Evidence Brief: Staffing Models in Specialty Care

Supplemental Materials

February 2022

U.S. Department of Veterans Affairs
Veterans Health Administration
Health Services Research & Development Service

Recommended citation: Apaydin E, Anderson JA, Rahman B, and Parr NJ. Evidence Brief: Specialty Care Staffing. Washington, DC: Evidence Synthesis Program, Health Services Research and Development Service, Office of Research and Development, Department of Veterans Affairs. VA ESP Project #09-199; 2022.

TABLE OF CONTENTS

APPENDIX A: SEARCH STRATEGY

SYSTEMATIC REVIEWS

Search for current systematic reviews (limited to last 7 years) **Date Searched: 10-15-21**			
A. Bibliographic Databases:	**#**	**Search Statement**	**Results**
MEDLINE: Systematic Reviews Ovid MEDLINE(R) ALL 1946 to October 14, 2021	1	(Outpatients/ AND ("Allergy and Immunology"/ OR Cardiology/ OR Critical Care/ OR Respiratory Therapy/ OR Dermatology/ OR exp Diabetes Mellitus/ OR Gastroenterology/ OR HIV/ OR Hepatitis B/ OR Hepatitis C/ OR Infectious Disease Medicine/ OR Nephrology/ OR Neurology/ OR exp Medical Oncology/ OR Optometry/ OR Pain Management/ OR Rheumatology/ OR Sleep Medicine Specialty/)) OR (((Outpatient$1 OR (outpatient adj3 (care OR clinic$1))) AND (vascular medicine OR cardiology OR angiology OR cardiovascular disease OR dermatology OR critical care OR ICU OR intensive care OR endocrinology OR gastroenterology OR sleep medicine OR hepatology OR infectious disease$1 OR nephrology OR neurology OR nervous system OR oncology OR cancer OR optometry OR rheumatology OR immunology OR allergy OR HIV OR AIDS OR hepatitis OR diabetes OR pulmonary OR respiratory therap*))).ti,ab.	48686
	2	Personnel Staffing and Scheduling/ OR Shift Work Schedule/ OR Work Schedule Tolerance/ OR Workload/ OR Workforce/ OR Models, Nursing/ OR Resource Allocation/ OR (schedule* OR staff* OR personnel OR workload$1 OR work hours OR work load$1 OR nursing model$1 OR staffing model$1 OR (resource adj1 allocation) OR resource$1).ti,ab.	871713
	3	1 AND 2	5310
	4	(systematic review.ti. or meta-analysis.pt. or meta-analysis.ti. or systematic literature review.ti. or this systematic review.tw. or pooling project.tw. or (systematic review.ti,ab. and review.pt.) or meta synthesis.ti. or meta-analy*.ti. or integrative review.tw. or integrative research review.tw. or rapid review.tw. or umbrella review.tw. or consensus development conference.pt. or practice guideline.pt. or drug class reviews.ti. or cochrane database syst rev.jn. or acp journal club.jn. or health technol assess.jn. or evid rep technol assess summ.jn. or jbi database system rev implement rep.jn. or (clinical guideline and management).tw. or ((evidence based.ti. or evidence-based medicine/ or best practice*.ti. or evidence synthesis.ti,ab.) and (((review.pt. or diseases category/ or behavior.mp.) and behavior mechanisms/) or therapeutics/ or evaluation studies.pt. or validation studies.pt. or guideline.pt. or pmcbook.mp.)) or (((systematic or systematically).tw. or critical.ti,ab. or study selection.tw. or ((predetermined or inclusion) and criteri*).tw. or exclusion criteri*.tw. or main outcome measures.tw. or standard of care.tw. or standards of care.tw.) and ((survey or surveys).ti,ab. or overview*.tw. or review.ti,ab. or reviews.ti,ab. or search*.tw. or handsearch.tw. or analysis.ti. or critique.ti,ab. or appraisal.tw. or (reduction.tw. and (risk/ or risk.tw.) and (death or recurrence).mp.)) and ((literature or articles or publications or	479631

		publication or bibliography or bibliographies or published).ti,ab. or pooled data.tw. or unpublished.tw. or citation.tw. or citations.tw. or database.ti,ab. or internet.ti,ab. or textbooks.ti,ab. or references.tw. or scales.tw. or papers.tw. or datasets.tw. or trials.ti,ab. or meta-analy*.tw. or (clinical and studies).ti,ab. or treatment outcome/ or treatment outcome.tw. or pmcbook.mp.))) not (letter or newspaper article).pt.	
	5	7 and 8	177
	6	limit 9 to english language and last 7 years	105
CDSR: Protocols and Reviews EBM Reviews - Cochrane Database of Systematic Reviews 2005 to October 13, 2021	1	(Outpatients AND (Allergy OR Immunology OR Cardiology OR Critical Care OR Respiratory Therapy OR Dermatology OR Diabetes Mellitus OR Gastroenterology OR HIV OR Hepatitis B OR Hepatitis C OR Infectious Disease Medicine OR Nephrology OR Neurology OR Medical Oncology OR Optometry OR Pain Management OR Rheumatology OR Sleep Medicine Specialty)).kw.	0
	2	(((Outpatient$1 OR (outpatient adj3 (care OR clinic$1))) AND (vascular medicine OR cardiology OR angiology OR cardiovascular disease OR dermatology OR critical care OR ICU OR intensive care OR endocrinology OR gastroenterology OR sleep medicine OR hepatology OR infectious disease$1 OR nephrology OR neurology OR nervous system OR oncology OR cancer OR optometry OR rheumatology OR immunology OR allergy OR HIV OR AIDS OR hepatitis OR diabetes OR pulmonary OR respiratory therap*))).ti,ab.	62
	3	1 OR 2	62
	4	(Personnel Staffing OR Scheduling OR Shift Work Schedule OR Work Schedule Tolerance OR Workload OR Workforce OR Nursing Models OR Resource Allocation).kw.	15
	5	(schedule* OR staff* OR personnel OR workload$1 OR work hours OR work load$1 OR nursing model$1 OR staffing model$1 OR (resource adj1 allocation) OR resource$1).ti,ab.	820
	6	4 OR 5	826
	7	3 AND 6	8
	8	Limit 7 to last 7 years	3

Search for current systematic reviews (limited to last 7 years) **Date Searched: 10-21-21**		
B. Non-bibliographic databases	**Evidence**	**Results**
AHRQ: evidence reports, technology assessments, US Preventative Services Task Force Evidence Synthesis	http://www.ahrq.gov/research/findings/evidence-based-reports/search.html Search: staffing models	0
CADTH	https://www.cadth.ca	0

	Search: staffing models	
ECRI Institute	https://guidelines.ecri.org/ Search: staffing models	0
HTA: Health Technology Assessments (UP TO 2016)	http://www.ohsu.edu/xd/education/library/ Search: See Cochrane search above	0
NHS Evidence	http://www.evidence.nhs.uk/default.aspx Search: staffing models; outpatient	0
EPPI-Centre	http://eppi.ioe.ac.uk/cms/Default.aspx?tabid=62 Use browser search function [CNTL + F] for keyword search Search: staffing models; outpatient	0
NLM	http://www.ncbi.nlm.nih.gov/books Search: staffing models; outpatient	0
VA Products - VATAP, PBM and HSR&D publications	A. http://www.hsrd.research.va.gov/research/default.cfm B. http://www.research.va.gov/research_topics/ C. https://va.dimensions.ai/discover/publication Search: staffing models; outpatient How nursing staff skill mix, education and experience modify patient acuity-based estimates of required unit staffing. https://www.hsrd.research.va.gov/research/abstracts.cfm?Project_ID=2141706986	1

PRIMARY STUDIES

Search for primary literature **Date searched: 10-21-21**		
MEDLINE [Ovid MEDLINE(R) ALL 1946 to October 18, 2021]		
#	**Search Statement**	**Results**
1	(Outpatients/ AND ("Allergy and Immunology"/ OR Cardiology/ OR Critical Care/ OR Respiratory Therapy/ OR Dermatology/ OR exp Diabetes Mellitus/ OR Gastroenterology/ OR HIV/ OR Hepatitis B/ OR Hepatitis C/ OR Infectious Disease Medicine/ OR Nephrology/ OR Neurology/ OR exp Medical Oncology/ OR Optometry/ OR Pain Management/ OR Rheumatology/ OR Sleep Medicine Specialty/)) OR (((Outpatient$1 OR (outpatient adj3 (care OR clinic$1))) AND (vascular medicine OR cardiology OR angiology OR cardiovascular disease OR dermatology OR critical care OR ICU OR intensive care OR endocrinology OR gastroenterology OR sleep medicine OR hepatology OR infectious disease$1 OR nephrology OR neurology OR nervous system OR oncology OR cancer OR optometry OR rheumatology OR immunology OR	55771

	allergy OR HIV OR AIDS OR hepatitis OR diabetes OR pulmonary OR respiratory therap*))).ti,ab.	
2	Personnel Staffing and Scheduling/ OR Shift Work Schedule/ OR Work Schedule Tolerance/ OR Workload/ OR Workforce/ OR Models, Nursing/ OR Resource Allocation/ OR (schedule* OR staff* OR personnel OR workload$1 OR work hours OR work load$1 OR nursing model$1 OR staffing model$1 OR (resource adj1 allocation) OR resource$1).ti,ab.	872034
3	1 AND 2	5516
4	Limit 3 to english language	5074
CINAHL		
#	**Search Statement**	**Results**
1	(MH "Outpatients") AND ((MH "Allergy and Immunology") OR (MH "Cardiology") OR (MH "Critical Care") OR (MH "Respiratory Therapy") OR (MH "Dermatology") OR (MH "Diabetes Mellitus+") OR (MH "Gastroenterology Care") OR (MH "Human Immunodeficiency Virus") OR (MH "Hepatitis B") OR (MH "Hepatitis C") OR (MH "Communicable Diseases") OR (MH "Nephrology") OR (MH "Neurology") OR (MH "Oncology+") OR (MH "Optometry") OR (MH "Pain Management") OR (MH "Rheumatology") OR (MH "Sleep Disorders"))	3022
2	TI ((((Outpatient$1 OR (outpatient N3 (care OR clinic$1))) AND (vascular medicine OR cardiology OR angiology OR cardiovascular disease OR dermatology OR critical care OR ICU OR intensive care OR endocrinology OR gastroenterology OR sleep medicine OR hepatology OR infectious disease$1 OR nephrology OR neurology OR nervous system OR oncology OR cancer OR optometry OR rheumatology OR immunology OR allergy OR HIV OR AIDS OR hepatitis OR diabetes OR pulmonary OR respiratory therap*)))) OR AB ((((Outpatient$1 OR (outpatient N3 (care OR clinic$1))) AND (vascular medicine OR cardiology OR angiology OR cardiovascular disease OR dermatology OR critical care OR ICU OR intensive care OR endocrinology OR gastroenterology OR sleep medicine OR hepatology OR infectious disease$1 OR nephrology OR neurology OR nervous system OR oncology OR cancer OR optometry OR rheumatology OR immunology OR allergy OR HIV OR AIDS OR hepatitis OR diabetes OR pulmonary OR respiratory therap*))))	2073
3	1 OR 2	4990
4	(MH "Personnel Staffing and Scheduling") OR (MH "Shiftwork") OR (MH "Workload") OR (MH "Workforce")	52060
5	TI ((schedule* OR staff* OR personnel OR workload$1 OR work hours OR work load$1 OR nursing model$1 OR staffing model$1 OR (resource N1 allocation) OR resource$1)) OR AB ((schedule* OR staff* OR personnel OR workload$1 OR work hours OR work load$1 OR nursing model$1 OR staffing model$1 OR (resource N1 allocation) OR resource$1))	203450
6	4 OR 5	241628
7	3 AND 6	307
8	Limit 7 to English language	292

APPENDIX B: EXCLUDED STUDIES

Exclude reasons: 1=Ineligible population, 2=Ineligible intervention, 3=Ineligible comparator, 4=Ineligible outcome, 5=Ineligible timing, 6=Ineligible study design, 7=Ineligible publication type 8=Outdated or ineligible systematic review, 9=Non-English language, 10=Unable to obtain full text

Citation	Exclude Reason
Agrawal D, Jain R. Staffing at Ambulatory Endoscopy Centers in the United States: Practice, Trends, and Rationale. *Gastroenterology Research & Practice*. 2018;2018:9463670	E4
Albarrati Am Pt P. Outpatient physical therapy cardiovascular assessment: Physical therapist perspective and experience. Physiotherapy Theory & Practice. 2019;35(9):843-850	E1
Allen JI, Aldrich L, Moote M. Building a Team-Based Gastroenterology Practice With Advanced Practice Providers. *Gastroenterology & Hepatology*. 2019;15(4):213-220	E4
Allison TG, Squires RW, Johnson BD & Gau GT. Achieving National Cholesterol Education Program goals for low-density lipoprotein cholesterol in cardiac patients: importance of diet, exercise, weight control, and drug therapy. *Mayo Clinic Proceedings*. 1999; 74(5): 466-473.	E4
Al-Shamsi HO, Alhazzani W, Alhuraiji A, et al. A Practical Approach to the Management of Cancer Patients During the Novel Coronavirus Disease 2019 (COVID-19) Pandemic: An International Collaborative Group. *Oncologis*t. 2020;25(6):e936-e945	E4
Anil G, Hirisave Krishna B, Johnson CC, Richards SL, Bhandari P. Outpatient Practice Reactivation in an Integrated Community Practice During the COVID-19 Pandemic. *Telemedicine Journal & E Health*. 2021. p. 22.	E2
Ansari M, Alexander M, Tutar A, Bello D, Massie BM. Cardiology participation improves outcomes in patients with new-onset heart failure in the outpatient setting. Journal of the American College of Cardiology. 2003;41(1):62-8	E1
Atanda A, Shapiro NL, Stubbings J, Groo V. Implementation of a New Clinic-Based, Pharmacist-Managed PCSK9 Inhibitor Consultation Service. Journal of Managed Care & Specialty Pharmacy. 2017;23(9):918-925	E4
Atlas KR, Forbes M, Riches J, et al. The scope of hospital medicine practice at night: a national survey of night shift hospitalists. *Hospital Practice*. 2021;49(4):292-297	E1
Awad C, Canneva A, Chiasson CO, et al. PHIRST Trial - pharmacist consults: prioritization of HIV-patients with a referral screening tool. *AIDS Care*. 2017;29(11):1463-1472	E1
Bellanti JA. The role of the allergist/immunologist in the COVID-19 pandemic: A Janus-faced presentation. *Allergy & Asthma Proceedings*. 2020;41(6):397-412	E1
Benedetti R, Flock B, Pedersen S, Ahern M. Improved clinical outcomes for fee-for-service physician practices participating in a diabetes care collaborative. *Joint Commission Journal on Quality & Safety*. 2004;30(4):187-194	E1
Benjamin EM, Schneider MS, Hinchey KT. Implementing practice guidelines for diabetes care using problem-based learning: a prospective controlled trial using firm systems. *Diabetes Care.* 1999;22(10):1672-1678. doi:10. 2337/diacare. 22. 10. 1672	E1

Berk RA, Baigis-Smith J, Nanda JP. Health care needs of persons with HIV/AIDS in various settings. *Western Journal of Nursing Research*. 1995;17(6):647-71	E2
Berkhof FF, Hesselink AM, Vaessen DL, Uil SM, Kerstjens HA, van den Berg JW. The effect of an outpatient care on-demand-system on health status and costs in patients with COPD. A randomized trial. *Respiratory Medicine.* 2014;108(8):1163-70	E5
Berkhof FF, van den Berg JW, Uil SM, Kerstjens HA. Telemedicine, the effect of nurse-initiated telephone follow up, on health status and health-care utilization in COPD patients: a randomized trial. *Respirology*. 2015;20(2):279-85	E2
Bess KD, Adams J, Watt MH, et al. Providers' Attitudes Towards Treating Depression and Self-Reported Depression Treatment Practices in HIV Outpatient Care. *AIDS Patient Care & STDs*. 2013;27(3):171-180. doi:10. 1089/apc. 2012. 0406	E2
Bickell NA, Young GJ. Coordination of care for early-stage breast cancer patients. *Journal of General Internal Medicine*. 2001;16(11):737-42	E4
Bjegovich-Weidman M, Kahabka J, Bock A, Frick J, Kowalski H, Mirro J. Development by a Large Integrated Health Care System of an Objective Methodology for Evaluation of Medical Oncology Service Sites. *Journal of Oncology Practice/ American Society of Clinical Oncology*. 2012;8(2):70	E4
Blay N, Cairns J, Chisholm J, O'Baugh J. Research into the workload and roles of oncology nurses within an outpatient oncology unit. *European Journal of Oncology Nursing*. 2002;6(1):6-12; discussion 13-4	E5
Bozzo J, Carlson B, Diers D. Using hospital data systems to find target populations: new tools for clinical nurse specialists. *Clinical Nurse Specialist*. 1998;12(2):86-91	E2
Bukhari M, Dixey J, Deighton C. A survey of new to follow-up ratios in rheumatology outpatient departments. *Clinical Medicine*. 2011;11(1):99-100	E5
Bunnell CA, Gross AH, Weingart SN, et al. High performance teamwork training and systems redesign in outpatient oncology. *BMJ Quality & Safety*. 2013;22(5):405-13	E2
Byock I, Twohig JS, Merriman M, Collins K. Promoting excellence in end-of-life care: a report on innovative models of palliative care. *Journal of Palliative Medicine*. 2006;9(1):137-51	E1
Carroll JJ, Colasanti J, Lira MC, Del Rio C, Samet JH. HIV Physicians and Chronic Opioid Therapy: It's Time to Raise the Bar. *AIDS & Behavior*. 2019;23(4):1057-1061	E6
Chang BP, Rostanski S, Willey J, et al. Safety and Feasibility of a Rapid Outpatient Management Strategy for Transient Ischemic Attack and Minor Stroke: The Rapid Access Vascular Evaluation-Neurology (RAVEN) Approach. *Annals of Emergency Medicine.* 2019;74(4):562-571	E2
Chin MH, Zhang JX, Merrell K. Specialty differences in the care of older patients with diabetes. *Medical Care*. 2000;38(2):131-40	E2
Chung MH, Hung KC, Chiou JF, Fang HF, Chiu CH. Nursing manpower forecast for cancer patients. *Computer Methods & Programs in Biomedicine*. 2021;201:105967	E5
Clapp JD, Burke AC. Supervisor ideology and organizational response: HIV/AIDS prevention in outpatient substance abuse treatment units. *Administration in Social Work*. 1997;21(1):49-64	E7
Cochrane B, Foster J, Boyd R, Atlantis E. Implementation challenges in delivering team-based care ('TEAMcare') for patients with chronic obstructive pulmonary disease in a public hospital setting: a mixed methods approach. *BMC Health Services Research*. 2016;16(a):347+A37	E2

Colubi MM, Perez-Elias MJ, Elias L, et al. Missing scheduled visits in the outpatient clinic as a marker of short-term admissions and death. *HIV Clinical Trials*. 2012;13(5):289-95	E2
Colvin L, Cartwright A, Collop N, et al. Advanced practice registered nurses and physician assistants in sleep centers and clinics: a survey of current roles and educational background. *Journal of Clinical Sleep Medicine*. 2014;10(5):581-7	E4
Coombes CE, Gregory ME. The Current and Future Use of Telemedicine in Infectious Diseases Practice. *Current Infectious Disease Reports*. 2019;21(11):41	E6
Covington CC, Muckler VC, Sheldon L, Alexander R, Morgan B. Improving Emergency Airway Knowledge and Self-Efficacy Levels of Outpatient Gastroenterology Staff via Implementation of Online Education and In Situ Simulation. Gastroenterology Nursing. 2019;42(3):242-250	E2
Craig K, Flaherty-Quemere A. Implementing an automated acuity tool for scoring case management cases and caseloads at Blue Cross Blue Shield of Massachusetts. *Professional Case Management*. 2009;14(4):185-91	E4
Crowther M. Optimal management of outpatients with heart failure using advanced practice nurses in a hospital-based heart failure center. *Journal of the American Academy of Nurse Practitioners.* 2003;15(6):260-5	E5
Dandachi D, Dang BN, Lucari B, Teti M, Giordano TP. Exploring the Attitude of Patients with HIV About Using Telehealth for HIV Care. *AIDS Patient Care & STDs*. 2020;34(4):166-172	E2
Dave SS, Miles K, Griffiths C, Mercey DE, Edwards SG. Is it time to rethink the roles of health professionals in the HIV outpatient setting? *Sexually Transmitted Infections*. 2004;80(2):153-4	E7
Davis MP, Strasser F, Cherny N. How well is palliative care integrated into cancer care? A MASCC, ESMO, and EAPC Project. *Supportive Care in Cancer.* 2015;23(9):2677-85	E1
Davis TME, Drinkwater JJ, Fegan PG, Chikkaveerappa K, Sillars B, Davis WA. Community-based management of complex type 2 diabetes: adaptation of an integrated model of care in a general practice setting. *Internal Medicine Journal.* 2021;51(1):62-68	E5
De la Cruz MG, Wong A, Castro D, Bruera E. Snapshot of an outpatient supportive care center at a comprehensive cancer center. *Journal of Clinical Oncology*. 2016;34(29):145-145. doi:10. 1200/jco. 2016. 34. 26_suppl. 145	E2
Dechert TA, Sarani B, McMaster M, et al. Medical emergency team response for the non-hospitalized patient. *Resuscitation.* 2013;84(3):276-9	E2
Donohue RB. Use of evidence-based practice by outpatient oncology nurses in the management of cancer-related pain and fatigue. University of Utah; 2012.	E7
Dumkow LE, Beuschel TS, Brandt KL. Expanding Antimicrobial Stewardship to Urgent Care Centers Through a Pharmacist-Led Culture Follow-up Program. *Infectious Diseases & Therapy*. 2017;6(3):453-459	E1
Eisenberg S. Ambulatory oncology clinics. Oncology nurses juggle staffing and scheduling in the outpatient setting. *ONS Connect.* 2009;24(8):6-8	E4
Emamifar A, van Bui Hansen MH, Jensen Hansen IM. The ratio of nurse consultation and physician efficiency index of senior rheumatologists is significantly higher than junior physicians in rheumatology residency training: A new efficiency measure in a cohort, exploratory study. *Medicine*. 2017;96(14):e6601	E4

Enterline JP, Majidi FM, Ogorzalek LL, et al. Integrated ambulatory care services in oncology. *Proceedings - the Annual Symposium on Computer Applications in Medical Care*. 1992:197-201	E4
Erdmann CM. The value of the intersystem model for cosmetic nursing practice. *Dermatology Nursing*. 2003;15(4):335-8	E4
Essien UR, He W, Ray A, et al. Disparities in Quality of Primary Care by Resident and Staff Physicians: Is There a Conflict Between Training and Equity? *Journal of General Internal Medicine*. 2019;34(7):1184-1191	E1
Fan VS, Gaziano JM, Lew R, et al. A comprehensive care management program to prevent chronic obstructive pulmonary disease hospitalizations: a randomized, controlled trial. *Annals of Internal Medicine*. 2012;156(10):673-83	E2
Ferre-Ybarz L, Salinas Argente R, Nevot Falco S, et al. Allergy medical care network: a new model of care for specialties. *Allergologia et Immunopathologia*. 2015;43(1):48-56	E5
Finlay E, Newport K, Sivendran S, Kilpatrick L, Owens M, Buss MK. Models of Outpatient Palliative Care Clinics for Patients With Cancer. *Journal of Oncology practice/American Society of Clinical Oncology*. 2019;15(4):187-193	E1
Flemming KD, Allison TG, Covalt JL, Herzig DE, Brown RD. Utility of a post-hospitalization stroke prevention program managed by nurses. *Hospital Practice.* 2013;41(3):70-9	E1
Foisy MM, Tseng A, Blaikie N. Pharmacists' provision of continuity of care to patients with human immunodeficiency virus infection. *American Journal of Health-System Pharmacy*. 1996;53(9):1013-7	E4
Freeman WD, Gronseth G, Eidelman BH. Invited article: is it time for neurohospitalists? *Neurology*. 2008;70(15):1282-1288. doi:10. 1212/01. wnl. 0000308949. 45423. 13	E4
Frey MK, Fowlkes RK, Badiner NM, et al. Gynecologic oncology care during the COVID-19 pandemic at three affiliated New York City hospitals. *Gynecologic Oncology*. 2020;159(2):470-475	E2
Frogge MH. Streamlining outpatient cisplatin therapy to meet the challenges of today. *A65*. 1989;5(2 Suppl 1):21-8	E4
Garvey C, Carlin B, Raskin J. Program organization in pulmonary rehabilitation. Clinics in Chest Medicine. 2014;35(2):423-8	E4
Giannitrapani KF, Silveira MJ, Azarfar A, et al. Cross Disciplinary Role Agreement is Needed When Coordinating Long-Term Opioid Prescribing for Cancer: a Qualitative Study. Journal of General Internal Medicine. 2021;36(7):1867-1874	E4
Glare PA, Semple D, Stabler SM, Saltz LB. Palliative care in the outpatient oncology setting: evaluation of a practical set of referral criteria. *Journal of oncology practice/American Society of Clinical Oncology*. 2011;7(6):366-70	E1
Graney BA, Au DH, Baron AE, et al. Advancing Symptom Alleviation with Palliative Treatment (ADAPT) trial to improve quality of life: a study protocol for a randomized clinical trial. *Trials*. 2019;20(1):355	E4
Granger CL, Parry SM, Denehy L, Remedios L. Evidence, education and multi-disciplinary integration are needed to embed exercise into lung cancer clinical care: A qualitative study involving physiotherapists. *Physiotherapy Theory & Practice.* 2018. p. 852-860.	E10
Greenhalgh T, Shaw S, Wherton J, et al. Real-World Implementation of Video Outpatient Consultations at Macro, Meso, and Micro Levels: Mixed-Method Study. *Journal of Medical Internet Research*. 2018;20(4):e150	E2

Hall-Smith J, Ball C, Coakley J. Follow-up services and the development of a clinical nurse specialist in intensive care. *Intensive & Critical Care Nursing*. 1997;13(5):243-248	E1
Hamel LM, Chapman R, Eggly S, et al. Measuring the use of examination room time in oncology clinics: a novel approach to assessing clinic efficiency and patient flow. *Journal of Oncology Practice/American Society of Clinical Oncology.* 2014;10(6):e385-9	E2
Harris MG, Bean CA. Changing the role of the nurse in the hematology-oncology outpatient setting. *Oncology Nursing Forum*. 1991;18(1):43-6	E4
Hashemi-Sadraei N, Sasankan S, Crozier N, et al. Improving Outpatient Infusion Clinic Wait Times at a Comprehensive Cancer Center. *JCO Oncology Practice.* 2021: OP2100118	E2
Hemingway JF, Singh N, Starnes BW. Emerging practice patterns in vascular surgery during the COVID-19 pandemic. *Journal of Vascular Surgery*. 2020;72(2):396-402	E1
Hendershot E, Murphy C, Doyle S, Van-Clieaf J, Lowry J, Honeyford L. Outpatient chemotherapy administration: decreasing wait times for patients and families. *Journal of Pediatric Oncology Nursing*. 2005;22(1):31-37	E1
Henninger D, Dailey C. Measuring nursing workload in an outpatient department. *Journal of Nursing Administration*. 1983;13(9):20-3	E2
Ho ET. Improving waiting time and operational clinic flow in a tertiary diabetes center. *BMJ Quality Improvement Reports*. 2014;2(2)	E5
Hoberty PD, Chiu CY, Hoberty RJ. Staffing exercise sessions in pulmonary rehabilitation. *Respiratory Care*. 2001;46(7):694-7	E7
Hodgins FE, Lang JM, Malseptic GG, Melby LH, Connolly KA. Coordinating Outpatient Care for Pregnant and Postpartum Women with Opioid Use Disorder: Implications from the COACHH Program. *Maternal & Child Health Journal*. 2019;23(5):585-591	E4
Hollinworth H. Nurses' assessment and management of pain at wound dressing changes. *Journal of Wound Care*. 1995;4(2):77-83	E2
Hook A. Breast cancer navigation and patient satisfaction: exploring a community-based patient navigation model in a rural setting. *Oncology Nursing Forum*.2012;39(4).	E4
Hoskins P, Alford J, Fowler P, et al. Outpatient stabilization programme--an innovative approach in the management of diabetes. *Diabetes Research*. 1985;2(2):85-8	E5
Hui D, Hannon BL, Zimmermann C, Bruera E. Improving patient and caregiver outcomes in oncology: Team-based, timely, and targeted palliative care. *CA: a Cancer Journal for Clinicians*. 2018;68(5):356-376	E1
Israni A, Dean CE, Salkowski N, et al. Variation in structure and delivery of care between kidney transplant centers in the United States. *Transplantation.* 2014;98(5):520-8	E2
James ND, Guerrero D, Brada M. Who should follow up cancer patients? Nurse specialist based outpatient care and the introduction of a phone clinic system. *Clinical Oncology*. 1994. p. 283-7.	E5
Jeger RV, Jorg L, Rickenbacher P, Pfisterer ME, Hoffmann A. Benefit of outpatient cardiac rehabilitation in under-represented patient subgroups. *Journal of Rehabilitation Medicine*. 2007;39(3):246-51	E2

Jerant A, Kravitz RL, Tancredi D, et al. Training Primary Care Physicians to Employ Self-Efficacy-Enhancing Interviewing Techniques: Randomized Controlled Trial of a Standardized Patient Intervention. *Journal of General Internal Medicine*. 2016;31(7):716-22	E1
Jessup M, Albert NM, Lanfear DE, et al. ACCF/AHA/HFSA 2011 survey results: current staffing profile of heart failure programs, including programs that perform heart transplant and mechanical circulatory support device implantation. *Journal of Cardiac Failure*. 2011;17(5):349-58	E2
Jones C, Macmillan RR, Griffiths RD. Providing psychological support for patients after critical illness. *Clinical Intensive Care*.1994. p. 176-9.	E2
Jorgensen L, Jacobsen HR, Pedersen B, Uhrenfeldt L. Calling an Oncological Emergency Telephone to Seek Advice: An Interview Study. *Cancer Nursing*. 2021;44(2):98-105	E7
Karus D, Raveis VH, Marconi K, et al. Service needs of patients with advanced HIV disease: a comparison of client and staff reports at three palliative care projects. AIDS Patient Care & STDs. 2004;18(3):145-158. doi:10. 1089/108729104322994838	E1
Kasle DA, Torabi SJ, Savoca EL, Judson BL, Manes RP. Outpatient Otolaryngology in the Era of COVID-19: A Data-Driven Analysis of Practice Patterns. *Otolaryngology - Head & Neck Surgery*. 2020;163(1):138-144	E2
Katz MH, Slack R, Bruno M, et al. Outpatient virtual clinical encounters after complex surgery for cancer: a prospective pilot study of "TeleDischarge". *Journal of Surgical Research*. 2016;202(1):196-203	E1
Kegel LM. Advanced practice nurses can refine the management of heart failure. *Clinical Nurse Specialist*. 1995;9(2):76-81	E4
Kenealy TW, Parsons MJ, Rouse AP, et al. Telecare for diabetes, CHF or COPD: effect on quality of life, hospital use and costs. A randomised controlled trial and qualitative evaluation. *PLoS ONE*. 2015;10(3):e0116188	E2
Kennedy LC, Wong KM, Kamat NV, et al. Untangling the Multidisciplinary Care Web: Streamlining Care Through an Immune-Related Adverse Events (IRAE) *Tumor Board. Targeted Oncology*. 2020;15(4):541-548	E5
Kenney-Lueptow J. Inpatient Navigation: Utilizing Nurse Navigation Principles to Transition Patients Through Hospitalization, Discharge, and Outpatient Care. *Journal of Oncology Navigation & Survivorship*. 2020;11(1):7-13	E1
Klafke N, Mahler C, von Hagens C, Blaser G, Bentner M, Joos S. Developing and implementing a complex Complementary and Alternative (CAM) nursing intervention for breast and gynecologic cancer patients undergoing chemotherapy--report from the CONGO (complementary nursing in gynecologic oncology) study. *Supportive Care in Cancer*. 2016;24(5):2341-2350	E2
Klingenheben T, Albakri A, T MH. Transtelephonic ECG Monitoring to Guide Outpatient Antiarrhythmic Drug Therapy in Patients With Non-Permanent Atrial Fibrillation: Efficacy and Safety From a Single-Center Experience. *Journal of Atrial Fibrillation*. 2019;11(6):2161	E2
Knight V, Guy RJ, Handan W, Lu H, McNulty A. It is more efficient to type: innovative self-registration and appointment self-arrival system improves the patient reception process. Sexually Transmitted Diseases. 2014;41(6):392-4	E2
Knox A. Ambulatory care unit role optimization for the specialized oncology nurse. *Canadian Oncology Nursing Journal*. 2020;30(3):159-168	E7
Konstan MW, Butler SM, Schidlow DV, Morgan WJ, Julius JR, Johnson CA. Patterns of medical practice in cystic fibrosis: part I. Evaluation and monitoring of health status	E2

of patients. Investigators and Coordinators of the Epidemiologic Study of Cystic Fibrosis. *Pediatric Pulmonology*. 1999;28(4):242-7

Krantz, M. J. , Havranek, E. P. , Haynes, D. K. , Smith, I. , Bucher-Bartelson, B. , & Long, C. S. (2008). Inpatient initiation of β-blockade plus nurse management in vulnerable heart failure patients: a randomized study. *Journal of Cardiac Failure*, 14(4), 303-309.	E1
Kuhns WJ, Allen FH, Jr. , Kellner A. Blood banking as a professional discipline in medicine. *Transfusion*. 1975;15(2):152-8	E2
Kurian T, Stranges E, Czerlanis C. Standardization of the Discharge Process for Inpatient Hematology and Oncology Using Plan-Do-Study-Act Methodology Improves Follow-Up and Patient Hand-Off. *Federal Practitioner*. 2021;38(Suppl 2):S50-S56	E2
Lamkin L, Rosiak J, Buerhaus P, Mallory G, Williams M. Oncology Nursing Society Workforce Survey. Part II: perceptions of the nursing workforce environment and adequacy of nurse staffing in outpatient and inpatient oncology settings. *Oncology Nursing Forum.* 2002;29(1):93-100	E2
Larenas-Linnemann DE, Gupta P, Mithani S, Ponda P. Survey on immunotherapy practice patterns: dose, dose adjustments, and duration. *Annals of Allergy, Asthma, & Immunology*. 2012;108(5):373-378. e3	E2
LeBlanc ES, Rosales AG, Kachroo S, Mukherjee J, Funk KL, Nichols GA. Do Patient or Provider Characteristics Impact Management of Diabetes? *American Journal of Managed Care*. 2015;21(9):597-606	E2
Lee PW, Markle PS, West AN, Lee RE. Use and Quality of Care at a VA Outreach Clinic in Northern Maine. *Journal of Primary Care & Community Health*. 2012;3(3):159-63	E1
Lewandowski L. Developing collaborative partnerships between inpatient nephrology and outpatient dialysis units. *Advances in Renal Replacement Therapy.* 1995;2(4):371-2	E6
Lewis R, Hendry M. A review comparing the effectiveness of nurse-led follow up for cancer with conventional care. *Nursing Times.* 2009;105(37):25-7	E5
Lopez-Martinez N, Segu JL, Vazquez-Castro J, et al. Analysis of the implementation of a personalized care model in diabetes mellitus as an example of chronic disease with information and communication technology support. *Expert Review of Pharmacoeconomics & Outcomes Research*. 2017;17(2):141-148	E5
Lucciola ME, Nelson NM, Rea JM, Boudreaux AJ, Fedderson DJ, Hodge NS. Clinical Nurse Specialist Impact on COVID-19 Preparation at a Military Treatment Facility. *Clinical Nurse Specialist*. 2021;35(3):138-146	E1
Lynn SE. The development of a time-based nursing information system in dermatology outpatients and day therapy areas. *Journal of Nursing Management*. 2002;10(3):153-160. doi:10. 1046/j. 1365-2834. 2002. 00322. x	E4
Maarseveen TD, Maurits MP, Niemantsverdriet E, van der Helm-van Mil AHM, Huizinga TWJ, Knevel R. Handwork vs machine: a comparison of rheumatoid arthritis patient populations as identified from EHR free-text by diagnosis extraction through machine-learning or traditional criteria-based chart review. *Arthritis Research & Therapy*. 2021;23(1):174	E5
MacKinnon NJ, Flagstad MS, Peterson CR, Mesch-Beatty K. Disease management program for asthma: baseline assessment of resource use. *American Journal of Health-System Pharmacy*. 1996;53(5):535-41	E2

Mahaffey K, Stanisstreet D, Ford M, et al. Role of the diabetes inpatient specialist nurse in preventing hospital admission from A&E. *Journal of Diabetes Nursing*. 2012;16(2):57-61	E1
Maltoni M, Scarpi E, Dall'Agata M, et al. Systematic versus on-demand early palliative care: A randomised clinical trial assessing quality of care and treatment aggressiveness near the end of life. *European Journal of Cancer*. 2016;69:110-118	E1
Mannel R, Mannel RS. Staffing for hospital lactation programs: recommendations from a tertiary care teaching hospital. *Journal of Human Lactation*. 2006;22(4):409-17	E1
Martin S. Developing the nurse practitioner's role in minor surgery. *Nursing Times*. 2002;98(33):39-40	E1
Matsuda A, Kobayashi M, Sakakibara Y, et al. Quality of life of lung cancer patients receiving outpatient chemotherapy. *Experimental & Therapeutic Medicine*. 2011;2(2):291-294	E5
Matta ME, Patterson SS. Evaluating multiple performance measures across several dimensions at a multi-facility outpatient center. *Health Care Management Science*. 2007;10(2):173-94	E2
Matthews J. Earlier access to palliative medicine: An experience of integration into a community oncology practice. *Journal of Clinical Oncology*. 2016;34(29):92-92. doi:10. 1200/jco. 2016. 34. 26_suppl. 92	E7
Maxwell S, Wellman LG, Savage T. Merging Two Robust Women's Services in Alignment With a Comprehensive Nursing Strategic Business Plan. *JOGNN: Journal of Obstetric, Gynecologic & Neonatal Nursing.* 2014;43(Supp 1):S49-S50. doi:10. 1111/1552-6909. 12434	E7
McBride A, Campen CJ, Camamo J, et al. Implementation of a pharmacy-managed program for the transition of chemotherapy to the outpatient setting. *American Journal of Health-System Pharmacy*. 2018;75(9):e246-e258	E2
McCarley PB, Hudson M, Kammerer J. Staffing: PCT certification and education: the cart before the horse? *Nephrology News & Issues*. 2009;23(11):4p-4p	E7
McNett M, Goldenberg D, Schaefer C, et al. Treatment patterns among physician specialties in the management of fibromyalgia: results of a cross-sectional study in the United States. *Current Medical Research & Opinion*. 2011;27(3):673-83	E2
Mettlin C, Kizilbash M, Michalek A. Hospital-based cancer detection programs for the community. *Journal of Surgical Oncology*. 1980;15(3):249-57	E2
Milne E, Hutchinson A, Platt P, Parkin D. An evaluation of ambulatory visit groups in rheumatology out-patients. *Journal of Public Health Medicine*. 1994;16(1):41-9	E1
Mims RB, Thomas LL, Conroy MV. Physician house calls: a complement to hospital-based medical care. *Journal of the American Geriatrics Society*. 1977;25(1):28-34	E1
Min L, Cigolle CT, Bernstein SJ, et al. Diabetes care improvement in pharmacist- versus nurse-supported patient-centered medical homes. *American Journal of Managed Care*. 2017;23(11):e374-e381	E5
Mitchell C, Catalan J, McIntosh C, Feher MD. Joint liaison psychiatry-diabetes clinic: a new specialist service. *Diabetic Medicine*. 2000;17(6):481-3	E2
Mock V, Burke MB, Sheehan P, et al. A nursing rehabilitation program for women with breast cancer receiving adjuvant chemotherapy. *Oncology Nursing Forum*. 1994;21(5):899-907; discussion 908	E2
Morrow GR, Craytor JK, Brown J, Fass M. Nurses' perceptions of themselves, cancer nurses, typical, ideal and cancer patients. *Perceptual & Motor Skills*. 1976;43(3 Pt 2):1083-91	E2

Moscovice IS, Casey MM, Wu Z. Disparities in Geographic Access to Hospital Outpatient Pulmonary Rehabilitation Programs in the United States. *Chest.* 2019;156(2):308-315	E7
Mullally DI, Sogn DD, Goldstein RA, Cohen SG. Academic manpower needs in allergy and clinical immunology. *Journal of Allergy & Clinical Immunology*. 1983;72(3):252-4	E7
Musellim B, Borekci S, Uzan G, et al. What should be the appropriate minimal duration for patient examination and evaluation in pulmonary outpatient clinics? *Annals of Thoracic Medicine*. 2017;12(3):177-182	E5
Mutsekwa RN, Canavan R, Whitfield A, Spencer A, Angus RL. Dietitian first gastroenterology clinic: an initiative to reduce wait lists and wait times for gastroenterology outpatients in a tertiary hospital service. *Frontline Gastroenterology*. 2019;10(3):229-235	E5
Myers Virtue S, Howrey HL, Duffy NM, Wallace M. Shifting psychosocial oncology care to telepsychology during the COVID-19 pandemic. *Journal of Psychosocial Oncology*. 2021. p. 416-427.	E1
Nelson CA, Takeshita J, Wanat KA, et al. Impact of store-and-forward (SAF) teledermatology on outpatient dermatologic care: A prospective study in an underserved urban primary care setting. *Journal of the American Academy of Dermatology*. 2016;74(3):484-90. e1	E1
Nicholson C, Bowler S, Jackson C, Schollay D, Tweeddale M, O'Rourke P. Cost comparison of hospital- and home-based treatment models for acute chronic obstructive pulmonary disease. *Australian Health Review*. 2001;24(4):181-7	E5
Nolan K, Schall MW, Erb F, Nolan T. Using a framework for spread: The case of patient access in the Veterans Health Administration. *Joint Commission Journal on Quality & Patient Safety*. 2005;31(6):339-47	E2
Norman PS, Biermann CW, Frick OL, et al. Physician manpower in allergy and immunology. *Journal of Allergy & Clinical Immunology*. 1978;62(1):61-6	E2
O'Brien CW, Breland JY, Slightam C, Nevedal A, Zulman DM. Engaging high-risk patients in intensive care coordination programs: the engagement through CARInG framework. *Translational Behavioral Medicine*. 2018;8(3):351-356	E2
Ocker BM, Plank DM. The research nurse role in a clinic-based oncology research setting. *Cancer Nursing*. 2000;23(4):286-92; quiz 293-4	E2
Okera M, Baker NA, Hayward AM, Selva-Nayagam S. Oncology workforce issues: the challenge of the outpatient clinic. *Internal Medicine Journal*. 2011;41(6):499-503	E2
Okuboyejo S, Eyesan O. mHealth: Using Mobile Technology to Support Healthcare. *Online Journal of Public Health Informatics*. 2014;5(3):233	E2
Patel SD, Nguyen PAA, Bachler M, Atkinson B. Implementation of postdischarge follow-up telephone calls at a comprehensive cancer center. *American Journal of Health-System Pharmacy.* 2017;74(11 Supplement 2):S42-S46	E2
Pedersen CA, Schneider PJ, Scheckelhoff DJ. ASHP national survey of pharmacy practice in hospital settings: dispensing and administration--2002. *American Journal of Health-System Pharmacy*. 2003;60(1):52-68	E2
Perros P, Frier BM. An audit of waiting times in the diabetic outpatient clinic: role of patients' punctuality and level of medical staffing. *Diabetic Medicine*. 1996;13(7):669-73	E5
Pinsky B, Harnett J, Paulose-Ram R, Mardekian J, Samant N, Nair KV. Impact of Treatment by NCQA-Certified Physicians on Diabetes-Related Outcomes. *American Health & Drug Benefits*. 2011;4(7):429-38	E1

Platek ME, Johnson J, Woolf K, Makarem N, Ompad DC. Availability of Outpatient Clinical Nutrition Services for Patients With Cancer Undergoing Treatment at Comprehensive Cancer Centers. *Journal of Oncology Practice/American Society of Clinical Oncology*. 2015;11(1):1-5	E2
Potter MA, Wilson C. Applying Bureaucratic Caring Theory and the Chronic Care Model to Improve Staff and Patient Self-Efficacy. *Nursing Administration Quarterly*. 2017;41(4):310-320. doi:10. 1097/NAQ. 0000000000000256	E1
Rabow MW, O'Riordan DL, Pantilat SZ. A statewide survey of adult and pediatric outpatient palliative care services. *Journal of Palliative Medicine*. 2014;17(12):1311-6	E1
Rarick M. Treating advanced ovarian cancer within the health maintenance organization: a Kaiser Permanente approach. *Seminars in Oncology.* 1999;26(1 Suppl 1):52-8	E4
Reardon JZ, Levine S, Peske G, et al. A comparison of outpatient cardiac and pulmonary rehabilitation patients. *Journal of Cardiopulmonary Rehabilitation.* 1995;15(4):277-82	E2
Reese O, Wright C, Sandoval A, et al. "Establishment of an acute headache infusion clinic as an alternative for emergency department care". Journal of the Neurological Sciences. 2021;423:117384.	E5
Reynolds L. How Do We Adequately Staff an Outpatient Oncology Unit? *Clinical Journal of Oncology Nursing*. 2021;25(1):104	E7
Richter JM, Ha JB, Marx M, Campbell EJ, Pandolfi MC. A Digital Preprocedure Instruction Program for Outpatient Colonoscopy. *Telemedicine Journal & E-Health*. 2020;26(4):468-476	E2
Roberts NA, Alexander K, Wyld D, Janda M. What is needed by staff to implement PROMs into routine oncology care? A qualitative study with the multi-disciplinary team. *European Journal of Cancer Care*. 2019;28(6):e13167	E5
Rodriguez AL, Jackson HJ, Cloud R, Morris K, Stansel CC. Oncology Nursing Considerations when Developing Outpatient Staffing and Acuity Models. *Seminars in Oncology Nursing*. 2020;36(3):151018	E4
Rogers B, Pesata B, Lee JH, Zhao J, Krieger J, Daily K. Chemotherapy education: current practices of oncology nurses counseling patients. *Supportive Care in Cancer.* 2021;27:27	E2
Rosenthal MB, de Brantes FS, Sinaiko AD, Frankel M, Robbins RD, Young S. Bridges to Excellence--recognizing high-quality care: analysis of physician quality and resource use. *American Journal of Managed Care*. 2008;14(10):670-7	E2
Ruane-Morris M, Thompson G, Lawton S. The reorganisation of a dermatology department. *Professional Nurse*. 1995;10(10):629-32	E4
Ryan S, Hassell AB, Lewis M, Farrell A. Impact of a rheumatology expert nurse on the wellbeing of patients attending a drug monitoring clinic. *Journal of Advanced Nursing.* 2006;53(3):277-86	E5
Sadler K, Bahwere P, Guerrero S, Collins S. Community-based therapeutic care in HIV-affected populations. *Transactions of the Royal Society of Tropical Medicine & Hygiene*. 2006;100(1):6-9	E6
Sandberg ES, Estrada E, Jain N, et al. Designing and implementing an outpatient management pathway for patients with newly diagnosed insulin-dependent diabetes mellitus. *Endocrinology, and Diabetes & Metabolism*. 2019;2(2):e00055	E1
Sanson-Fisher RW, Hobden BT, Carey ML, Turon HE, Waller AE, Proietto AM. The System for Patient Assessment of Cancer Experiences (SPACE): a cross-sectional	E5

study examining feasibility and acceptability. *Supportive Care in Cancer.* 2020;28(4):1737-1745

Sarani B, Toevs C, Mayglothling J, Kaplan LJ. The burden of the U. S. crisis in the surgical critical care workforce and workflow. *American Surgeon.* 2015;81(1):19-22	E1
Sattler LA, Hunninghake JC, Sjulin TJ, et al. Critical Care Education and Skills Validation Course for Internal Medicine Physicians in the Military. *Military Medicine*. 2021;23:23	E1
Sawicki PT, Muhlhauser I, Didjurgeit U, Berger M. Improvement of hypertension care by a structured treatment and teaching programme. *Journal of Human Hypertension*. 1993;7(6):571-3	E5
Schroeder C. Nursing's response to the crisis of access, costs, and quality in health care. *Advances in Nursing Science*. 1993;16(1):1-20	E6
Schwartz LL, Raymer JM, Nash CA, Hanson IA, Muenter DT. Hypertension: role of the nurse-therapist. *Mayo Clinic Proceedings*. 1990;65(1):67-72	E4
Selvig D, Sewell JL, Tuot DS, Day LW. Gastroenterologist and primary care perspectives on a post-endoscopy discharge policy: impact on clinic wait times, provider satisfaction and provider workload. *BMC Health Services Research.* 2018;18(1):16	E2
Serena A, Dwyer A, Peters S, Eicher M. Feasibility of advanced practice nursing in lung cancer consultations during early treatment: A phase II study. *European Journal of Oncology Nursing*. 2017;29:106-114	E5
Shaker MS, Oppenheimer J, Grayson M, et al. COVID-19: Pandemic Contingency Planning for the Allergy and Immunology Clinic. *The Journal of Allergy & Clinical Immunology in Practice*. 2020;8(5):1477-1488. e5	E2
Shaw RJ, McDuffie JR, Hendrix CC, Edie A, Lindsey-Davis L, Williams JW Jr. Effects of Nurse-Managed Protocols in the Outpatient Management of Adults with Chronic Conditions. VA-ESP Project #09-010; 2013.	E7
Siaw MYL, Ko Y, Malone DC, et al. Impact of pharmacist-involved collaborative care on the clinical, humanistic and cost outcomes of high-risk patients with type 2 diabetes (IMPACT): a randomized controlled trial. *Journal of Clinical Pharmacy & Therapeutics*. 2017;42(4):475-482	E1
Silvay G, Zafirova Z. Ten Years Experiences With Preoperative Evaluation Clinic for Day Admission Cardiac and Major Vascular Surgical Patients: Model for "Perioperative Anesthesia and Surgical Home". *Seminars in Cardiothoracic & Vascular Anesthesia*. 2016;20(2):120-32	E7
Silver N, Weber RS, Lozano M, et al. Reducing patient wait times in a head and neck cancer outpatient clinic: A pilot study. *Laryngoscope*. 2020;130(4):E151-E154	E2
Skrutkowski M, Saucier A, Eades M, et al. Impact of a pivot nurse in oncology on patients with lung or breast cancer: symptom distress, fatigue, quality of life, and use of healthcare resources. *Oncology Nursing Forum*. 2008;35(6):948-54	E5
Sly RM, O'Donnell R. Association of asthma mortality with medical specialist density. *Annals of Allergy*. 1992;68(4):340-4	E2
Smith GS, Richardson A. Development of nursing documentation for use in the outpatient oncology setting. *European Journal of Cancer Care*. 1996;5(4):225-32	E5
Smrke A, Younger E, Wilson R, et al. Telemedicine During the COVID-19 Pandemic: Impact on Care for Rare Cancers. *JCO Global Oncology*. 2020;6:1046-1051	E4

Solberg LI, Maciosek MV, Sperl-Hillen JM, et al. Does improved access to care affect utilization and costs for patients with chronic conditions? *American Journal of Managed Care*. 2004;10(10):717-22	E2
Soroka M, Crump T, Bennett A. Optometry within hospitals at the Veterans Administration. *Optometry*. 2005;76(11):657-60	E5
Soteriades ES. A workplace modified duty program for employees in an oncology center. *Work*. 2017;56(1):157-164. doi:10. 3233/WOR-162478	E2
Sparber A. Complementary therapy in critical care settings: a review of surveys and implications for nurses. *Critical Care Nursing Clinics of North America*. 2003;15(3):305-312	E10
Standiford CJ, Nolan E, Harris M, Bernstein SJ. Improving the provision of language services at an academic medical center: ensuring high-quality health communication for limited-English-proficient patients. *Academic Medicine*. 2009;84(12):1693-7	E2
Steen A, Bovio Franck J. Improving clinic utilization and workload capture for clinical pharmacy specialists. American Journal of Health-System Pharmacy. 2020;77(7):552-559	E2
Strijbos JH, Postma DS, van Altena R, Gimeno F, Koeter GH. A comparison between an outpatient hospital-based pulmonary rehabilitation program and a home-care pulmonary rehabilitation program in patients with COPD. A follow-up of 18 months. *Chest*. 1996;109(2):366-72	E5
Strowd RE, Strauss L, Graham R, et al. Rapid Implementation of Outpatient Teleneurology in Rural Appalachia: Barriers and Disparities. *Neurology Clinical Practice*. 2021;11(3):232-241	E2
Suss S, Bhuiyan N, Demirli K, Batist G. Toward Implementing Patient Flow in a Cancer Treatment Center to Reduce Patient Waiting Time and Improve Efficiency. *Journal of Oncology Practice/American Society of Clinical Oncology*. 2017;13(6):e530-e537	E5
Tanaka GJ, Fujiwara J, Kramer H, Bredt AB, Wortmann M. Justification and implementation of an oncology pharmacist practitioner in an HMO setting. *Hospital Pharmacy.* 1985;20(8):568-9, 573-4	E7
Tavernier SS, Beck SL, Dudley WN. Diffusion of a Distress Management Guideline into practice. *Psycho-Oncology*. 2013;22(10):2332-8	E2
Tennison JM, Ngo-Huang A, Fu JB, Hill AE, Dibaj SS, Bruera E. Frequency and Characteristics of Recommendations from Interdisciplinary Outpatient Cancer Rehabilitation Monthly Team Meetings. *PM&R*. 2019;11(3):252-257	E4
Thomas S, Glynne-Jones R, Chait I. Is it worth the wait? A survey of patients' satisfaction with an oncology outpatient clinic. *European Journal of Cancer Care*. 1997;6(1):50-8	E5
Thompson Stone R, Tollefson T, Epstein R, Jozefowicz RF, Mink JW. Education Research: Positive effect of scheduled faculty modeling on clerkship student bedside skills exposure and learning. *Neurology.* 2017;88(24):e236-e239	E1
Thygeson NM, Wang M, O'Riordan D, Pantilat SZ. Self-Reported California Hospital Palliative Care Program Composition, Certification, and Staffing Level Are Associated with Lower End-of-Life Medicare Utilization. *Journal of Palliative Medicine*. 2016;19(12):1281-1287	E1
Tierney WM, Overhage JM, Murray MD, et al. Can computer-generated evidence-based care suggestions enhance evidence-based management of asthma and chronic obstructive pulmonary disease? A randomized, controlled trial. *Health Services Research*. 2005;40(2):477-97	E2

Tomicki S, Dieguez G, Latimer H, Cockrum P, Kim G. Real-World Cost of Care for Commercially Insured versus Medicare Patients with Metastatic Pancreatic Cancer Who Received Guideline-Recommended Therapies. *American Health & Drug Benefits*. 2021;14(2):70-78	E2
Tomkins CS, Braid JJ, Williams HC. Do dermatology outpatients value a copy of the letter sent to their general practitioner? In what way and at what cost? *Clinical & Experimental Dermatology*. 2004;29(1):81-6	E2
Tonna JE, Hanson HA, Cohan JN, et al. Balancing revenue generation with capacity generation: Case distribution, financial impact and hospital capacity changes from cancelling or resuming elective surgeries in the US during COVID-19. *BMC Health Services Research*, 20(1), 1-7.	E1
Vachon GC, Ezike N, Brown-Walker M, Chhay V, Pikelny I, Pendergraft TB. Improving access to diabetes care in an inner-city, community-based outpatient health center with a monthly open-access, multistation group visit program. *Journal of the National Medical Association*. 2007;99(12):1327-36	E1
van Egdom LSE, Lagendijk M, van der Kemp MH, et al. Implementation of Value Based Breast Cancer Care. *European Journal of Surgical Oncology*. 2019;45(7):1163-1170	E5
Vickery DM, Liang MH, Collis PB, et al. Physician extenders in walk-in clinics: a prospective evaluation of the AMOSIST program. *Archives of Internal Medicine*. 1975;135(5):720-5	E1
Virani SS, Akeroyd JM, Ramsey DJ, et al. Health Care Resource Utilization for Outpatient Cardiovascular Disease and Diabetes Care Delivery Among Advanced Practice Providers and Physician Providers in Primary Care. *Population Health Management*. 2018;21(3):209-216	E1
Vortherms J, Spoden B, Wilcken J. From evidence to practice: developing an outpatient acuity-based staffing model. *Clinical Journal of Oncology Nursing*. 2015;19(3):332-7	E10
Wachsberg KN, O'Leary KJ, Buck R, et al. Impact of Real-Time Clinical Decision Support on Blood Utilization and Outcomes in Hospitalized Patients with Solid Tumor Cancer. *Joint Commission Journal on Quality & Patient Safety*. 2019;45(1):57-62	E2
Weber C, Beaulieu M, Djurdjev O, et al. Towards rational approaches of health care utilization in complex patients: an exploratory randomized trial comparing a novel combined clinic to multiple specialty clinics in patients with renal disease-cardiovascular disease-diabetes. *Nephrology Dialysis Transplantation*. 2012;27 Suppl 3:iii104-10	E5
Weck CE, Lex KM, Lorenzl S. Telemedicine in Palliative Care: Implementation of New Technologies to Overcome Structural Challenges in the Care of Neurological Patients. *Frontiers in Neurology*. 2019;10:510	E1
Weems J, Siegel RD, Bowen TN, Stinnett L, Ashley J. Embedding palliative care (pc) in a community-based cancer center: Benefits and barriers. *Journal of Clinical Oncology*. 2016;34(29):153-153. doi:10. 1200/jco. 2016. 34. 26_suppl. 153	E1
Weissman DE, Griffie J. The Palliative Care Consultation Service of the Medical College of Wisconsin. *Journal of Pain & Symptom Management*. 1994;9(7):474-9	E1
Whitmer K, Pruemer J, Wilhelm C, McCaig L, Hester JD. Development of an outpatient oncology symptom management clinic. *Clinical Journal of Oncology* Nursing. 2011;15(2):175-9	E4
Whittington MD, Ho PM, Kirsh SR, et al. Cost savings associated with electronic specialty consultations. American Journal of Managed Care. 2021;27(1):e16-e23	E2

Wingo MT, Halvorsen AJ, Beckman TJ, Johnson MG, Reed DA. Associations between attending physician workload, teaching effectiveness, and patient safety. *Journal of Hospital Medicine*. 2016;11(3):169-73	E2
Wood L, Richards J, Jacobs P. The role of the professional nurse in a bone marrow transplantation programme. *Curationis*. 1990;13(3-4):77-84	E6
Wood S, Bisson JI. Experience of incorporating a mental health service into patient care after operations for cancers of the head and neck. *British Journal of Oral & Maxillofacial Surgery.* 2004;42(2):149-54	E5
Yehia BR, Gebo KA, Hicks PB, et al. Structures of care in the clinics of the HIV Research Network. *AIDS Patient Care & Stds*. 2008;22(12):1007-13	E2
Yu GC, Beresford R. Implementation of a chronic illness model for diabetes care in a family medicine residency program. *Journal of General Internal Medicine*. 2010;25 Suppl 4:S615-9	E1
Yu J, Shah BM, Ip EJ, Chan J. A Markov model of the cost-effectiveness of pharmacist care for diabetes in prevention of cardiovascular diseases: evidence from Kaiser Permanente Northern California. *Journal of Managed Care Pharmacy*. 2013;19(2):102-14	E1
Zini EM, Lanzola G, Bossi P, Quaglini S. An Environment for Guideline-based Decision Support Systems for Outpatients Monitoring. *Methods of Information in Medicine.* 2017;56(4):283-293	E4

APPENDIX C: EVIDENCE TABLES

CHARACTERISTICS OF INCLUDED PRIMARY STUDIES

Author **Year** **N**	**Study Design** **Follow-up**	**Specialty Care Setting** **Population**	**Participant Characteristics** Age %male %white	**Staffing Model/ Intervention**	**Comparator**
Albert 2010[1] N = 15,381	Cross-sectional NA	Cardiology Chronic HF or previous MI and left ventricular systolic dysfunction	Age (M [SD]): 68.6 (13.2) years Male: 71.3% White: 41.6%	Existing staff Number of APNs or PAs/ practice	0 APNs/PAs
Garnett 2020[2] N = 1,790	Cross-sectional NA	Hematology Adults with complex hematologic cancer	Age (M [SD]): NR Male: NR White: NR	Existing staff Existence of nurse care managers	None
Graze 2014[3] N = NR	Repeated cross-sectional 18 months	Oncology Breast cancer patients attending the Anne Arundel Medical Center DeCesris Cancer Institute	Age (M [SD]): NR Male: 0% (100% female) White: NR	New clinic Symptom management clinic (SMC) led by advanced oncology nurse practitioners, embedded within oncology practice at medical center. Existing oncology nurse triage call system was integrated with the SMC to enhance coordination, communication, and patient education.	Pre-integration of symptom management clinic into triage system
Huang 2018[4] N = 55	Uncontrolled Pre/post 1.33 months [40 days]	Hematology/ oncology Patients in an outpatient chemotherapy unit	Age (M [SD]): NR Male: NR White: NR	Staff reorganization Schedule optimization to reduce staffing violations of nurse-to-patient ratios	Pre-implementation of schedule optimization

Author **Year** **N**	**Study Design** **Follow-up**	**Specialty Care Setting** **Population**	**Participant Characteristics** Age %male %white	**Staffing Model/ Intervention**	**Comparator**
Reese 2021[5] N = 133	Retrospective cohort study NA	Neurology Patients presenting to outpatient neurology clinic deemed appropriate candidates for headache infusion by clinic nurse.	Age (M [SD]): NR Male: NR White: NR	New clinic Headache Infusion Center set up infusion patients following a multistep protocol to meet neurology team's clinical experience and patient needs.	Comparable issues seen in the ED
Ross 2014 N:= NR[6]	Repeated cross-sectional 8 months	Neurology Patients referred for new neurologic symptoms or signs providing direction for future care needs (migraine, MS, Parkinson's *etc*).	Age (M [SD]): NR Male: NR White: NR	New staff A new clinical team was established to obtain new neurology referrals and evaluate patients with new neurologic symptoms or signs and provide direction for future care needs. Team directs patients to: primary care physician, a subspecialty clinic, or a general neurology physician who provides ongoing care.	Pre-implementation of pilot program (single neurology physician assistant)
Ruder 2011[7] N = 199	Cross-sectional NA	Oncology Ambulatory oncology clinic patients: Diagnoses included solid tumors (89%), hematological malignancies (3%), and miscellaneous diseases (8%).	Age (M [SD]): NR Male: NR White: NR	New staff Addition of an oncology pharmacist to an outpatient oncology clinic. Services provided: patient and family disease state education and drug information, medication history and reconciliation, adverse drug event monitoring, disease-related symptoms and chemotherapy regimen management, and dosage review.	None
Smith 2004[8]	Repeated cross-sectional	Nephrology	Age (M [SD]): NR	New staff	Pre-implementation of physician extenders

Author Year N	**Study Design Follow-up**	**Specialty Care Setting Population**	**Participant Characteristics** Age %male %white	**Staffing Model/ Intervention**	**Comparator**
N = NR	NA	Huntsville Medical Group's rural ESRD patients on chronic dialysis	Male: NR White: NR	Physician extenders (PAs, NPs) integrated into the Huntsville Medical Consulting Group practice in a rural dialysis clinic. Visited chronic dialysis patients once per week to review medications, treatment plans, evaluation of vascular access, and home visits if patients did not show up for dialysis. Patients whose care management was not reimbursed by monthly capitation payment system were transitioned to having their care managed by physician extenders, with general guidance/supervisions by nephrologists.	

Abbreviations. APN = advanced practice nurse; HF = heart failure; MI = myocardial infarction; NA = not available; NR = not reported; RN = registered nurse; SD = standard deviation

OUTCOME DATA OF INCLUDED PRIMARY STUDIES

Author Year	Staffing Model	Analysis Type	Productivity Outcomes [a]	Patient-Important Outcomes [b]
Albert 2010[1]	Existing staff	Adjusted comparison	NR	Quality Compliance with guideline-recommended therapy (multivariate comparison (0 APN/PA ref)): ≥2 APN/PA for adherence to guideline-rec ICD/CRT-D (OR: 1.99; 95% CI: 1.91-3.26; p=0.007); ≥2 APN/PA for adherence to guideline-rec HF education (OR: 1.91; 95% CI: 1.16-3.14; p=0.011) Other guidelines-rec therapies NSD
Garnett 2020[2]	Existing staff	None	Utilization Prevented ED visits: 1% derived from NCM activities Prevented admission or readmission to hospital: 1% derived from NCM activities Quality Improved continuity of care: 52% derived from NCM activities	Patient Health Patient self-management: 15% derived from NCM activities Patient treatment adherence: 7% derived from NCM activities Change in health behavior: 21% derived from NCM activities
Graze 2014[3]	New clinic	Unadjusted comparison	Utilization Oncology unit admissions (related to symptoms of pain and weakness): 26 per month (pre-SMC clinic) vs 17 per month (7 months follow-up) ED Visits: At least 40 ED visits prevented (data NR)	Patient Satisfaction "Patient satisfaction has increased in the outpatient infusion center" (data estimated from Figure 2: 80% baseline satisfaction vs 90% final satisfaction).
Huang 2018[4]	Staff reorganization	Unadjusted comparison	Utilization Pre-optimization (40 days) vs post-optimization (40 days): Patient volume: 44.7 vs 44.7 Average chair utilization: 8.8 vs 8.3 Maximum chair utilization: 17.3 vs 14.1 Resource constraint violation: 20.1 vs 14.7 Provider Satisfaction	Healthcare Access Patient wait time to treatment initiation: decreased from as much as 40 minutes to 5 minutes (data NR) Wait time between provider visit and infusion appointment: 5 to 15-minute increase

Author Year	Staffing Model	Analysis Type	Productivity Outcomes [a]	Patient-Important Outcomes [b]
			Overall feedback from managers, physicians, nurses, pharmacists, and nurses was positive (data NR)	
Reese 2021[5]	New clinic Headache Infusion Center set up infusion patients following a multistep protocol to meet neurology team's clinical experience and patient needs.	Non-comparative	Utilization Mean duration of visit 2.51 hrs. infusion clinic vs 6.24 hrs. ED (comparable issues) Cost Mean cost of visit $962 in infusion clinic vs $10,375 in ED	Patient Satisfaction Average patient satisfaction scores ranged from 4.2-4.96 (out of 5 - very good) on all patient satisfaction measures
Ross 2014[6]	New staff	Unadjusted comparison	Utilization Lead time (average): 299 days pre- vs 10 days post-implementation of pilot	Patient Satisfaction Mean score: 89.25 pre- vs 89.25 post-implementation of pilot.
Ruder 2011[7]	New staff	None	Utilization The pharmacist saw patients on average 2.9 times during the course of treatment. There were 583 pharmacist clinical interventions and 378 consultation interventions. Cost Saved $210,000 in chemotherapy costs (estimated from reduced chemotherapy mixing and reduced dosages) Provider Satisfaction 98% positive ratings	Patient Satisfaction 95% positive ratings
Smith 2004[8]	New staff	None	Utilization Freq of Admission: 1.75 pre- vs 1.27 post-implementation admissions/patient Inpatient days/dialysis patient: 14.25 pre- vs 7.3 post-implementation days/patient	Patient Health Mortality: 19.01% pre- vs 9.3% post-implementation

Notes. [a]Productivity outcomes include: Utilization (ie, number of visits, emergency department visits), cost, and provider satisfaction; [b] Patient-important outcomes include patient satisfaction, healthcare access (*eg*, wait times for appointments), equity (*eg*, disparities in care), patient health outcomes (*eg*, symptom improvement), and quality (*ie*, meeting a quality measure)
Abbreviations. APN = advanced practice nurse; Avg. = Average; BCC = breast cancer center; ED = emergency department; HF = heart failure; LOS = length of stay; NA = not available; NCM = nurse care manager; NR = not reported; NSD = no significant difference; RN = registered nurse; SD = standard deviation..

QUALITY ASSESSMENT OF INCLUDED PRIMARY STUDIES

Cohort Studies

Author, Year	Selection bias	Bias in classification of interventions	Bias due to departures from intended interventions	Bias due to measurement of outcomes?	Bias due to confounding?	Bias due to missing data?	Bias in the selection of reported results	Overall bias
Reese 2021[5] (duration of visit outcome)	High Patients in intervention group assessed by clinician to be eligible for infusion clinic. No information on comparison group (ED patients with "equivalent problem"). Do not know if groups were comparable, selected during same timeframe, *etc.* Patients attending ED likely to be different to those calling clinic.	High Intervention groups not clearly defined, no information on those attending ED. Unclear how comparison group was defined.	Low Intervention is single visit to headache clinic.	High No information differences between patient groups. It is likely that the groups differed in important characteristics (symptom severity, demographics, *etc*) that may have influenced the duration of visit (primary outcome compared between the 2 groups). No attempt to adjust for potential confounding.	High No information differences between patient groups. It is likely that the groups differed in important characteristics (symptom severity, demographics, *etc*) that may have influenced the duration of visit (primary outcome compared between the 2 groups). No attempt to adjust for potential confounding.	Unclear No information on missing data.	Unclear Primary outcome reported, unlikely to have been selected among other outcomes. No protocol identified.	High

Abbreviations. ED = Emergency department.

Uncontrolled Pre-Post Studies

Author, Year	Selection bias	Bias in classification of interventions	Bias due to departures from intended interventions	Bias due to measurement of outcomes?	Bias due to confounding?	Bias due to missing data?	Bias in the selection of reported results	Overall bias
Huang 2018[4]	Low All rooms/patients are selected	Unclear Change in scheduling may have affected patient participation	Low No departures/ interruptions described	Low Outcomes of patient volume, chair utilization, and resource constraint violations are measured in a standard way	Unclear No potentially confounding patient or provider characteristics measured	Unclear Missing data not reported	Unclear No study protocol reported	Unclear
Reese 2021[5] (pain and satisfaction outcomes)	Low Patients assessed by nurse/clinician to be eligible for infusion clinic were included.	Unclear Patients attending the infusion clinic were intervention group. No information about the participants or those that were not selected to attend infusion clinic.	Low Intervention is single visit to headache clinic.	High Pain: no information on how pain was assessed, or when it was assessed Satisfaction: only a subset of patients took survey, no information on this patient group and how if may have differed from the group overall.	Unclear No potential confounding variables measured	Unclear No information on missing data.	Unclear Primary outcome reported, unlikely to have been selected among other outcomes. No protocol identified.	High

Cross-sectional Studies

Author, Year	Were the criteria for inclusion in the sample clearly defined?	Were the study subjects and setting described in detail?	Was the exposure measured in a valid and reliable way?	Were objective, standard criteria used for measurement of the condition?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the outcomes measured in a valid and reliable way?	Was appropriate statistical analysis used?	Overall Study Quality
Albert 2010[1]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Good
Fonarow 1997[9]	Fonarow 1997 describes the inclusion/ exclusion criteria in detail.	Patient and practice characteristics were detailed in Tables 1 and 2, subgrouped by practice APN/PA staffing levels.	Full-time equivalent APN/PA staffing levels per practice were operational-ized as 0, >0 to <2, or ≥2.	Only patients with heart failure or prior myocardial infarction, along with left ventricular dysfunction/ poor ejection fraction were included, as detailed in the inclusion criteria.	Multivariate models controlled for patient and practice characteristics, as well as within-practice variation.	Authors used multilevel and multivariate models.	Outcomes were documentation of 6 different guideline-recommended heart failure therapies.	Authors used multilevel and multivariate models.	
Garnett 2020[2]	Yes	No	Yes	Yes	No	No	Unclear	NA	Fair
	All complex patients with hematologic cancer receiving care from NCM during specified time period. Detailed criteria defining	Inclusion criteria for patients was provided, but characteristics of included sample (demographic s, cancer characteristics	Exposure to nurse care manager tracked through electronic health records.	Specified criteria used to determine complex patients from electronic health record	No characteristics or potential confounding factors of patients mentioned.	No mention of adjustment for potential confounding factors	Case manager activities and care outcomes defined from previously established frameworks, but unclear how those specific measures were selected. Outcomes cross-linked to various	No statistical analysis - just presentation of percentages of outcomes/ activities	

Author, Year	Were the criteria for inclusion in the sample clearly defined?	Were the study subjects and setting described in detail?	Was the exposure measured in a valid and reliable way?	Were objective, standard criteria used for measurement of the condition?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the outcomes measured in a valid and reliable way?	Was appropriate statistical analysis used?	Overall Study Quality
	complex patients provided.	, *etc*) not provided.					nurse care management activities and health/care outcomes tracked in the electronic health record, but unclear how these were matched (*ie*, what activities/ outcome constituted 'improved continuity of care" or "patient self-management").		
Graze 2014[3]	Unclear	No	Yes	Unclear	No	No	Yes	NA	Fair
Fessele 2014[10]	Pilot study inclusion criteria described in Fessele 2014. At baseline 39 sites were supported by the ONS Foundation including the AAMC which is described in	No patient information. SMC led by advanced oncology nurse practitioners, embedded within oncology practice at medical center.	The number of ED visits prevented by SMC early management of presenting systems was tracked between June 2013 to January 2013. The protocol implemented	Over 2 years, the AAMC site tracked performance across all measures designated by the study and conducted their own pre/post assessment of 3 specific	No attempt to identify potential confounders.	None described	A list of clinically important symptoms was created and used to triage patients into the SMC. The AAMC tracked cases that were prevented from becoming ED cases through SMC management in the form of	No statistical analysis, but Fig 4 provides data on # of ED visits potentially prevented and Fig 5 shows a decline in oncology unit admissions	

Author, Year	Were the criteria for inclusion in the sample clearly defined?	Were the study subjects and setting described in detail?	Was the exposure measured in a valid and reliable way?	Were objective, standard criteria used for measurement of the condition?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the outcomes measured in a valid and reliable way?	Was appropriate statistical analysis used?	Overall Study Quality
	this study for the approval of developing a symptom management clinic (SMC) for breast cancer patients.		in the SMC to identify symptoms is described in Feselle 2014. .	outcomes of interest in comparison to the other sites in the study. The measurement of the condition comes down to the patient level information which there is no information about.			potential patient visits per presenting symptom	after implementation of the SMC	
Ruder 2011[7]	Yes Patients were seen by the pharmacist during routine hematology/ oncology treatments at the John Marsh Cancer Center between September	Unclear All patients in this sample were ambulatory oncology clinic patients, but no age restrictions or other criteria were provided.	No All patients who received treatment at the center and were seen by the pharmacist were included in this study, but the authors state that the methodology	Unclear This was a retrospective descriptive analysis of clinical interventions by the oncology pharmacist between September 2004 and	Unclear Pharmacist role evolved over the period of the study. Documentation lacked format and consistency - authors estimated that approximately 25% of	No These factors were identified in the limitations section, but authors stated that given the personal and professional relationships, which developed	No Survey was not a validated instrument and data collection methods were not consistent throughout study period.	NA No statistical analysis - authors provide table of patient and colleague survey results on a 5-pt Likert scale	Poor

Author, Year	Were the criteria for inclusion in the sample clearly defined?	Were the study subjects and setting described in detail?	Was the exposure measured in a valid and reliable way?	Were objective, standard criteria used for measurement of the condition?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the outcomes measured in a valid and reliable way?	Was appropriate statistical analysis used?	Overall Study Quality
	2004 and October 2006.		of the study evolved over time and earlier patients may not have had their data accurately recorded.	October 2006. .	pharmacist interventions were not documented.. The survey instruments used in this study were not validated and colleague surveys are likely biased.	over time, the colleague surveys are likely biased. Specific patient outcomes data are limited in this study			
Smith 2004[8]	No Sample was presumably patients visiting the centers for outpatient dialysis, but specifics not provided.	No Setting described, but no information on patient characteristics	Yes Exposure was introduction of PA to the clinic, but no specifics described of how many of the patients saw the PA, *etc*.	Unclear No information on the patient population provided	No No characteristics or potential confounding factors of patients mentioned.	No No mention of adjustment for potential confounding factors	Unclear Outcomes of mortality and length of stay are objective, but no details on how that data was collected	NA No statistical analysis, comparison of percentages and LOS before/after introduction of PA, but no statistical testing between groups	Poor

Abbreviations. AAMC = Anne Arundel Medical Center; ED = emergency department; LOS = length of stay; PA = physician assistant; ONS = oncology nursing service; SMC = symptom management clinic;

APPENDIX D: RESEARCH IN PROGRESS

Status	Title	Study Design	Intervention	Information Resources
Completed (July 2021) No Publication	GrandAides, a Workforce Innovation to Address Post-Acute Care	RCT	Specially trained "GrandAide" supporting outpatient post-acute care for patients discharged from the hospital with congestive heart failure.	NCT04966442

Abbreviations. RCT = randomized controlled trial

APPENDIX E: PEER REVIEWER DISPOSITION

Comment #	Reviewer #	Comment	Author Response
Are the objectives, scope, and methods for this review clearly described?			
1	1	Yes	None
2	2	Yes	None
3	3	Yes	None
4	4	Yes	None
5	5	Yes	None
6	6	Yes	None
Is there any indication of bias in our synthesis of the evidence?			
7	1	Yes – See comments below	
8	2	No	None
9	3	No	None
10	4	No	None
11	5	No	None
12	6	No	None
Are there any published or unpublished studies that we may have overlooked?			
13	1	Yes - The report focused on studies that involved staffing interventions and thus excluded many observational studies that did not involve changes in staffing practice.	Thank you for all of your thoughtful comments. We have addressed them individually below.
14	2	No	None
15	3	No	None
16	4	No	None
17	5	No	None
18	6	Yes - There is more literature on use of medical scribes, including within specialty care settings such as cardiology clinics, and impacts on productivity. For example -- Clinicoecon Outcomes Res. 2013;5:399-406; Clinicoecon Outcomes Res. 2015;7:489-95.	Thanks for pointing this out. The Minneapolis ESP recently completed a systematic review of medical scribes in cardiac, orthopedic, and emergency care, and so we specifically excluded this intervention type to avoid a duplication of work. This exclusion is now noted in our Methods section.

		However, the review cites only one study (an RCT, still in progress).	Citation: https://www.hsrd.research.va.gov/publications/esp/medical-scribes.cfm
Additional suggestions or comments can be provided below. If applicable, please indicate the page and line numbers from the draft report.			
19	1	In response to a request from the VHA Office of Specialty Care Services (SCS) and Chiefs of Medicine Field Advisory Council, this Evidence Brief synthesized existing evidence on staffing models used in outpatient specialty care settings and its association with staff productivity and patient outcomes. The strengths of this Evidence Brief include the following:	None
20	1	Using rigorous evidence synthesis protocols	None
21	1	Reporting methodological details including data/literature search, abstraction/assessment, synthesis, and inclusion criteria	None
22	1	There are several conceptual and methodological issues that warrant clarification and reconsideration in order to make the conclusion of this evidence synthesis valid and informative	Thank you for these comments. We address them individually below.
23	1	There is a lack of clarity regarding the scope of this synthesis and the operationalization of staffing model(s). While the authors provided a general definition/description for the key construct – staffing models (page 6), it was not clear what aspects of staffing (e.g., staffing level, mixtures and/or proportions of different professionals, allocation of workload, tasks, and responsibilities) were used to define staffing model(s) and were considered as the team searched, assessed, and selected the primary studies.	Thank you for noting this omission. We now state our intention to examine supply-side staffing models/interventions in our Background section.
24	1	The authors identified two staffing model types (implementation of new or existing staff on an existing model of care vs. establishment of a new clinic) and organized the evidence based on these types. What's the rationale for identifying/using these two types? These two types seemingly cannot differentiate key aspects of staffing models (e.g., staffing level, mixtures	Thanks for noticing this. We now cite a recent Cochrane review (Butler 2019) on inpatient nurse staffing as the starting point for our example staffing model/intervention categories. We also note that no comprehensive reviews of outpatient specialty care staffing models/interventions exist, so we are providing possible categories for these models/interventions in Table 1.

		and/or proportions of different professionals, allocation of workload, tasks, and responsibilities).	
25	1	The report also used the term staffing interventions (sometimes interchangeably with staffing models). If an intervention is required to be included, the scope of this evidence synthesis is limited to those studies that involved changes in staffing practice, which should be clearly stated.	Thank you for highlighting this issue. We now refer to both staffing interventions and models throughout, to be inclusive of the non-interventional studies covered in this brief.
26	1	Potentially as a result of the conceptual issues mentioned above, I am concerned that many of the selected primary studies included in this synthesis were not related to staffing models or staffing interventions. For example, Allison (1999) is a clinical intervention focusing on follow-up care and the intervention did not focus on staffing. Graze (2014) is about providing symptom management and Hook (2012) is about providing care navigation for cancer patients. The focus of these studies (or the nature of the interventions) was not about staffing. Consequently, it is difficult to draw conclusion about the effects of staffing from these studies because the reported outcomes/changes, especially the patient outcomes, were more likely to result from the clinical interventions, not staffing. This may lead to a significant bias in the synthesis conclusion. To mitigate this bias, I would suggest selecting only primary studies for which staffing was the main intervention or independent variable.	These are great points. We understand that the interventions or models in the studies included in this brief contained overlapping clinical and staffing components. However, in healthcare, staffing-related interventions or models that improve clinical outcomes and staffing-related interventions that improve productivity outcomes are often inextricably linked, i.e., there is usually some tradeoff between staffing-related productivity and outcomes important to patients. That said, we have now excluded Allison 1999 and Hook 2012 as neither study reported productivity outcomes. In addition, quality outcomes were moved to the productivity outcome category to better reflect their importance to productivity rather than patients. We have retained the remaining eight studies as they all involve staffing interventions/models that affect productivity and/or patient-important outcomes.
27	2	The authors present a strong effort to synthesize a very challenging area to study. The paper states the potential impact of two strategies for addressing specialty care staffing: Adding staff and adding clinics. The quality of evidence available to make conclusions was low as stated by the authors, but it is helpful to see what is available.	Thank you for your comments.
28	2	While within the focus of studying the impact of adding new care staff or adding new clinics has on the function of specialty care clinics the paper is thorough, there are two extremely relevant phenomenon which I suspect	Thanks for this! We now note these COVID-19-related staffing issues in our Future Research section.

		readers in the VHA system at this time, and likely for the forseable future, would be really interested in seeing some commentary on. COVID has completely turned clinical care in the VHA on its head as it has in the entire country. Specialty clinics are scrambling to adapt to management of patients in hybrid telemedicine structures. There is a severe staffing shortage particularly with nurses	
29	2	I do not believe there is any strong published literature on how best to navigate these challenges, but to the extent that the authors might have insights on how various strategies could mitigate impact of these issues, or at least acknowledge the issue in the discussion even if more generally than the specific COVID situation, I believe it would add great value to this paper.	Thank you, as noted above, we have addressed these issues in our Future Research section.
30	3	1. Page 4, line 31; Page 6, line 20: Please consider further clarifying the context by which the term “staffing model” is used. Staffing model described as matching the demand with appropriate resources (specifically human resources/staff) is accurate. Healthcare operators/administrator often use “staffing model” as an operations tool, a staffing grid, a staffing plan which defines the allocation of clinical and office staff needed on a daily basis relative to volume of patients/procedures/visits scheduled in the clinic. There are many considerations in a “staffing model” to minimizing staff shortages and maximizing staff expertise including staff workload (staff to patient panel) hours per unit of service benchmarks, acuity, staff skill mix, which were not noted at all in the article.	This is a great comment. We now note, in both the Executive Summary and the Background section, that we have focused on supply-side staffing models that involve changes in staff, types of staff, or clinic types. We did not include literature on demand-side changes that would help staffing, like reducing patient panels or accepting only less complex patients.
31	3	2. Page 6, line 31: Table 1 identifies as “intervention types” same items identified as “staffing model types” on Page 10, Lines 58-59. This is confusing	This is now fixed – thank you.
32	3	3. Page 4, line 39: define “optimal staffing methods”	This is now fixed – thank you.
33	3	4. Page 4, line 40: consider “inefficiencies or non-value added time” vs “slack”	Thank you, we have made this edit.

34	3	5. Page 7, line 50: what is a “better implemented PACT models” versus one which is not?	This is now fixed – thank you.
35	3	6. Page 9, line 49: productivity outcomes, what is the working definition of productivity? Is health care utilization a productivity measure or a patient outcome measure? Provider and staff satisfaction rates from an operations standpoint is not a productivity measure. Typical productivity measures in healthcare include volume per FTE, wRVU per 1.0 cFTE.	Thanks for catching this – we now clarify that our included outcome types (utilization; provider/staff satisfaction; cost-effectiveness) comprise our definition of “productivity outcomes.”
36	3	7. Page 10, line 58-59: “Implementation of new or existing staff on an existing model of care”, consider “addition of new staff or redefined roles of existing staff”	Thank you, we have made this edit.
37	3	8. Page 16, line 17: Consider using “advanced practice providers” vs “physician extender	We have made this edit throughout.
38	3	10. Page 17, line 43: Consider using “advanced practice providers” vs “physician extender”	We have made this edit throughout.
39	3	11. Page 20, line 25: Consider using “advanced practice providers” vs “mid-level clinicians”	We have made this edit throughout.
40	3	12. Page 20, line 59: Consider using “advanced practice providers” vs “mid-level”	We have made this edit throughout.
41	5	Oncology I reviewed the ESP brief on Specialty Care Staffing. The reviewed studies are of low quality and strong conclusions cannot be made. It does not appear this study would provide clear evidence for any particular non-physician staffing model for oncology.	Thank you for your comments.
42	5	Nephrology Concur with [X]	Thank you for your comments.
43	5	Optometry I have reviewed the attached draft. Unfortunately, there was only one study identified for optometry and it was excluded for “ineligible timing.” I don’t see any meaningful extrapolations or inferences from the other data presented in the study to validly support any	We agree, there is a paucity of literature in this area, thank you for your comments.

		conclusions for optometry. Thank you for the opportunity to review.	
44	5	Endocrinology I concur with the findings and recommendations of the ESP specifically for Diabetes and Endocrinology but also as applicable to many specialties.	Thank you for your comments.
45	5	Neurology I have reviewed and agree with the staffing ESP report, particularly the recommendations for future research	Thank you for your comments.
46	6	In this Evidence Brief, requested by the VA Office of Specialty Care Services and other partners, the authors seek to review the available evidence regarding specialty care staffing models. Specifically, they ask: (1) which staffing models for outpatient specialty care are associated with increased staff productivity and improved patient outcomes; and (2) how outpatient specialty care staffing models vary by program/clinical specialty and contextual characteristics.	Thank you for your comments.
47	6	Overall, the team found only 10 studies (in 12 manuscripts) across all specialties relevant to their search, with overall low-quality evidence. Strikingly, only 2 of the 10 studies included any sort of statistical analysis. This is perhaps unsurprising because discussion of staffing models is often limited to the clinical and operations sphere, and there is a paucity of funded research in this space. The reality also is that specialties are quite distinct, and what might work well in one specialty may not work well in another. While I applaud the authors for their call for a comprehensive conceptual model of specialty care delivery to help guide future research, a 'one-size-fits all' model may not be feasible given inherent differences in specialty care delivery (e.g., procedural vs non-procedural specialties, short-term vs. chronic care management, etc.). Something analogous to a PACT/PCMH model may be more feasible with respect to specialty care management of patients with chronic diseases such as inflammatory bowel diseases, cirrhosis, or CHF, where	Thank you for your comments.

		in many cases the specialist serves in more of a primary care role. The real value of this review is in demonstrating the relative lack of methodologically rigorous inquiry into ways in which we might re-envision specialty care staffing models to maximize productivity (thereby improving overall Veteran access to care), patient/provider satisfaction, and patient-centered outcomes.	
48	6	A few comments to consider in revisions: I was surprised not to see more literature on use of medical scribes in the specialty care space. The authors cite a single study (an RCT still in progress), but there are at least a few more studies that were not highlighted. For example, there are several studies on use of medical scribes in cardiology clinics and impacts on productivity, which are included above.	Thanks for this. As we note above, we have specifically excluded scribes interventions in this review, as an ESP systematic review on scribes in specialty care was recently conducted. Citation: https://www.hsrd.research.va.gov/publications/esp/medical-scribes.cfm
49	6	Training physicians and other healthcare professionals is a central part of VA's statutory mission -- VA currently provides training for over 44,000 individual physician residents and fellows annually. Discussion of the extent to which trainee effort can be optimized within specialty care delivery models in VA to maximize trainee education while also improving overall Veteran access to care/productivity would be helpful to mention. Even if there are no current studies on this topic, it is a very relevant area to explore in future research.	Thank you for this suggestion. We did not find any studies involving staffing trainees, but we have added the topic to the Future Research section, given the importance of trainees to the VA and other teaching hospitals.
50	6	The rapid expansion of virtual care and how this impacts specialty care productivity, provider and patient satisfaction, and other outcomes, is very relevant here – it seems like an oversight not to mention this at all in the discussion. Virtual care delivery did not appear to be specifically excluded in the search – if virtual care delivery models are outside the scope of the review, I would make this more explicit.	Thanks! We did not find any studies of virtual specialty care staffing models/interventions in our search, but we have mentioned this area as a topic for Future Research section in our Discussion.

REFERENCES

1. Albert NM, Fonarow GC, Yancy CW, et al. Outpatient cardiology practices with advanced practice nurses and physician assistants provide similar delivery of recommended therapies (findings from IMPROVE HF). *American Journal of Cardiology.* 2010;105(12):1773-1779.
2. Garnett D, Hardy L, Fitzgerald E, Fisher T, Graham L, Overcash J. Nurse Case Manager: Measurement of Care Coordination Activities and Quality and Resource Use Outcomes When Caring for the Complex Patient With Hematologic Cancer. *Clinical Journal of Oncology Nursing.* 2020;24(1):65-74.
3. Graze L, Brady-Copertino C, Varner A, Stiver WS. The development of a nursing assessment and symptom management clinic. *Clinical Journal of Oncology Nursing.* 2014;18 Suppl:12-16.
4. Huang YL, Bryce AH, Culbertson T, et al. Alternative Outpatient Chemotherapy Scheduling Method to Improve Patient Service Quality and Nurse Satisfaction. *Journal of oncology practice/American Society of Clinical Oncology.* 2018;14(2):e82-e91.
5. Reese O, Wright C, Sandoval A, et al. "Establishment of an acute headache infusion clinic as an alternative for emergency department care". *Journal of the Neurological Sciences.* 2021;423:117384.
6. Ross SC. An option for improving access to outpatient general neurology. *Neurology Clinical Practice.* 2014;4(5):435-440.
7. Ruder AD, Smith DL, Madsen MT, Kass FH, 3rd. Is there a benefit to having a clinical oncology pharmacist on staff at a community oncology clinic? *Journal of Oncology Pharmacy Practice.* 2011;17(4):425-432.
8. Smith GO, Jr. The role of physician assistants in improving renal care. *Nephrology News & Issues.* 2004;18(5):51-56.
9. Fonarow GC, Albert NM, Curtis AB, et al. Improving evidence-based care for heart failure in outpatient cardiology practices: primary results of the Registry to Improve the Use of Evidence-Based Heart Failure Therapies in the Outpatient Setting (IMPROVE HF). In. *Circulation.* Vol 1222010:585-596.
10. Fessele K, Yendro S, Mallory G. Setting the bar: developing quality measures and education programs to define evidence-based, patient-centered, high-quality care. *Clinical Journal of Oncology Nursing.* 2014;18.