

An Appendix to the Work Project, presented as part of the requirements for the Award of a
Master Double Degree in Management from the NOVA – School of Business and Economics
and the Warsaw School of Economics

APPENDIXES

IS E-HEALTH A DISRUPTIVE INNOVATION WITHIN HEALTHCARE DELIVERY?

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Appendix 1. Number of analyzed articles divided by the area of study

	Area of Study									Total
	EHR	CPOE	Telemedicine	Monitoring	mHealth	CDSS	RDCS	General ICT	eHealth	
Patient Outcomes	6	3	18	9	10	8	4	12	5	75
Clinical Process	15	7	13	11	3	7	6	7	4	73
End-user Perception	5	3	13	4	6	3	7	8	4	53
Costs	3	2	16	10	0	0	1	3	4	39

Appendix 2. Percentage of articles that are in line with the disruptive theory

	EHR	CPOE	Telemedicine	Monitoring	mHealth	CDSS	RDCS	General ICT	eHealth
1: PATIENT OUTCOMES (DECREASED)	0%	0%	0%	11%	10%	38%	0%	0%	0%
1: CLINICAL PROCESS EFFICIENCY (DECREASED)	13%	14%	0%	0%	0%	14%	33%	0%	25%
2: END-USER PERCEPTION (NEGATIVE)	20%	67%	8%	0%	0%	33%	29%	13%	40%
3: COSTS (DECREASED)	67%	100%	50%	30%	n/a	n/a	100%	33%	25%

Appendix 3. Index of articles used to test hypothesis 1 in the area of patient outcomes

	eHealth influence on patient's health outcomes		
	Improved	No difference	Decreased
# of studies	43	29	2
% of studies	58%	39%	3%

#	Patient Outcomes	Study	Year	Authors	Technology
1	improved	Effect of electronic health records in ambulatory care: retrospective, serial, cross sectional study.	2005	Garrido T, Jamieson L, Zhou Y, Wiesenthal A, Liang L	EHR

2	improved	A systematic review of interactive computer-assisted technology in diabetes care. Interactive information technology in diabetes care.	2006	Jackson, Bolen S, Brancati, Batts-Turner, Gary	General ICT
3	improved	The effectiveness of web-based tools for improving blood glucose control in patients with diabetes mellitus: a meta-analysis	2011	Angeles,Howard, and Dolovich.	General ICT
4	improved	Home telemonitoring for congestive heart failure: a systematic review and meta-analysis	2010	J Polisena, K Tran, K Cimon, B Hutton, S McGill, K Palmer, and RE Scott.	Monitoring
5	improved	The Benefits Of Health Information Technology: A Review Of The Recent Literature Shows Predominantly Positive Results	2011	Melinda Beeuwkes Buntin1,*, Matthew F. Burke2, Michael C. Hoaglin3 and David Blumenthal4	EHR
6	improved	Prevention of adverse drug events through computerized surveillance.	1992	Evans RS1, Pestotnik SL, Classen DC, Bass SB, Burke JP.	RDCS
7	improved	Intensive care unit telemedicine: alternate paradigm for providing continuous intensivist care	2000	Rosenfeld BA, Dorman T, Breslow MJ, Pronovost P, Jenckes M, Zhang N, Anderson G, Rubin H.	Telemedicine
8	improved	Effect of a multiple-site intensive care unit telemedicine program on clinical and economic outcomes: an alternative paradigm for intensivist staffing.	2004	Breslow MJ, Rosenfeld BA, Doerfler M, Burke G, Yates G, Stone DJ, Tomaszewicz P, Hochman R, Plocher DW.	Telemedicine

9	improved	A Business Case for Tele-Intensive Care Units	2014	Alberto Coustasse, DrPH, MD, MBA, MPH, Stacie Deslich, MA, MS, Deanna Bailey, MS, Alesia Hairston, MS, David Paul, DDS, PhD,	Telemedicine
10	improved	Structured telephone support or telemonitoring programmes for patients with chronic heart failure.	2010	Inglis SC, Clark RA, McAlister FA, Ball J, Lewinter C, Cullington D, Stewart S, Cleland JG.	Monitoring
11	improved	Role of home blood pressure monitoring in overcoming therapeutic inertia and improving hypertension control: a systematic review and meta-analysis.	2011	Agarwal R, Bills JE, Hecht TJ, Light RP.	Monitoring
12	improved	Patient retention in antiretroviral therapy programs in sub-Saharan Africa: a systematic review.	2007	Rosen S, Fox MP, Gill CJ.	General ICT
13	improved	The Impact of Computerized Physician Order Entry on Medication Error Prevention	1999	David W. Bates, MD, MSc,1,2 Jonathan M. Teich, MD, PhD,1,2 Joshua Lee, MD,1 Diane Seger, RPh,1,2 Gilad J. Kuperman, MD, PhD,1,2 Nell Ma'Luf,1 Deborah Boyle,1 and Lucian Leape, MD3	CPOE
14	improved	Diagnosis, access and outcomes: Update of a systematic review of telemedicine services	2006	Hersh WR1, Hickam DH, Severance SM, Dana TL, Pyle Krages K, Helfand M.	Telemedicine
15	improved	Adverse drug event rates in six community hospitals and the potential impact of computerized physician order entry for prevention.	2010	Hug BL1, Witkowski DJ, Sox CM, Keohane CA, Seger DL, Yoon C, Matheny ME, Bates DW.	CPOE

16	improved	Impact of discharge planning decision support on time to readmission among older adult medical patients.	2014	Bowles KH1, Hanlon A, Holland D, Potashnik SL, Topaz M.	CDSS
17	improved	Computerized Clinical Decision Support to Prevent Venous Thromboembolism Among Hospitalized Patients: Proximal Outcomes from a Multiyear Quality Improvement Project.	2015	Amland RC, Dean BB, Yu H, Ryan H, Orsund T, Hackman JL, Roberts SR.	CDSS
18	improved	Clinical effects of home telemonitoring in the context of diabetes, asthma, heart failure and hypertension: a systematic review.	2010	Paré G, Moqadem K, Pineau G, St-Hilaire C.	Monitoring
19	improved	Electronic Results Management in Pediatric Ambulatory Care: Qualitative Assessment	2009	Timothy G. Ferris, Sarah A. Johnson, John Patrick T. Co, Meghan Backus, James Perrin, David W. Bates, Eric G. Poon	EHR
20	improved	Assessing the Effect of mHealth Interventions in Improving Maternal and Neonatal Care in Low- and Middle-Income Countries: A Systematic Review	2016	Stephanie Felicie Victoria Sondaal , Joyce Linda Browne, Mary Amoakoh-Coleman, Alexander Borgstein, Andrea Solnes	mHealth
21	improved	Impact of home blood pressure telemonitoring and blood pressure control: a meta-analysis of randomized controlled studies.	2011	Omboni S, Guarda A.	Monitoring
22	improved	Supporting family members of people with traumatic brain injury using telehealth: a systematic review.	2012	Rietdijk R, Togher L, Power E.	Telemedicine

23	improved	A systematic review of internet-based self-management interventions for youth with health conditions.	2009	Stinson J, Wilson R, Gill N, Yamada J, Holt J.	General ICT
24	improved	The impact of mobile monitoring technologies on glycosylated hemoglobin in diabetes: a systematic review.	2012	Baron J, McBain H, Newman S.	Monitoring
25	improved	Home-based educational interventions for children with asthma.	2011	Welsh EJ, Hasan M, Li P.	General ICT
26	improved	The impact of an electronic health record on nurse sensitive patient outcomes: an interrupted time series analysis	2011	Dawn W Dowding,corresponding author ¹ Marianne Turley, ² and Terhilda Garrido ³	EHR
27	improved	Effects of home telemonitoring to support improved care for chronic obstructive pulmonary diseases	2011	C. Sicotte, G. Pare, S. Morin, J. Potvin, M.-P. Moreault	Telemedicine
28	improved	Investigating the effectiveness of technologies applied to assist seniors: A systematic literature review	2015	Pouria Khosravia, , Amir Hossein Ghapanchia, b, ,	RDCS
29	improved	Information and communication technology as a tool for improving physical and social activity of the elderly	2012	H. Blažun, K. Saranto, P. Kokol, J. Vošner	General ICT
30	improved	Effects of robot-assisted activity for elderly people and nurses at a day service center	2004	K. Wada, T. Shibata, T. Saito, K. Tanie	General ICT

31	improved	Design, Implementation, and Wide Pilot Deployment of FitForAll: An Easy to use Exergaming Platform Improving Physical Fitness and Life Quality of Senior Citizens	2014	Evdokimos I. Konstantinidis ; Antonis S. Billis ; Christos A. Mouzakidis ; Vasiliki I. Zilidou ; Panagiotis E. Antoniou	mHealth
32	improved	Automated technology for in-home fall risk assessment and detection sensor system	2013	M.J. Rantz, M. Skubic, C. Abbott, C. Galambos, Y. Pak, D.K. Ho, E.E. Stone, L. Rui, J. Back, S.J. Miller	mHealth
33	improved	Hypertension Management Using Mobile Technology and Home Blood Pressure Monitoring: Results of a Randomized Trial in Two Low/Middle-Income Countries	2012	John D. Piette, Hema Datwani, Sofia Gaudio, Stephanie M. Foster, Joslyn Westphal, William Perry, Joel Rodríguez-Saldaña, Milton O. Mendoza-Avelares, and Nicolle Marinec	mHealth
34	improved	Multicenter randomised trial on home-based telemanagement to prevent hospital readmission of patients with chronic heart failure	2009	A. Giordano, S. Scalvini, E. Zanelli, U. Corrà, L. Gl, V. Ricci, P. Baiardi, F. Glisenti	Telemedicine
35	improved	Can pain be managed through the Internet? A systematic review of randomized controlled trials.	2011	Bender JL, Radhakrishnan A, Diorio C, Englesakis M, Jadad AR.	eHealth

36	improved	Electronic medical record systems, data quality and loss to follow-up: survey of antiretroviral therapy programmes in resource-limited settings	2008	Mathieu Forster a, Christopher Bailey b, Martin WG Brinkhof a, Claire Graber a, Andrew Boulle c, Mark Spohr b, Eric Balestre d, Margaret May e, Olivia Keiser a, Andreas Jahn f, Matthias Egger a & for the ART-LINC collaboration of the International Epidemiological Databases to Evaluate AIDS	RDCS
37	improved	Information and communication technology as a tool for improving physical and social activity of the elderly	2012	H. Blažun, K. Saranto, P. Kokol, J. Vošner	General ICT
38	improved	Deployment of assistive living technology in a nursing home environment: methods and lessons learned	2012	Hamdi AloulouEmail author, Mounir Mokhtari, Thibaut Tiberghien, Jit Biswas, Clifton Phua, Jin Hong Kenneth Lin and Philip Yap	General ICT
39	improved	Internet use and depression among older adults	2012	S.R. Cotten, G. Ford, S. Ford, T.M. Hale	eHealth
40	improved	Mobile Phone Intervention to Improve Diabetes Care in Rural Areas of Pakistan: A Randomized Controlled Trial	2015	Muhammad Shahid, Shiraz Shaikh	mHealth
41	improved	Improving Asthma Control Through Telemedicine: A Study of Short-Message Service	2005	Vedran Ostojic, Branimir Cvorisec, Sanja Barsic Ostojic, Dimitry Reznikoff, Asja Stipic-Markovic, and Zdenko Tadjman	mHealth

42	improved	Cluster-Randomized, Controlled Trial of a Simplified Multifaceted Management Program for Individuals at High Cardiovascular Risk (SimCard Trial) in Rural Tibet, China, and Haryana, India	2015	Maoyi Tian, Vamadevan S. Ajay, Danzeng Dunzhu, Safraj S. Hameed, Xian Li, Zhong Liu, Cong Li, Hao Chen, KaWing Cho, Ruilai Li, Xingshan Zhao, Devraj Jindal, Ishita Rawal, Mohammed K. Ali, Eric D. Peterson, Jiachao Ji, Ritvik Amarchand, Anand Krishnan, Nikhil Tandon, Li-Qun Xu, Yangfeng Wu, Dorairaj Prabhakaran and Lijing L. Yan	mHealth
43	improved	A mobile telephone-based interactive self-care system improves asthma control	2011	W-T. Liu, C-D. Huang, C-H. Wang, K-Y. Lee, S-M. Lin, H-P. Kuo	mHealth
44	didn't change	A descriptive feast but an evaluative famine: systematic review of published articles on primary care computing during 1980-97	2001	Elizabeth Mitchell, Frank Sullivan	RDCS
45	didn't change	Telehealthcare for chronic obstructive pulmonary disease.	2011	McLean S, Nurmatov U, Liu JL, Pagliari C, Car J, Sheikh A.	Telemedicine
46	didn't change	Effects of clinical decision-support systems on practitioner performance and patient outcomes: a synthesis of high-quality systematic review findings.	2011	Jaspers MW1, Smeulers M, Vermeulen H, Peute LW.	CDSS
47	didn't change	Impact of an intensive care unit telemedicine program on a rural health care system.	2009	Zawada ET Jr, Herr P, Larson D, Fromm R, Kapaska D, Erickson D.	Telemedicine

48	didn't change	Effects of clinical decision-support systems on practitioner performance and patient outcomes: a synthesis of high-quality systematic review findings.	2011	Jaspers MW1, Smeulers M, Vermeulen H, Peute LW.	CDSS
49	didn't change	Guided medication dosing for inpatients with renal insufficiency.	2001	Chertow GM1, Lee J, Kuperman GJ, Burdick E, Horsky J, Seger DL, Lee R, Mekala A, Song J, Komaroff AL, Bates DW.	EHR
50	didn't change	Randomized trial of monitoring, feedback, and management of care by telephone to improve treatment of depression in primary care.	2000	Simon GE1, VonKorff M, Rutter C, Wagner E.	mHealth
51	didn't change	Computer-based education for patients with hypertension: a systematic review	2010	Saksena A.	eHealth
52	didn't change	The impact of telemedicine interventions involving routine transmission of blood glucose data with clinician feedback on metabolic control in youth with type 1 diabetes: a systematic review and meta-analysis.	2010	Shulman RM, O'Gorman CS, Palmert MR.	Telemedicine
53	didn't change	'Rage against the machine?': nurses' and midwives' experiences of using Computerized Patient Information Systems for clinical information	2003	Timothy G. Ferris, Sarah A. Johnson, John Patrick T. Co, Meghan Backus, James Perrin, David W. Bates, Eric G. Poon	EHR

54	didn't change	A systematic review of the effects of eHealth on chronically ill patients.	2011	Eland-de Kok P, van Os-Medendorp H, Vergouwe-Meijer A, Bruijnzeel-Koomen C, Ros W.	eHealth
55	didn't change	Telemedicine and telecare for older patients--a systematic review.	2012	van den Berg N, Schumann M, Kraft K, Hoffmann W.	Telemedicine
56	didn't change	Systematic review of studies on telemonitoring of patients with congestive heart failure: a meta-analysis.	2011	Clarke M, Shah A, Sharma U.	Monitoring
57	didn't change	A meta-analysis of remote monitoring of heart failure patients.	2009	Klersy C, De Silvestri A, Gabutti G, Regoli F, Auricchio A.	Monitoring
58	didn't change	Clinical and economic outcomes of the electronic intensive care unit: results from two community hospitals.	2010	Morrison JL, Cai Q, Davis N, Yan Y, Berbaum ML, Ries M, Solomon G.	General ICT
59	didn't change	Effects of clinical decision-support systems on practitioner performance and patient outcomes: a synthesis of high-quality systematic review findings.	2011	Jaspers MW1, Smeulers M, Vermeulen H, Peute LW.	CDSS
60	didn't change	Evidence of benefit from telerehabilitation in routine care: a systematic review.	2011	Hailey D, Roine R, Ohinmaa A, Dennett L.	Telemedicine
61	didn't change	Effectiveness of web-based interventions on patient empowerment: a systematic review and meta-analysis.	2010	Samoocha D, Bruinvels DJ, Elbers NA, Anema JR, van der Beek AJ.	General ICT
62	didn't change	Telerehabilitation in stroke care--a systematic review.	2011	Johansson T, Wild C.	Telemedicine

63	didn't change	The effects of Internet or interactive computer-based patient education in the field of breast cancer: a systematic literature review.	2010	Ryhänen AM, Siekkinen M, Rankinen S, Korvenranta H, Leino-Kilpi H.	General ICT
64	didn't change	Nurse care coordination and technology effects on health status of frail older adults via enhanced self-management of medication: randomized clinical trial to test efficacy	2013	K.D. Marek, F. Stetzer, P.A. Ryan, L.D. Bub, S.J. Adams, A. Schlidt, R. Lancaster, A.-M. O'brien	Telemedicine
65	didn't change	A feasibility study to investigate the acceptability and potential effectiveness of a telecare service for older people with chronic obstructive pulmonary disease	2012	J.P.-C. Chau, D.T.-F. Lee, D.S.-F. Yu, A.Y.-M. Chow, W.-C. Yu, S.-Y. Chair, A.S. Lai, Y.-L. Chick	Telemedicine
66	didn't change	European citizens' use of eHealth services: A study of seven countries	2007	Hege K Andreassen Email author, Maria M Bujnowska-Fedak, Catherine E Chronaki, Roxana C Dumitru, Iveta Pudule, Silvina Santana, Henning Voss and Rolf Wynn	Telemedicine
67	didn't change	A randomized controlled pilot study of home-based step training in older people using videogame technology	2013	D. Schoene, S.R. Lord, K. Delbaere, C. Severino, T.A. Davies, S.T. Smith	mHealth
68	didn't change	Telehealthcare for asthma.	2010	McLean S, Chandler D, Nurmatov U, Liu J, Pagliari C, Car J, Sheikh A.	Telemedicine

69	didn't change	The addition of decision support into computerized physician order entry reduces red blood cell transfusion resource utilization in the intensive care unit.	2007	Fernández Pérez ER1, Winters JL, Gajic O.	CPOE
70	didn't change	Systematic review of cost effectiveness studies of telemedicine interventions	2002	Pamela S Whitten, Frances S Mair, Alan Haycox, Carl R May, Tracy L Williams, Seth Hellmich,	Telemedicine
71	didn't change	Assessment of research quality of telehealth trials in pain management: a meta-analysis.	2013	McGeary DD, McGeary CA, Gatchel RJ, Allison S, Hersh A.	eHealth
72	didn't change	The impact of the electronic medical record on structure, process, and outcomes within primary care: a systematic review of the evidence	2011	Jayna M Holroyd-Leduc, Diane Lorenzetti, Sharon E Straus, Lindsay Sykes, Hude Quan	EHR
73	decreased	A Randomized Controlled Trial of Telemonitoring in Older Adults with Multiple Health Issues to Prevent Hospitalizations and Emergency Department Visits	2012	Paul Y. Takahashi, MD, MPH; Jennifer L. Pecina, MD; Benjavan Upatising, MSIE, PhD; Rajeev Chaudhry, MBBS, MPH; Nilay D. Shah, PhD; Holly Van Houten, BA; Steve Cha, MS; Ivana Croghan, PhD; James M. Naessens, ScD; Gregory J. Hanson, MD	Monitoring
74	decreased	Effect of mobile phone intervention for diabetes on glycaemic control: a meta-analysis.	2011	Liang X, Wang Q, Yang X, Cao J, Chen J, Mo X, Huang J, Wang L, Gu D.	mHealth

Appendix 4. Index of articles used to test hypothesis 1 in the area of clinical process efficiency

	eHealth influence on clinical process efficiency		
	Improved	No difference	Decreased
# of studies	41	26	7
% of studies	55%	35%	9%

	Clinical Process Efficiency	Study	Year	Author	Technology
1	improved	A descriptive feast but an evaluative famine: systematic review of published articles on primary care computing during 1980-97	2001	Elizabeth Mitchell, Frank Sullivan	RDCS
2	improved	Effect of electronic health records in ambulatory care: retrospective, serial, cross sectional study.	2005	Garrido T, Jamieson L, Zhou Y, Wiesenthal A, Liang L.	EHR
3	improved	A systematic review of interactive computer-assisted technology in diabetes care. Interactive information technology in diabetes care.	2006	Jackson CL1, Bolen S, Brancati FL, Batts-Turner ML, Gary TL.	General ICT
4	improved	The effectiveness of web-based tools for improving blood glucose control in patients with diabetes mellitus: a meta-analysis	2011	RN Angeles, MI Howard, and L Dolovich.	General ICT
5	improved	Telehealthcare for chronic obstructive pulmonary disease.	2011	McLean S, Nurmatov U, Liu JL, Pagliari C, Car J, Sheikh A.	Telemedicine

6	improved	Effects of clinical decision-support systems on practitioner performance and patient outcomes: a synthesis of high-quality systematic review findings.	2011	Jaspers MW1, Smeulers M, Vermeulen H, Peute LW.	CDSS
7	improved	Impact of an intensive care unit telemedicine program on a rural health care system.	2009	Zawada ET Jr, Herr P, Larson D, Fromm R, Kapaska D, Erickson D.	Telemedicine
8	improved	Effects of clinical decision-support systems on practitioner performance and patient outcomes: a synthesis of high-quality systematic review findings.	2011	Jaspers MW1, Smeulers M, Vermeulen H, Peute LW.	CDSS
9	improved	Role of computerized physician order entry systems in facilitating medication errors.	2005	Koppel R1, Metlay JP, Cohen A, Abaluck B, Localio AR, Kimmel SE, Strom BL.	CPOE
10	improved	Information Systems for Patient Follow-Up and Chronic Management of HIV and Tuberculosis: A Life-Saving Technology in Resource-Poor Areas	2007	Hamish SF Fraser, MBChB, MSc,corresponding author1,2,6 Christian Allen, BS,3 Christopher Bailey, MLIS,4 Gerry Douglas, MS,5 Sonya Shin, MD, MPH,1,2 and Joaquin Blaya, MS2,6	CDSS
11	improved	Home telemonitoring for congestive heart failure: a systematic review and meta-analysis	2010	J Polisena, K Tran, K Cimon, B Hutton, S McGill, K Palmer, and RE Scott.	Monitoring
12	improved	The Benefits of Health Information Technology: A Review Of The Recent Literature Shows Predominantly Positive Results	2011	Melinda Beeuwkes Buntin1,* , Matthew F. Burke2, Michael C. Hoaglin3 and David Blumenthal4	EHR

13	improved	Prevention of adverse drug events through computerized surveillance.	1992	Evans RS1, Pestotnik SL, Classen DC, Bass SB, Burke JP.	EHR
14	improved	Intensive care unit telemedicine: alternate paradigm for providing continuous intensivist care	2000	Rosenfeld BA, Dorman T, Breslow MJ, Pronovost P, Jenckes M, Zhang N, Anderson G, Rubin H.	Telemedicine
15	improved	Effect of a multiple-site intensive care unit telemedicine program on clinical and economic outcomes: an alternative paradigm for intensivist staffing.	2004	Breslow MJ, Rosenfeld BA, Doerfler M, Burke G, Yates G, Stone DJ, Tomaszewicz P, Hochman R, Plocher DW.	Telemedicine
16	improved	A Business Case for Tele-Intensive Care Units	2014	Alberto Coustasse, DrPH, MD, MBA, MPH, Stacie Deslich, MA, MS, Deanna Bailey, MS, Alesia Hairston, MS, David Paul, DDS, PhD,	Telemedicine
17	improved	Structured telephone support or telemonitoring programmes for patients with chronic heart failure.	2010	Inglis SC, Clark RA, McAlister FA, Ball J, Lewinter C, Cullington D, Stewart S, Cleland JG.	Monitoring
18	improved	A cost-benefit analysis of electronic medical records in primary care.	2003	Wang SJ1, Middleton B, Prosser LA, Bardon CG, Spurr CD, Carchidi PJ, Kittler AF, Goldszer RC, Fairchild DG, Sussman AJ, Kuperman GJ, Bates DW.	EHR
19	improved	Finding value in EMRs (electronic medical records)	1997	Khoury, A.	EHR

20	improved	Immediate Benefits Realized Following Implementation of Physician Order Entry at an Academic Medical Center	2002	Hagop S. Mekhjian, MD, Rajee R. Kumar, PhD, Lynn Kuehn, MSN, RN, Thomas D. Bentley, MS, RNC, Phyllis Teater, MBA, Andrew Thomas, MD, MBA, Beth Payne, MS, RN, CCRN, and Asif Ahmad, MS, MBA	CPOE
21	improved	Assessing telemedicine: a systematic review of the literature.	2001	Roine R, Ohinmaa A, Hailey D.	Telemedicine
22	improved	Home Telehealth for Patients With Chronic Obstructive Pulmonary Disease (COPD)	2012	J Franek	Telemedicine
23	improved	Risks, barriers, and benefits of EHR systems: a comparative study based on size of hospital.	2006	Thakkar M1, Davis DC.	EHR
24	improved	Role of home blood pressure monitoring in overcoming therapeutic inertia and improving hypertension control: a systematic review and meta-analysis.	2011	Agarwal R, Bills JE, Hecht TJ, Light RP.	Monitoring
25	improved	Patient retention in antiretroviral therapy programs in sub-Saharan Africa: a systematic review.	2007	Rosen S, Fox MP, Gill CJ.	General ICT
26	improved	The Impact of Computerized Physician Order Entry on Medication Error Prevention	1999	David W. Bates, MD, MSc,1,2 Jonathan M. Teich, MD, PhD,1,2 Joshua Lee, MD,1 Diane Seger, RPh,1,2 Gilad J. Kuperman, MD, PhD,1,2 Nell Ma'Luf,1 Deborah Boyle,1 and Lucian Leape, MD3	CPOE

27	improved	Diagnosis, access and outcomes: Update of a systematic review of telemedicine services	2006	Hersh WR1, Hickam DH, Severance SM, Dana TL, Pyle Krages K, Helfand M.	Telemedicine
28	improved	Adverse drug event rates in six community hospitals and the potential impact of computerized physician order entry for prevention.	2010	Hug BL1, Witkowski DJ, Sox CM, Keohane CA, Seger DL, Yoon C, Matheny ME, Bates DW.	CPOE
29	improved	Impact of discharge planning decision support on time to readmission among older adult medical patients.	2014	Bowles KH1, Hanlon A, Holland D, Potashnik SL, Topaz M.	CDSS
30	improved	Computerized Clinical Decision Support to Prevent Venous Thromboembolism Among Hospitalized Patients: Proximal Outcomes from a Multiyear Quality Improvement Project.	2015	Amland RC, Dean BB, Yu H, Ryan H, Orsund T, Hackman JL, Roberts SR.	CDSS
31	improved	Clinical effects of home telemonitoring in the context of diabetes, asthma, heart failure and hypertension: a systematic review.	2010	Paré G, Moqadem K, Pineau G, St-Hilaire C.	Monitoring
32	improved	Electronic Results Management in Pediatric Ambulatory Care: Qualitative Assessment	2009	Timothy G. Ferris, Sarah A. Johnson, John Patrick T. Co, Meghan Backus, James Perrin, David W. Bates, Eric G. Poon	EHR
33	improved	Guided medication dosing for inpatients with renal insufficiency.	2001	Chertow GM1, Lee J, Kuperman GJ, Burdick E, Horsky J, Seger DL, Lee R, Mekala A, Song J, Komaroff AL, Bates DW.	EHR

34	improved	Randomised trial of monitoring, feedback, and management of care by telephone to improve treatment of depression in primary care.	2000	Simon GE1, VonKorff M, Rutter C, Wagner E.	mHealth
35	improved	Effect of the implementation of an enterprise-wide Electronic Health Record on productivity in the Veterans Health Administration.	2006	Evans DC1, Nichol WP, Perlin JB.	EHR
36	improved	The effects on clinician ordering patterns of a computerized decision support system for neuroradiology imaging studies.	2001	Sanders DL1, Miller RA.	RDCS
37	improved	Impact of Computerized Physician Order Entry on Clinical Practice in a Newborn Intensive Care Unit	2004	Leandro Cordero MD1, Lynn Kuehn MSN, RN2, Rajee R Kumar PhD2 and Hagop S Mekhjian MD	CPOE
38	improved	Comparing clinical automated, medical record, and hybrid data sources for diabetes quality measures.	2002	Kerr EA1, Smith DM, Hogan MM, Krein SL, Pogach L, Hofer TP, Hayward RA.	EHR
39	improved	Text messaging reminders to reduce non-attendance in chronic disease follow-up: a clinical trial	2009	Su-May Liew, Seng Fah Tong, Verna Kar Mun Lee, Chirk Jenn Ng, Kwok Chi Leong, Cheong Lieng Teng	mHealth
40	improved	Evaluation of the impact of a CPOE system on nurse-physician communication--a mixed method study	2009	Pirnejad H1, Niazkhani Z, van der Sijs H, Berg M, Bal R. \\	CPOE

41	improved	Assessing the Effect of mHealth Interventions in Improving Maternal and Neonatal Care in Low- and Middle-Income Countries: A Systematic Review	2016	Stephanie Felicie Victoria Sondaal , Joyce Linda Browne, Mary Amoakoh-Coleman, Alexander Borgstein, Andrea Solnes Miltenburg, Mirjam Verwijs, Kerstin Klipstein-Grobusch	mHealth
42	didn't change	Internet-Based Device-Assisted Remote Monitoring of Cardiovascular Implantable Electronic Devices	2012	G Pron, L Ieraci, K Kaulback	Monitoring
43	didn't change	Impact of home blood pressure telemonitoring and blood pressure control: a meta-analysis of randomized controlled studies.	2011	Omboni S, Guarda A.	Monitoring
44	didn't change	Supporting family members of people with traumatic brain injury using telehealth: a systematic review.	2012	Rietdijk R, Togher L, Power E.	Telemedicine
45	didn't change	Computer-based education for patients with hypertension: a systematic review	2010	Saksena A.	eHealth
46	didn't change	Using interactive software to teach image-based clinical laboratory tests in developing countries: a pilot trial in Nepal.	2003	Mallapaty G1, Kim S, Astion ML.	RDCS
47	didn't change	Effect of electronic health records in ambulatory care: retrospective, serial, cross sectional study	2005	Garrido T1, Jamieson L, Zhou Y, Wiesenthal A, Liang L.	EHR

48	didn't change	Using Touchscreen Electronic Medical Record Systems to Support and Monitor National Scale-Up of Antiretroviral Therapy in Malawi	2010	Gerald P. Douglas,1,2,* Oliver J. Gadabu,1 Sabine Joukes,1 Soyapi Mumba,1 Michael V. McKay,1 Anne Ben-Smith,3 Andreas Jahn,4,5 Erik J. Schouten,4,6 Zach Landis Lewis,2 Joep J. van Oosterhout,7 Theresa J. Allain,7 Rony Zachariah,8 Selma D. Berger,9 Anthony D. Harries,9,10 and Frank Chimbwandira4	RDCS
49	didn't change	The impact of telemedicine interventions involving routine transmission of blood glucose data with clinician feedback on metabolic control in youth with type 1 diabetes: a systematic review and meta-analysis.	2010	Shulman RM, O'Gorman CS, Palmert MR.	Telemedicine
50	didn't change	'Rage against the machine?': nurses' and midwives' experiences of using Computerized Patient Information Systems for clinical information	2003	Timothy G. Ferris, Sarah A. Johnson, John Patrick T. Co, Meghan Backus, James Perrin, David W. Bates, Eric G. Poon	EHR
51	didn't change	A systematic review of internet-based self-management interventions for youth with health conditions.	2009	Stinson J, Wilson R, Gill N, Yamada J, Holt J.	General ICT
52	didn't change	The impact of mobile monitoring technologies on glycosylated hemoglobin in diabetes: a systematic review.	2012	Baron J, McBain H, Newman S.	Monitoring

53	didn't change	A systematic review of the effects of eHealth on chronically ill patients.	2011	Eland-de Kok P, van Os-Medendorp H, Vergouwe-Meijer A, Bruijnzeel-Koomen C, Ros W.	eHealth
54	didn't change	Telemedicine and telecare for older patients--a systematic review.	2012	van den Berg N, Schumann M, Kraft K, Hoffmann W.	Telemedicine
55	didn't change	Systematic review of studies on telemonitoring of patients with congestive heart failure: a meta-analysis.	2011	Clarke M, Shah A, Sharma U.	Monitoring
56	didn't change	A meta-analysis of remote monitoring of heart failure patients.	2009	Klersy C, De Silvestri A, Gabutti G, Regoli F, Auricchio A.	Monitoring
57	didn't change	The impact of eHealth on the quality and safety of health care: a systematic overview.	2011	Black AD1, Car J, Pagliari C, Anandan C, Cresswell K, Bokun T, McKinstry B, Procter R, Majeed A, Sheikh A.	eHealth
58	didn't change	Insufficient evidence of benefit: a systematic review of home telemonitoring for COPD.	2011	Bolton CE, Waters CS, Peirce S, Elwyn G; EPSRC and MRC Grand Challenge Team.	Monitoring
59	didn't change	Clinical and economic outcomes of the electronic intensive care unit: results from two community hospitals.	2010	Morrison JL, Cai Q, Davis N, Yan Y, Berbaum ML, Ries M, Solomon G.	General ICT
60	didn't change	Home-based educational interventions for children with asthma.	2011	Welsh EJ, Hasan M, Li P.	General ICT
61	didn't change	Effects of clinical decision-support systems on practitioner performance and patient outcomes: a synthesis of high-quality systematic review findings.	2011	Jaspers MW1, Smeulers M, Vermeulen H, Peute LW.	CDSS

62	didn't change	A Randomized Controlled Trial of Telemonitoring in Older Adults with Multiple Health Issues to Prevent Hospitalizations and Emergency Department Visits	2012	Paul Y. Takahashi, MD, MPH; Jennifer L. Pecina, MD; Benjavan Upatising, MSIE, PhD; Rajeev Chaudhry, MBBS, MPH; Nilay D. Shah, PhD; Holly Van Houten, BA; Steve Cha, MS; Ivana Croghan, PhD; James M. Naessens, ScD; Gregory J. Hanson, MD	Monitoring
63	didn't change	Evidence of benefit from telerehabilitation in routine care: a systematic review.	2011	Hailey D, Roine R, Ohinmaa A, Dennett L.	Telemedicine
64	didn't change	Effectiveness of web-based interventions on patient empowerment: a systematic review and meta-analysis.	2010	Samoocha D, Bruinvels DJ, Elbers NA, Anema JR, van der Beek AJ.	General ICT
65	didn't change	Effect of mobile phone intervention for diabetes on glycaemic control: a meta-analysis.	2011	Liang X, Wang Q, Yang X, Cao J, Chen J, Mo X, Huang J, Wang L, Gu D.	mHealth
66	didn't change	Electronic health records implementation: an evaluation of information system impact and contingency factors.	2014	Nguyen L1, Bellucci E2, Nguyen LT2.	EHR
67	didn't change	A systematic review of the mediating role of knowledge, self-efficacy and self-care behaviour in telehealth patients with heart failure.	2012	Ciere Y, Cartwright M, Newman SP.	Telemedicine
68	decreased	Remote working: survey of attitudes to eHealth of doctors and nurses in rural general practices in the United Kingdom.	2005	Richards H1, King G, Reid M, Selvaraj S, McNicol I, Brebner E, Godden D.	eHealth

69	decreased	Barriers to implementation of a computerized decision support system for depression: an observational report on lessons learned in "real world" clinical settings.	2009	Trivedi MH1, Daly EJ, Kern JK, Grannemann BD, Sunderajan P, Claassen CA.	CDSS
70	decreased	The impact of an electronic health record on nurse sensitive patient outcomes: an interrupted time series analysis	2011	Dawn W Dowding,corresponding author1 Marianne Turley,2 and Terhilda Garrido3	EHR
71	decreased	Instant availability of patient records, but diminished availability of patient information: a multi-method study of GP's use of electronic patient records.	2008	Christensen T1, Grimsmo A.	EHR
72	decreased	Impact of a computerized physician order entry system on nurse-physician collaboration in the medication process.	2008	Pirnejad H1, Niazkhani Z, van der Sijs H, Berg M, Bal R.	CPOE
73	decreased	The Impact of e-Prescribing on Prescriber and Staff Time in Ambulatory Care Clinics: A Time-Motion Study	2007	William Hollingworth PhD, Emily Beth Devine PharmD, MBA, Ryan N. Hansen PharmD, Nathan M. Lawless CE, RPh, Bryan A. Comstock MSc, Jennifer L. Wilson-Norton RPh, MBA, Kathleen L. Tharp, Sean D. Sullivan PhD	RDCS
74	decreased	Effect of electronic laboratory reporting on the burden of lyme disease surveillance--New Jersey, 2001-2006.	2008	Centers for Disease Control and Prevention (CDC).	RDCS

Appendix 5. Index of articles used to test hypothesis 2 in the area of end-user perception

	End-user perception of eHealth		
	Positive	Neutral	Negative
# of studies	41	3	10
% of studies	76%	6%	19%

	End-User Perception	Study	Year	Author	Technology
1	positive	A descriptive feast but an evaluative famine: systematic review of published articles on primary care computing during 1980-97	2001	Elizabeth Mitchell, Frank Sullivan	RDCS
2	positive	Internet-Based Device-Assisted Remote Monitoring of Cardiovascular Implantable Electronic Devices	2012	G Pron, L Ieraci, K Kaulback	Monitoring
3	positive	Remote working: survey of attitudes to eHealth of doctors and nurses in rural general practices in the United Kingdom.	2005	Richards H1, King G, Reid M, Selvaraj S, McNicol I, Brebner E, Godden D.	eHealth
4	positive	Multicenter randomised trial on home-based telemanagement to prevent hospital readmission of patients with chronic heart failure	2009	A. Giordano, S. Scalvini, E. Zanelli, U. Corrà, L. Gl, V. Ricci, P. Baiardi, F. Glisenti	Telemedicine
5	positive	Impact of home blood pressure telemonitoring and blood pressure control: a meta-analysis of randomized controlled studies.	2011	Omboni S, Guarda A.	Monitoring

6	positive	Supporting family members of people with traumatic brain injury using telehealth: a systematic review.	2012	Rietdijk R, Togher L, Power E.	Telemedicine
7	positive	Remote working: survey of attitudes to eHealth of doctors and nurses in rural general practices in the United Kingdom.	2005	Richards H1, King G, Reid M, Selvaraj S, McNicol I, Brebner E, Godden D.	RDCS
8	positive	Telerehabilitation in stroke care--a systematic review.	2011	Johansson T, Wild C.	Telemedicine
9	positive	Effects of home telemonitoring to support improved care for chronic obstructive pulmonary diseases	2011	C. Sicotte, G. Pare, S. Morin, J. Potvin, M.-P. Moreault	Telemedicine
10	positive	Effect of electronic health records in ambulatory care: retrospective, serial, cross sectional study.	2005	Garrido T, Jamieson L, Zhou Y, Wiesenthal A, Liang L.	EHR
11	positive	A systematic review of interactive computer-assisted technology in diabetes care. Interactive information technology in diabetes care.	2006	Jackson CL1, Bolen S, Brancati FL, Batts-Turner ML, Gary TL.	General ICT
12	positive	The effectiveness of web-based tools for improving blood glucose control in patients with diabetes mellitus: a meta-analysis	2011	RN Angeles, MI Howard, and L Dolovich.	General ICT

13	positive	Telehealthcare for chronic obstructive pulmonary disease.	2011	McLean S, Nurmatov U, Liu JL, Pagliari C, Car J, Sheikh A.	Telemedicine
14	positive	Effects of clinical decision-support systems on practitioner performance and patient outcomes: a synthesis of high-quality systematic review findings.	2011	Jaspers MW1, Smeulers M, Vermeulen H, Peute LW.	CDSS
15	positive	Impact of an intensive care unit telemedicine program on a rural health care system.	2009	Zawada ET Jr, Herr P, Larson D, Fromm R, Kapaska D, Erickson D.	Telemedicine
16	positive	Effects of clinical decision-support systems on practitioner performance and patient outcomes: a synthesis of high-quality systematic review findings.	2011	Jaspers MW1, Smeulers M, Vermeulen H, Peute LW.	CDSS
17	positive	Role of computerized physician order entry systems in facilitating medication errors.	2005	Koppel R1, Metlay JP, Cohen A, Abaluck B, Localio AR, Kimmel SE, Strom BL.	CPOE

18	positive	Information Systems for Patient Follow-Up and Chronic Management of HIV and Tuberculosis: A Life-Saving Technology in Resource-Poor Areas	2007	Hamish SF Fraser, MBChB, MSc,corresponding author ^{1,2,6} Christian Allen, BS, ³ Christopher Bailey, MLIS, ⁴ Gerry Douglas, MS, ⁵ Sonya Shin, MD, MPH, ^{1,2} and Joaquin Blaya, MS ^{2,6}	RDCS
19	positive	Computer-based education for patients with hypertension: a systematic review	2010	Saksena A.	eHealth
20	positive	Using interactive software to teach image-based clinical laboratory tests in developing countries: a pilot trial in Nepal.	2003	Mallapaty G1, Kim S, Astion ML.	RDCS
21	positive	Effect of electronic health records in ambulatory care: retrospective, serial, cross sectional study	2005	Garrido T1, Jamieson L, Zhou Y, Wiesenthal A, Liang L.	EHR

22	positive	Using Touchscreen Electronic Medical Record Systems to Support and Monitor National Scale-Up of Antiretroviral Therapy in Malawi	2010	Gerald P. Douglas,1,2,* Oliver J. Gadabu,1 Sabine Joukes,1 Soyapi Mumba,1 Michael V. McKay,1 Anne Ben-Smith,3 Andreas Jahn,4,5 Erik J. Schouten,4,6 Zach Landis Lewis,2 Joep J. van Oosterhout,7 Theresa J. Allain,7 Rony Zachariah,8 Selma D. Berger,9 Anthony D. Harries,9,10 and Frank Chimbwandira4	Monitoring
23	positive	Investigating the effectiveness of technologies applied to assist seniors: A systematic literature review	2015	Pouria Khosravia, , Amir Hossein Ghapanchia, b, ,	mHealth
24	positive	Information and communication technology as a tool for improving physical and social activity of the elderly	2012	H. Blažun, K. Saranto, P. Kokol, J. Vošner	General ICT
25	positive	Effects of robot-assisted activity for elderly people and nurses at a day service center	2004	K. Wada, T. Shibata, T. Saito, K. Tanie	General ICT

26	positive	Design, Implementation, and Wide Pilot Deployment of FitForAll: An Easy to use Exergaming Platform Improving Physical Fitness and Life Quality of Senior Citizens	2014	Evdokimos I. Konstantinidis ; Antonis S. Billis ; Christos A. Mouzakidis ; Vasiliki I. Zilidou ; Panagiotis E. Antoniou	mHealth
27	positive	Automated technology for in-home fall risk assessment and detection sensor system	2013	M.J. Rantz, M. Skubic, C. Abbott, C. Galambos, Y. Pak, D.K. Ho, E.E. Stone, L. Rui, J. Back, S.J. Miller	mHealth
28	positive	Hypertension Management Using Mobile Technology and Home Blood Pressure Monitoring: Results of a Randomized Trial in Two Low/Middle-Income Countries	2012	John D. Piette, Hema Datwani, Sofia Gaudioso, Stephanie M. Foster, Joslyn Westphal, William Perry, Joel Rodríguez-Saldaña, Milton O. Mendoza-Avelares, and Nicolle Marinec	mHealth
29	positive	The effects of Internet or interactive computer-based patient education in the field of breast cancer: a systematic literature review.	2010	Ryhänen AM, Siekkinen M, Rankinen S, Korvenranta H, Leino-Kilpi H.	General ICT

30	positive	Nurse care coordination and technology effects on health status of frail older adults via enhanced self-management of medication: randomized clinical trial to test efficacy	2013	K.D. Marek, F. Stetzer, P.A. Ryan, L.D. Bub, S.J. Adams, A. Schlidt, R. Lancaster, A.-M. O'Brien	Telemedicine
31	positive	A feasibility study to investigate the acceptability and potential effectiveness of a telecare service for older people with chronic obstructive pulmonary disease	2012	J.P.-C. Chau, D.T.-F. Lee, D.S.-F. Yu, A.Y.-M. Chow, W.-C. Yu, S.-Y. Chair, A.S. Lai, Y.-L. Chick	Telemedicine
32	positive	European citizens' use of E-health services: A study of seven countries	2007	Hege K Andreassen Email author, Maria M Bujnowska-Fedak, Catherine E Chronaki, Roxana C Dumitru, Iveta Pudule, Silvina Santana, Henning Voss and Rolf Wynn	Telemedicine
33	positive	Telehospice: Using Telecommunication Technology for Terminally Ill Patients	2001	Pamela Whitten, Gary Doolittle MD, Seth Hellmich MA	eHealth
34	positive	Use of telemedicine for haemodialysis: perceptions of patients and health-care providers, and clinical effects	2008	Whitten P1, Buis L.	Telemedicine

35	positive	Integration of Wearable Solutions in AAL Environments with Mobility Support	2015	Susana E. P. Costa, Joel J. P. C. Rodrigues, Bruno M. C. Silva, João N. Isento, Juan M. Corchado	mHealth
36	positive	A feasibility study to investigate the acceptability and potential effectiveness of a telecare service for older people with chronic obstructive pulmonary disease	2012	J.P.-C. Chau, D.T.-F. Lee, D.S.-F. Yu, A.Y.-M. Chow, W.-C. Yu, S.-Y. Chair, A.S. Lai, Y.-L. Chick	Telemedicine
37	positive	Engaging older adults with dementia in creative occupations using artificially intelligent assistive technology	2013	V. Leuty, J. Boger, L. Young, J. Hoey, A. Mihailidis	General ICT
38	positive	Older adults' satisfaction with a medication dispensing device in home care	2013	B. Reeder, G. Demiris, K.D. Marek	General ICT
39	positive	Supporting daily activities and indoor travel of persons with moderate Alzheimer's disease through standard technology resources	2013	G.E. Lancioni, N.N. Singh, M.F. O'reilly, J. Sigafos, C. Renna, M. Ventrella, K. Pinto, M.G. Minervini, D. Oliva, J. Groeneweg	RDCS
40	positive	Smartphone-centric ambient assisted living platform for patients suffering from co-morbidities monitoring	2015	Igor Bisio ; Fabio Lavagetto ; Mario Marchese ; Andrea Sciarrone	mHealth

41	positive	Electronic health record acceptance by physicians: Testing an integrated theoretical model	2014	Marie-Pierre Gagnon a,b,†, El Kebir Ghandour a, Pascaline Kengne Talla a, David Simonyan a, Gaston Godin b, Michel Labrecque a, Mathieu Ouimet a,c, Michel Rousseau d	EHR
42	neutral	Home telemonitoring for congestive heart failure: a systematic review and meta-analysis	2010	J Polisen, K Tran, K Cimon, B Hutton, S McGill, K Palmer, and RE Scott.	Monitoring
43	neutral	The impact of telemedicine interventions involving routine transmission of blood glucose data with clinician feedback on metabolic control in youth with type 1 diabetes: a systematic review and meta-analysis.	2010	Shulman RM, O'Gorman CS, Palmert MR.	Telemedicine
44	neutral	'Rage against the machine?': nurses' and midwives' experiences of using Computerized Patient Information Systems for clinical information	2003	Timothy G. Ferris, Sarah A. Johnson, John Patrick T. Co, Meghan Backus, James Perrin, David W. Bates, Eric G. Poon	EHR

45	negative	The Benefits Of Health Information Technology: A Review Of The Recent Literature Shows Predominantly Positive Results	2011	Melinda Beeuwkes Buntin1,*, Matthew F. Burke2, Michael C. Hoaglin3 and David Blumenthal4	General ICT
46	negative	Barriers to implementation of a computerized decision support system for depression: an observational report on lessons learned in "real world" clinical settings.	2009	Trivedi MH1, Daly EJ, Kern JK, Grannemann BD, Sunderajan P, Claassen CA.	CDSS
47	negative	A randomized controlled pilot study of home-based step training in older people using videogame technology	2013	D. Schoene, S.R. Lord, K. Delbaere, C. Severino, T.A. Davies, S.T. Smith	RDCS
48	negative	Usage of medical internet and e-health services by the elderly.	2015	Bujnowska-Fedak MM1, Mastalerz-Migas A.	eHealth
49	negative	Passive sensor technology interface to assess elder activity in independent living	2011	G.L. Alexander, B.J. Wakefield, M. Rantz, M. Skubic, M.A. Aud, S. Erdelez, S. Al Ghenaimi	RDCS

50	negative	When requests become orders—A formative investigation into the impact of a computerized physician order entry system on a pathology laboratory service	2006	Andrew Georgioua, Johanna Westbrooka, Jeffrey Braithwaiteb, Rick Iedemab, Sangeeta Raya, Rowena Forsythb, Anthony Dimosc, Tony Germanosc	CPOE
51	negative	Interest in the use of computerized patient portals: role of the provider-patient relationship.	2008	Zickmund SL1, Hess R, Bryce CL, McTigue K, Olshansky E, Fitzgerald K, Fischer GS.	CPOE
52	negative	Patient opinion--EHR assessment from the users perspective.	2004	Zurita L1, Nøhr C.	EHR
53	negative	Remote working: survey of attitudes to eHealth of doctors and nurses in rural general practices in the United Kingdom.	2005	Richards H1, King G, Reid M, Selvaraj S, McNicol I, Brebner E, Godden D.	eHealth
54	negative	Could a low-cost audio-visual link be useful in rheumatology?	2000	Graham LE1, McGimpsey S, Wright S, McClean G, Carsar J, Stevenson M, Wootton R, Taggart AJ.	Telemedicine

Appendix 6. Index of articles used to test hypothesis 3 in the area of cost savings

	eHealth influence on healthcare unit costs		
	Decreased	No difference	Increased
# of studies	21	14	4
% of studies	54%	36%	10%

Costs	Study	Year	Author	Technology
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1	decreased	A descriptive feast but an evaluative famine: systematic review of published articles on primary care computing during 1980-97	2001	Elizabeth Mitchell, Frank Sullivan	RDCS
2	decreased	Internet-Based Device-Assisted Remote Monitoring of Cardiovascular Implantable Electronic Devices	2012	G Pron, L Ieraci, K Kaulback	Monitoring
3	decreased	Multicenter randomized trial on home-based telemanagement to prevent hospital readmission of patients with chronic heart failure	2009	A. Giordano, S. Scalvini, E. Zanelli, U. Corrà, L. Gl, V. Ricci, P. Baiardi, F. Glisenti	telemedicine
4	decreased	Home telemonitoring for congestive heart failure: a systematic review and meta-analysis	2010	J Polisen, K Tran, K Cimon, B Hutton, S McGill, K Palmer, and RE Scott.	Monitoring
5	decreased	Prevention of adverse drug events through computerized surveillance.	1992	Evans RS1, Pestotnik SL, Classen DC, Bass SB, Burke JP.	General ICT
6	decreased	Intensive care unit telemedicine: alternate paradigm for providing continuous intensivist care	2000	Rosenfeld BA, Dorman T, Breslow MJ, Pronovost P, Jenckes M, Zhang N, Anderson G, Rubin H.	Telemedicine
7	decreased	Effect of a multiple-site intensive care unit telemedicine program on clinical and economic outcomes: an alternative paradigm for intensivist staffing.	2004	Breslow MJ, Rosenfeld BA, Doerfler M, Burke G, Yates G, Stone DJ, Tomaszewicz P, Hochman R, Plocher DW.	Telemedicine

8	decreased	A Business Case for Tele-Intensive Care Units	2014	Alberto Coustasse, DrPH, MD, MBA, MPH, Stacie Deslich, MA, MS, Deanna Bailey, MS, Alesia Hairston, MS, David Paul, DDS, PhD,	Telemedicine
9	decreased	Structured telephone support or telemonitoring programmes for patients with chronic heart failure.	2010	Inglis SC, Clark RA, McAlister FA, Ball J, Lewinter C, Cullington D, Stewart S, Cleland JG.	Monitoring
10	decreased	A cost-benefit analysis of electronic medical records in primary care.	2003	Wang SJ1, Middleton B, Prosser LA, Bardon CG, Spurr CD, Carchidi PJ, Kittler AF, Goldszer RC, Fairchild DG, Sussman AJ, Kuperman GJ, Bates DW.	EHR
11	decreased	Finding value in EMRs (electronic medical records)	1997	Khoury, A.	EHR
12	decreased	Immediate Benefits Realized Following Implementation of Physician Order Entry at an Academic Medical Center	2002	Hagop S. Mekhjian, MD, Rajee R. Kumar, PhD, Lynn Kuehn, MSN, RN, Thomas D. Bentley, MS, RNC, Phyllis Teater, MBA, Andrew Thomas, MD, MBA, Beth Payne, MS, RN, CCRN, and Asif Ahmad, MS, MBA	CPOE
13	decreased	Assessing telemedicine: a systematic review of the literature.	2001	Roine R, Ohinmaa A, Hailey D.	Telemedicine
14	decreased	Multicenter randomised trial on home-based telemanagement to prevent hospital readmission of patients with chronic heart failure	2009	A. Giordano, S. Scalvini, E. Zanelli, U. Corrà, L. Gl, V. Ricci, P. Baiardi, F. Glisenti	Telemedicine

15	decreased	Telehealthcare for asthma.	2010	McLean S, Chandler D, Nurmatov U, Liu J, Pagliari C, Car J, Sheikh A.	Telemedicine
16	decreased	The addition of decision support into computerized physician order entry reduces red blood cell transfusion resource utilization in the intensive care unit.	2007	Fernández Pérez ER1, Winters JL, Gajic O.	CPOE
17	decreased	Financial benefits of a pediatric intensive care unit-based telemedicine program to a rural adult intensive care unit: impact of keeping acutely ill and injured children in their local community.	2004	Marcin JP, Nesbitt TS, Struve S, Traugott C, Dimand RJ.	Telemedicine
18	decreased	Risk - Cash-flow Evaluation of the E-Health Implementation Project in the Slovak Republic	2014	Stanislav Sendek	eHealth
19	decreased	Impact of home blood pressure telemonitoring and blood pressure control: a meta-analysis of randomized controlled studies.	2011	Omboni S, Guarda A.	Monitoring
20	decreased	Supporting family members of people with traumatic brain injury using telehealth: a systematic review.	2012	Rietdijk R, Togher L, Power E.	Telemedicine
21	decreased	Remote working: survey of attitudes to eHealth of doctors and nurses in rural general practices in the United Kingdom.	2005	Richards H1, King G, Reid M, Selvaraj S, McNicol I, Brebner E, Godden D.	eHealth

22	didn't change	Telerehabilitation in stroke care--a systematic review.	2011	Johansson T, Wild C.	Telemedicine
23	didn't change	The impact of telemedicine interventions involving routine transmission of blood glucose data with clinician feedback on metabolic control in youth with type 1 diabetes: a systematic review and meta-analysis.	2010	Shulman RM, O'Gorman CS, Palmert MR.	Telemedicine
24	didn't change	Home Telehealth for Patients With Chronic Obstructive Pulmonary Disease (COPD)	2012	J Franek	Telemedicine
25	didn't change	A systematic review of internet-based self-management interventions for youth with health conditions.	2009	Stinson J, Wilson R, Gill N, Yamada J, Holt J.	General ICT
26	didn't change	The impact of mobile monitoring technologies on glycosylated hemoglobin in diabetes: a systematic review.	2012	Baron J, McBain H, Newman S.	Monitoring
27	didn't change	A systematic review of the effects of e-health on chronically ill patients.	2011	Eland-de Kok P, van Os-Medendorp H, Vergouwe-Meijer A, Bruijnzeel-Koomen C, Ros W.	eHealth
28	didn't change	Telemedicine and telecare for older patients--a systematic review.	2012	van den Berg N, Schumann M, Kraft K, Hoffmann W.	Telemedicine
29	didn't change	Systematic review of studies on telemonitoring of patients with congestive heart failure: a meta-analysis.	2011	Clarke M, Shah A, Sharma U.	Monitoring

30	didn't change	A meta-analysis of remote monitoring of heart failure patients.	2009	Klersy C, De Silvestri A, Gabutti G, Regoli F, Auricchio A.	Monitoring
31	didn't change	The impact of eHealth on the quality and safety of health care: a systematic overview.	2011	Black AD1, Car J, Pagliari C, Anandan C, Cresswell K, Bokun T, McKinstry B, Procter R, Majeed A, Sheikh A.	eHealth
32	didn't change	Insufficient evidence of benefit: a systematic review of home telemonitoring for COPD.	2011	Bolton CE, Waters CS, Peirce S, Elwyn G; EPSRC and MRC Grand Challenge Team.	Monitoring
33	didn't change	Systematic review of cost effectiveness studies of telemedicine interventions	2002	Pamela S Whitten, Frances S Mair, Alan Haycox, Carl R May, Tracy L Williams, Seth Hellmich,	Telemedicine
34	didn't change	Improving neonatal care at a primary health care facility in rural India with the help of Level III urban NICU using telemedicine.	2012	Gaurav Kumar, MD, Derik M. Falk, MD, Robert S. Bonello, MD, Jeremy M. Kahn, MD, Eli Perencevich, MD, and Peter Cram, MD, MBA	Monitoring
35	didn't change	Systematic review of studies of the cost-effectiveness of telemedicine and telecare. Changes in the economic evidence over twenty years.	2012	Mistry H.	Telemedicine
36	increased	Effects of home telemonitoring to support improved care for chronic obstructive pulmonary diseases	2011	C. Sicotte, G. Pare, S. Morin, J. Potvin, M.-P. Moreault	Monitoring
37	increased	Risks, barriers, and benefits of EHR systems: a comparative study based on size of hospital.	2006	Thakkar M1, Davis DC.	EHR

38	increased	Clinical and economic outcomes of the electronic intensive care unit: results from two community hospitals.	2010	Morrison JL, Cai Q, Davis N, Yan Y, Berbaum ML, Ries M, Solomon G.	General ICT
39	increased	Costs and cost-effectiveness of a telemedicine intensive care unit program in 6 intensive care units in a large health care system.	2011	Franzini; Sail; Thomas; Wueste;	Telemedicine