiveness)	Analytic; Experimental; Randomized	B	DE		
117	Plaisant C, Lam S, Lam SJ, et al. Searching electronic health records for temporal patterns in patient histories: a case study with microsoft amalga. AMIA Annu Symp Proc 2008;601–5.https://www.ncbi.nlm.nih.gov/pubmed/18999158	PubMed	2008	North America	1-15	Providers; Researchers	Observation; User Feedback	Analysis Tool	Temporal	Multi-Patient	Yes	None	Temporal Pattern Analysis (Research)	Descriptive; Qualitative	B	A		
124	Nabovati E, Vakili-Arki H, Eslami S, et al. Usability evaluation of Laboratory and Radiology Information Systems integrated into a hospital information system. J Med Syst 2014;38:35. doi:10.1007/s10916-014-0035-z	PubMed	2014	Asia	1-15	Providers; Technicians	Survey	EHR Interface	Tabular Wit Color Coding; Icons	Multi-Orders	Yes	None	Heuristics (Usability); General Usability Assessment (Satisfaction)	Descriptive; Qualitative	A	D		
127	Klimov D, Shahar Y, Taieb-Maimon M. Intelligent interactive visual exploration of temporal associations among multiple time-oriented patient records. Methods Inf Med 2009;48:254–62. doi:10.3414/ME9227	PubMed	2009	Asia	1-15	Providers; Researchers	Observation	Analysis Tool	Temporal	Multi-Patient	Yes	Different Users	General Usability Assessment (Satisfaction); Time (Efficiency); Accuracy (Effectiveness)	Analytic; Experimental; Non-Randomized	C	E		
129	Wang TD, Plaisant C, Quinn AJ, et al. Aligning temporal data by sentinel events: discovering patterns in electronic health records. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. ACM 2008. 457–66. doi:10.1145/1357054.1357129	ACM Digital	2008	North America	16-30	Providers; Researchers	Observation	Analysis Tool	Temporal	Multi-Patient	Yes	None	Time (Efficiency); Accuracy (Effectiveness)	Analytic; Experimental; Non-Randomized; Descriptive; Qualitative	A	E	B	A
130	Wang TD, Plaisant C, Shneiderman B, et al. Temporal summaries: supporting temporal categorical searching, aggregation and comparison. IEEE Trans Vis Comput Graph 2009;15:1049–56. doi:10.1109/TVCG.2009.187	PubMed	2009	North America	1-15	Providers; Researchers	Observation	Analysis Tool	Temporal	Aggregate	Yes	None	Temporal Pattern Analysis (Research)	Descriptive; Qualitative	B	A		
135	Mamykina L, Goose S, Hedqvist D, et al. CareView: analyzing nursing narratives for temporal trends. In: CHI '04 Extended Abstracts on Human Factors in Computing Systems. ACM 2004. 1147–50. doi:10.1145/985921.986010	ACM Digital	2004	North America	UNKNOWN	Nurses	Observation; Questionnaire	Dashboard Single Patient	Temporal	Single Patient	Yes	Self Control Pre-Post	Time (Efficiency); Accuracy (Effectiveness); Preference (Usability)	Analytic; Experimental; Non-Randomized	A	D	B	E
137	Aigner W, Miksch S. CareVis: integrated visualization of computerized protocols and temporal patient data. Artif Intell Med 2006;37:203–18. doi:10.1016/j.artmed.2006.04.002	PubMed	2006	Oceania	1-15	Providers	Interview	Dashboard Single Patient	Temporal	Single Patient	Yes	None	General Usability Assessment (Satisfaction)	Descriptive; Qualitative	B	BE		
138	Elting LS, Martin CG, Cantor SB, et al. Influence of data display formats on physician investigators' decisions to stop clinical trials: prospective trial with repeated measures. BMJ 1999;318:1527–31.https://www.ncbi.nlm.nih.gov/pubmed/10356010	PubMed	1999	North America	31-100	Providers	Observation; Questionnaire	Visualization	Tabular; Bars; Pie Chart; Block Chart	Aggregate	No	Crossover Design	Accuracy (Effectiveness)	Analytic; Experimental; Randomized	B	E		
140	Eghdam A, Forsman J, Falkenhav M, et al. Combining usability testing with eye-tracking technology: evaluation of a visualization support for antibiotic use in intensive care. Stud Health Technol Inform 2011;169:945–9.https://www.ncbi.nlm.nih.gov/pubmed/21893885	PubMed	2011	Europe	1-15	Providers	Observation; Questionnaire	Dashboard Single Patient	Tabular; Tree; Line Graphs;	Single Patient	No	None	Time (Efficiency); Task Completion (Effectiveness); General Usability Assessment (Satisfaction)	Descriptive; Qualitative	B	CE		
141	Zhang Y, Drews FA, Westenskow DR, et al. Effects of Integrated Graphical Displays on Situation Awareness in Anaesthesiology. Cogn Technol Work 2002;4:82–90. doi:10.1007/s101110200007	Other (book)	2002	North America	1-15	Providers	Observation	Visualization System Tool (?)	3D Visuals	Single Patient	Yes	Crossover Design	Time (Efficiency)	Analytic; Experimental; Randomized	B	AE		
142	Bauer DT, Guerlain S, Brown PJ. The design and evaluation of a graphical display for laboratory data. J Am Med Inform Assoc 2010;17:416–24. doi:10.1136/jamia.2009.000505	PubMed	2010	North America	1-15	Providers	Observation; Questionnaire	Dashboard	Temporal	Single Patient	No	Crossover Design	Time (Efficiency); Accuracy (Effectiveness)	Analytic; Experimental; Non-Randomized	B	CE		
144	Hirsch JS, Tanenbaum JS, Lipsky Gorman S, et al. HARVEST, a longitudinal patient record summarizer. J Am Med Inform Assoc 2015;22:263–74. doi:10.1136/amiajnl-2014-002945	PubMed	2015	North America	1-15	Providers	Observation; Survey;	Analysis Tool	Temporal	Single Patient	Yes	Crossover Design	Time (Efficiency); Accuracy (Effectiveness); Helpfulness (Satisfaction)	Analytic; Experimental; Randomized	B	CE		
151	Plaisant C, Wu J, Hettinger AZ, et al. Novel user interface design for medication reconciliation: an evaluation of Twinlist. J Am Med Inform Assoc 2015;22:340–9. doi:10.1093/jamia/ocu021	PubMed	2015	North America	16-30	Providers	User Feedback; Observation; Questionnaire	EHR Interface	Tabular With Color Coding	Single Patient	Yes	Crossover Design	Time (Efficiency); Number Of Actions (Efficiency); Accuracy (Effectiveness); General Usability Assessment (Satisfaction)	Analytic; Experimental; Non-Randomized	B	CE		
152	Mandalika VBH, Chernoglazov AI, Billinghurst M, et al. A Hybrid 2D/3D User Interface for Radiological Diagnosis. J Digit Imaging Published Online First: 1 August 2017. doi:10.1007/s10278-017-0002-6	PubMed	2017	Oceania	31-100	Radiologists	Observation; Questionnaire	Visualization System Tool (?)	3D Visuals	Single Patient	Yes	Concurent Controls	General Usability Assessment (Satisfaction); Time (Efficiency); Accuracy (Effectiveness)	Analytic; Experimental; Non-Randomized	B	CE		
153	Stubbs B, Kale DC, Das A. Sim-TwentyFive: an interactive visualization system for data-driven decision support. AMIA Annu Symp Proc 2012;2012:891–900.https://www.ncbi.nlm.nih.gov/pubmed/23304364	PubMed	2012	North America	1-15	Providers	Survey	Analysis Tool	Tabular With Color Coding; Temporal	Multi-Patient	Yes	None	Platform/Browser Performance (Efficiency); Timing (Efficiency); Ease Of Use (Satisfaction)	Descriptive; Qualitative	B	CE		