Studies in Social Science Research
ISSN 2690-0793 (Print) ISSN 2690-0785 (Online)
Vol. 2, No. 4, 2021
www.scholink.org/ojs/index.php/sssr

Original Paper

Understanding Source-Related Influences on Physicians Translating Comparative Effectiveness Research into Patient Care: Results from a Study of Cardiologists

Katherine A. Elder, PhD, MPAff[1*]

[1] Communication Program, California State University, Channel Islands, Camarillo, CA

[*] Katherine A. Elder, E-mail: Katherine.elder@gmail.com

Received: November 8, 2021 Accepted: November 19, 2021 Online Published: November 22, 2021

doi:10.22158/sssr.v2n4p66 URL: http://dx.doi.org/10.22158/sssr.v2n4p66

Abstract

Comparative effectiveness research (CER), which refers to an evaluation of the clinical effectiveness of two or more medical interventions that are used to treat the same condition, has the potential to inform decision-making in both policy circles and physicians' exam rooms. The ability of stakeholders to translate that research into practice has important implications for health outcomes, but the impact of information sources on physicians in translating CER remains understudied. This project examines the source-related influences on and motivations of cardiologists with respect to willingness to make changes in their practice based on emerging CER results. The results from this survey of cardiologists (N = 42) indicate that the sources of information (including perceived credibility of those sources) matter greatly to cardiologists when deciding whether to make a change in practice. These findings suggest data-based implications for researchers and practitioners that are engaged in closing the CER translation gap.

Keywords

Comparative effectiveness research, translational research, source credibility, physician behavior change

1. Introduction

The term "Translational Research" first appeared in PubMed in 1993, and since then, scholars have increasingly taken on defining and studying the concept (De Maria Marchiano et al., 2021; DeMaria, 2013; Fort et al., 2017). However, despite this uptick in translational research, there still does not appear to be a unifying definition of the term (DeMaria, 2013; Fort et al., 2017; Rubio et al., 2010;

Woolf, 2008). The general conclusion is that *translation* in health refers to the long and complicated process of converting information from basic science to improvements in clinical and, ultimately, public health outcomes (Drolet & Lorenzi, 2011; Marincola, 2003; Pober et al., 2001; Rubio et al., 2010; Sussman et al., 2006). In a widely cited review, Balas and Boren claim that it takes 17 years to translate only 14% of original health/medical research into practice, and that a majority of original research is never translated into practice (Balas & Boren, 2000). Whether this long of a lag involved in converting research to practice exists is not in question, and countless researchers, advocates, and even government agencies have taken on the task of bridging this gap (Balas & Boren, 2000; Berwick, 2003; Denis et al., 2002; Green, 2008; Green et al., 2009).

Comparative effectiveness research (CER) in health care has had the attention of U.S.-based policymakers and politicians over the past three decades (Chalkidou et al., 2009; Denis et al., 2002; Tunis et al., 2010). The first stand-alone piece of legislation to address CER was introduced in 2002, and the American Recovery and Reinvestment Act (ARRA) of 2009 appropriated $1.1 billion to funding CER. This set the stage for CER support in the Patient Protection and Affordable Care Act (ACA) of 2010, which established the nongovernmental Patient-Centered Outcomes Research Institute (PCORI) to focus on the delivery of evidence-based health care (Allen, 2018).

CER generally refers to an evaluation of clinical effectiveness of two or more medical interventions (sometimes including a "wait and see" approach) that are used to treat the same condition, the purpose of which is to inform decision-making – starting at high policy levels and ultimately funneling down to conversations about treatment between doctors and patients (Chalkidou et al., 2009; Dreyer et al., 2010; Weissman et al., 2015). The value of CER, then, lies in the ability of researchers and practitioners to translate it into clinical care (Shah et al., 2010). That said, there is an incorrect assumption among some that, as soon as CER is published that holds the potential to improve efficiency, quality, and cost-effectiveness of care, those findings will be immediately integrated by clinicians (Avorn & Fischer, 2010; Macintyre, 2012). Some recommendations for closing the translation gap between CER and practice have been decision aids (Shah et al., 2010), physician report cards (Avorn & Fischer, 2010), and clinical guidelines and continuing medical education (CME) (Avorn & Fischer, 2010; Shah et al., 2010). The Institute of Medicine has also advocated for the inclusion and meaningful participation of stakeholder involvement in many aspects of CER, including setting priorities and disseminating results (Devine et al., 2013; Sox & Greenfield, 2009). This is echoed by scholars who recognize that stakeholders in health care are likely to play different roles (fueled by different motivations) in the process of translating evidence-based research (e.g., translational research has its origins in the pharmaceutical industry) (Garland et al., 2021; Lean et al., 2008; Schumock & Pickard, 2018). The relationships between these stakeholders are ever-changing, representing feedback loops between basic and applied research, public opinion and the media, political platforms, and public health initiatives, to name a few (Macintyre, 2012; Sussman et al., 2006). Examining the CER translation process through a stakeholder-based framework has some potential to shorten the extensive gap by promoting more

efficient uptake of findings and determining the feasibility of CER results in a clinical setting (Arterburn et al., 2020).

Of the potential stakeholders involved in translating CER into practice, physicians bear the responsibility of directly interacting with patients, and their professional impact depends on their ability to provide effective and efficient care. Naturally, there is an abundance of literature examining the factors that contribute to physician practice patterns, though researchers note it is difficult to isolate any one factor as a primary cause of behavior change (Cunningham et al., 2019; Keating, 2017). One category of factors includes personal characteristics, such as personality traits (Green et al., 2002) and personal biases and habits (Ubel & Asch, 2015). A second category of factors can be classified as economic and institutional dynamics, including reimbursement mechanisms (e.g., fee-for-service) (Campbell et al., 2007; Hillman et al., 1998; Khullar et al., 2015) and feelings of burnout (Avorn & Fischer, 2010; Dobrow et al., 2004; Sussman et al., 2006; Whippen & Canellos, 1991).

Finally, information processes, including concerns about accessing up-to-date information (Schumock & Pickard, 2018), beliefs about what constitutes evidence (Gupta et al., 2017; Ubel & Asch, 2015), and the source or combination of sources from which the physician receives the evidence (Gupta et al., 2017; Pollack et al., 2017) are likely to impact physician behavior. In one review of the literature on physician behavior change, researchers found that medical decisions are disproportionately influenced by the physicians' mentors (Cunningham et al., 2019). In general, the role that specific information sources and their characteristics (including credibility) play in physician behavior and engagement in the translation process remains understudied (Keating, 2017) and is the focus of this paper. In order to explore the role of information sources on physicians' translation of CER, the following two research questions were developed:

RQ1: Do sources of information, given a hypothetical scenario, differentially predict patterns of change in physician practice?

RQ2: What characteristic(s) of information sources might motivate a behavioral response to that source?

Given the exploratory nature of this topic, the present study concentrates on one case prompt and one physician specialty, both of which are described below.

2. Method

This project involves an examination of influences on and motivations of cardiologists with respect to ability and willingness to make changes in their practice based on emerging CER results. Cardiologists were selected for this case for a few reasons. First, cardiac care and intervention continue to be a priority; the leading cause of death in the United States every year since 1921 has been heart disease (Centers for Disease Control and Prevention National Center for Health Statistics, various years). Second, cardiovascular disease is the costliest chronic disease in the U.S., with stroke and heart failure being the most explosive chronic conditions in the Medicare fee-for-service program (American Heart

Association, 2017). Between 2002 and 2012, expenditures for heart conditions increased by $17.5 billion (from $83.5 billion to $101.0 billion, adjusted for 2012 dollars) (Soni, 2015). Finally, processes involved in cardiology practice and care are understudied; the National Institutes of Health only invests 4% of its budget on researching heart disease (American Heart Association, 2017), and there is a dearth of research focusing specifically on cardiologist decision-making, continuing education, and information-seeking behavior.

The case selected for this project relates to a recent controversy in cardiology, clearly demonstrates the role of CER in reversing or correcting practice, and provides compelling data for correcting this practice. Beta-blockers are prescribed to patients for a number of conditions, most commonly used for the management of cardiac arrhythmias and hypertension. The Centers for Medicare and Medicaid Services (CMS) published prescriber-level Medicare data that indicate that in 2013 Metoprolol, a beta-blocker, was the tenth most common drug by claim count (over 21 million claims, with 3.9 million beneficiaries, nearly 406 thousand prescribers, and totaling over $162 million in cost) (Centers for Medicare and Medicaid Services, 2015). Given this high volume, it is critical that researchers and clinicians understand the uses for and potential impacts of pharmaceuticals, not only through clinical trials, but through CER mechanisms such as meta-analyses.

Research has been conducted on pharmaceutical interventions for decades. One body of initial clinical research examining the effects of beta-blockers is the Dutch Echocardiographic Cardiac Risk Evaluation Applying Stress Echocardiography (DECREASE) family of trials, which provided justification for prescribing perioperative beta-blockers to three classes of patients undergoing high- or immediate-risk surgery (Bouri et al., 2014). Clinical guidelines based on these data were published by the European Society of Cardiology in 2009. In 2013 (revised in 2014), Bouri et al. published a CER meta-analysis of the non-DECREASE clinical trials of beta-blockers and found that the neutral effect on mortality suggested by the DECREASE trials was inaccurate. Instead, these researchers found a 27% risk increase in 30-day mortality and concluded that guidelines based in any part on DECREASE data should be retracted immediately (Bouri et al., 2014). As of 2014, the European Society of Cardiology and the American College of Cardiology/American Heart Association had partially revised and updated their guidelines based on non-DECREASE data (Bolsin et al., 2013).

2.1 Sample

An online survey was administered anonymously in 2017 to 42 cardiologists practicing medicine in the United States, recruited through either Olson Research Group (contracted for this project) or my own network (designed in a way so that I could not know any of the respondents). The purpose of combining recruitment methods was to maximize the number of survey respondents given budgetary considerations, as respondents were provided modest compensation for their time. Subjects were presented with a consent statement which stated that their participation in the study indicated consent. The study was approved by the University Park Institutional Review Board at the University of Southern California. All 42 cardiologists selected for this study currently practice medicine and provide

direct patient care in the U.S., and 83.3% of them (n = 35) graduated from medical school in either the U.S. or Canada. An overwhelming majority of 95.2% (n = 40) of those surveyed identified as male. When asked to indicate race/ethnicity, 28.6% (n = 12) selected Asian, 2.4% (n = 1) selected Pacific Islander, 69% (n = 29) selected White (non-Hispanic), and 2.4% (n = 1) selected Other. Respondents were also presented with the options of African American/Black (non-Hispanic), Hispanic, and Native American/Alaska Native. The earliest recorded graduation year from medical school was 1968, and the most recent was 2007. The average number of years certified as a cardiologist is 21.21 (SD = 7.835), and the range is 38 years. Exactly half (21) of the cardiologists fall into the highest annual income bucket offered on the survey ($300,000 +); 11.9% ($n$ = 5) recorded < $100,000, 9.5% ($n$ = 4) recorded $100,000-$150,000, 4.8% (n = 2) recorded $150,001 - $200,000, 7.1% ($n$ = 3) recorded $200,001 – 250,000, and 16.7% (n = 7) recorded $250,001 – 300,000.

2.2 Procedure

2.2.1 Case Prompt

The specific case referring to the DECREASE family of trials was presented at the conclusion of this survey. In collaboration with a practicing physician, the following case prompt was developed:

Clinical guidelines recommend the prescription of beta-blockers in several classes of patients, including those who will be undergoing non-cardiac surgery. You learn that the series of trials that provide justification to prescribe perioperative beta-blockers in these classes of patients is insecure; much of the data had been lost, and that which remained was found to contain serious flaws, including, in one case, complete fabrication of a dataset. The European Society of Cardiology has stopped recommending the use of beta-blockers in patients undergoing non-cardiac surgery, but the American Heart Association guidelines based on these trials have not been retracted.

2.2.2 Measures

After being presented with the case prompt, participants were asked, “Which of the following would best describe your reaction had you received the information about the insecurity of the clinical trials from:” and provided with the following nine sources: professional medical journal, non-profit patient advocacy organization, medical-related website (e.g., WebMD), colleague, CME class, news broadcast, industry representative (e.g., pharmaceutical, medical device), professional association (e.g., International Association of Cardiologists, U.S. Preventive Services Task Force), and online resources for clinical guidelines (e.g., National Guideline Clearinghouse). Respondents were asked to select one of five reactions on a Likert scale, anchored by 1 (Not at all likely to change practice) and 5 (Very likely to change practice).

A factor analysis suggests that source items load on two factors: professional sources (professional medical journal, colleague, CME class, industry representative, professional association, and online resource for clinical guidelines) (α = .836), and non-professional sources (non-profit patient advocacy organization, medical-related website, and news broadcast) (α = .793). However, the two factors were highly correlated (r = .581, p < .001). Additionally, the nine items combined had higher reliability (α

= .866), and reliability analysis suggested that removing any of the items would not improve this score. Given that the sample for the factor analysis was small and the reliability of the overall measure high compared to the separate measures, physicians' average "likeliness to change" score was computed across all nine items. Source-specific "likeliness to change" scores were analyzed separately when appropriate.

A number of items from Harvard's Medical Professionalism Survey were also adapted to capture *information processes,* including engagement in the translation process (such as by serving as a reviewer for scholarly journals, working with community-based organizations to promote health research, and participating in the development of formal clinical practice guidelines, to name a few) (Campbell et al., 2007). A variety of source credibility items were developed for this study. Respondents were asked to respond to a 5-point Likert scale anchored by 1 (Not at all credible) and 5 (Very credible) to reflect their perceived credibility of the same sources that followed the case prompt.

2.2.3 Analysis

Due to the sample size and the exploratory nature of this study, analyses were conducted using primarily descriptive and inferential statistics. In general and unless otherwise noted, all correlations used, as a dependent variable, a computation of the mean of all nine "likeliness to change" items, as all nine of them loaded on one factor (α = .866). Pearson *r* correlation coefficients or Kendall tau-b coefficients, depending on the nature of the variables and whether or not they are normally distributed, were used to correlate information processes with likeliness to change items.

3. Result

The results in testing the impact of information processes on physicians' translation of CER suggest a significant difference in changing practice based on *source of information* [$F(1,8) = 22.35$, $p < .001$]. The estimated marginal means of the likeliness of changing practice given a particular source are reported in Table 1. The estimated marginal mean for likeliness to change based on information from a medical journal (the source most likely to prompt change) is significantly higher ($p < .05$) than that for colleagues, medical-related websites, industry representatives, non-profit organizations, and news broadcasters as a source. The estimated marginal mean for the source least likely to prompt change – a news broadcast – is significantly different from every source except for industry representatives and non-profits. This information suggests that source of information does matter in a physician's decision-making process. Interestingly, independent samples t-tests did not suggest that physician engagement in the translation process itself (to name a few activities: whether a respondent serves as a reviewer for a professional journal, participates in the development of clinical guidelines, or volunteers with community-based health promotion organizations) impacts their overall likeliness to change practice, nor their likeliness to change practice for each individual source. This leads us to the second research question: what is it about a source that may predict a physician's response to that source?

To address this question, I examined whether there is a relationship between a respondent's likeliness to

change score for a source and perceived credibility of that source (Table 2). In the case of every source except medical journals and non-profit organizations (the latter of which approaches significance), the relationship between likeliness to change for a source and perceived credibility of that source is statistically significant (p <.05). It should be noted that an online resource for clinical guidelines (e.g., National Guideline Clearinghouse) was not used in this part of the analysis, as credibility is not in question because the guidelines represent fact.

Table 1. Estimated Marginal Means of Likeliness to Change Given a Particular Source (on a scale of 1-5)

			95% Confidence Interval	
Source	Est. Marginal Mean	Standard Error	Lower Bound	Upper Bound
Journal	3.976	.130	3.714	4.238
Non-profit	2.810	.141	2.524	3.095
Website	3.214	.154	2.902	3.526
Colleague	3.357	.117	3.121	3.594
CME class	3.667	.121	3.422	3.912
News	2.476	.161	2.152	2.801
Industry rep.	2.929	.150	2.625	3.232
Professional assoc.	3.881	.137	3.604	4.158
Guidelines	3.595	.153	3.287	3.903

Table 2. Bivariate Pearson Correlations between Likeliness to Change Given a Source and Source Credibility

Source	*r*
Journal	.200
Non-profit	.279
Website	.394*
Colleague	.346*
CME class	.426**
News	.408**
Industry rep.	.501**
Professional assoc.	.376*

Note. * p < .05 ** p < .01

4. Discussion

The first finding suggested by this research is simple: information sources matter. Cardiologists were significantly more likely to make changes in practice when provided with CER information in a medical journal or via a professional association; industry representatives, non-profit organizations, and news broadcasts were not compelling enough on their own to move a change in practice. In fact, likeliness to change practice with news broadcasts as a source fell closer to "unlikely to change" than to a neutral response. This supports previous research that suggests that translation models for CER should be inclusive of different stakeholders, taking into account the reciprocal influence those stakeholders have.

The second finding indicated by these data is that perceived source credibility strongly impacts cardiologist decision-making. With the exception of only two sources – journals and non-profit organizations (which reflect both extremes of the "likeliness to change" spectrum) – source credibility and likeliness to change practice given a source were significantly correlated. There is a lesson to be taken from non-physician stakeholders in CER translation: when working with cardiologists (and, presumably, physicians representing other specialties), it is extremely important not only to understand physicians' information needs, but also how to promote the individual/organizational credibility of non-physician stakeholders.

The primary limitation of this study relates to the small sample size. A number of analyses that could have gauged the moderating and mediating influences of different variables on source-related predictors of physician behavior were simply not possible with this small sample and inadequate power for such analyses. Further, the lack of diversity both with respect to gender and to racial/ethnic identity compromises the generalizability of these findings. Future examinations into stakeholders in the CER translation process should aim to expand the sample in order to generalize findings. Finally, self-reported data, particularly as it involves a theoretical case (and, therefore, actions cannot be measured), may not necessarily capture behavioral tendencies.

Prior research on the role of physicians in translating CER indicates that there are likely a variety of factors that influence decision-making. These can include broad systemic and institutional factors, or could be as personal as a physician's history with the topic. The aim of this article is to report data for only one potential factor motivating physician behavior change. That said, though the decision-making framework is likely multivariate and complicated, there is strong evidence that information source and source credibility could impact physician behavior. This is noteworthy because it is changeable; while interventions cannot impact reimbursement systems or alter a physician's career trajectory, they can focus on perceived credibility of, and messaging delivery through, different sources. These findings suggest data-based implications for researchers and practitioners that are engaged in closing the CER translation gap. As we navigate what scientists are calling a "pandemic era," (The Lancet Planetary Health, 2021) with patients presenting with known and unknown disease and comorbidity, the value of CER to compare vaccinations, and behavioral and pharmacological interventions, will be more

important than ever. Understanding nuances involved in bridging the communication gap from "bench to bedside" has the potential to enhance patient safety, improve cost effectiveness, and save lives.

Acknowledgements

The Author thanks Dr. Lynn Miller for her seemingly limitless expertise, patience, and kindness in her role as adviser of this project.

Funding Acknowledgement

This doctoral dissertation was supported by the University of Southern California Annenberg School for Communication and Journalism.

Human Subjects Approval Statement

This project was approved by the University Park Institutional Review Board at the University of Southern California (UP-17-00110).

Declaration of Conflicting Interest

The Author declares that there is no conflict of interest.

References

Allen, T. (2018). A policymaker's perspective on comparative effectiveness research: History and prospects. https://www.healthaffairs.org/do/10.1377/hblog20181003.112848/full/

American Heart Association. (2017). *Cardiovascular Disease: A Costly Burden For America*.

Arterburn, D. E., Toh, S., Williams, N., Anau, J., Courcoulas, A., Tavakkoli, A., Stilwell, D., Tuzzio, L., Lewis, C. C., Wilcox, M. N., & McTigue, K. M. (2020). Translating stakeholder-driven comparative effectiveness research into practice: the PCORnet Bariatric Study. *J Comp Eff Res*, *9*(15), 1035-1041. https://doi.org/10.2217/cer-2020-0156

Avorn, J., & Fischer, M. (2010). 'Bench to behavior': translating comparative effectiveness research into improved clinical practice. *Health Aff (Millwood)*, *29*(10), 1891-1900. https://doi.org/10.1377/hlthaff.2010.0696

Balas, E. A., & Boren, S. A. (2000). Managing Clinical Knowledge for Health Care Improvement. *Yearb Med Inform*, (1), 65-70. https://www.ncbi.nlm.nih.gov/pubmed/27699347

Berwick, D. M. (2003). Disseminating innovations in health care. *JAMA*, *289*(15), 1969-1975. https://doi.org/10.1001/jama.289.15.1969

Bolsin, S., Colson, M., & Marsiglio, A. (2013). Perioperative beta blockade. *BMJ*, *347*, f5640.

Bouri, S., Shun-Shin, M. J., Cole, G. D., Mayet, J., & Francis, D. P. (2014). Meta-analysis of secure randomised controlled trials of beta-blockade to prevent perioperative death in non-cardiac surgery. *Heart*, *100*(6), 456-464. https://doi.org/10.1136/heartjnl-2013-304262

Campbell, E. G., Gruen, R. L., Mountford, J., Miller, L. G., Cleary, P. D., & Blumenthal, D. (2007). A national survey of physician-industry relationships. *N Engl J Med*, *356*(17), 1742-1750. https://doi.org/10.1056/NEJMsa064508

Centers for Disease Control and Prevention National Center for Health Statistics. (various years). *National Vital Statistics System Mortality Data*. https://www.cdc.gov/nchs/nvss/deaths.htm

Centers for Medicare and Medicaid Services. (2015). *CMS release prescriber-level Medicare data for the first time*.

Chalkidou, K., Tunis, S., Lopert, R., Rochaix, L., Sawicki, P. T., Nasser, M., & Xerri, B. (2009). Comparative effectiveness research and evidence-based health policy: experience from four countries. *Milbank Q*, *87*(2), 339-367. https://doi.org/10.1111/j.1468-0009.2009.00560.x

Cunningham, B. P., Bakker, C. J., Parikh, H. R., Johal, H., & Swiontkowski, M. F. (2019). Physician Behavior Change: A Systematic Review. *J Orthop Trauma*, *33 Suppl 7*, S62-S72. https://doi.org/10.1097/BOT.0000000000001616

De Maria Marchiano, R., Di Sante, G., Piro, G., Carbone, C., Tortora, G., Boldrini, L., Pietragalla, A., Daniele, G., Tredicine, M., Cesario, A., Valentini, V., Gallo, D., Babini, G., D'Oria, M., & Scambia, G. (2021). Translational research in the era of precision medicine: Where we are and where we will go. *Journal of Personalized Medicine*, *11*(3), 216.

DeMaria, A. N. (2013). Translational research? *J Am Coll Cardiol*, *62*(24), 2342-2343. https://doi.org/10.1016/j.jacc.2013.11.008

Denis, J. L., Hebert, Y., Langley, A., Lozeau, D., & Trottier, L. H. (2002). Explaining diffusion patterns for complex health care innovations. *Health Care Manage Rev*, *27*(3), 60-73. https://doi.org/10.1097/00004010-200207000-00007

Devine, E. B., Alfonso-Cristancho, R., Devlin, A., Edwards, T. C., Farrokhi, E. T., Kessler, L., Lavallee, D. C., Patrick, D. L., Sullivan, S. D., Tarczy-Hornoch, P., Yanez, N. D., Flum, D. R., & Collaborative, C. (2013). A model for incorporating patient and stakeholder voices in a learning health care network: Washington State's Comparative Effectiveness Research Translation Network. *J Clin Epidemiol*, *66*(8 Suppl), S122-129. https://doi.org/10.1016/j.jclinepi.2013.04.007

Dobrow, M. J., Goel, V., & Upshur, R. E. (2004). Evidence-based health policy: context and utilisation. *Soc Sci Med*, *58*(1), 207-217. https://doi.org/10.1016/s0277-9536(03)00166-7

Dreyer, N. A., Tunis, S. R., Berger, M., Ollendorf, D., Mattox, P., & Gliklich, R. (2010). Why observational studies should be among the tools used in comparative effectiveness research. *Health Aff (Millwood)*, *29*(10), 1818-1825. https://doi.org/10.1377/hlthaff.2010.0666

Drolet, B. C., & Lorenzi, N. M. (2011). Translational research: understanding the continuum from bench to bedside. *Transl Res*, *157*(1), 1-5. https://doi.org/10.1016/j.trsl.2010.10.002

Fort, D. G., Herr, T. M., Shaw, P. L., Gutzman, K. E., & Starren, J. B. (2017). Mapping the evolving definitions of translational research. *J Clin Transl Sci*, *1*(1), 60-66. https://doi.org/10.1017/cts.2016.10

Garland, S. N., Trevino, K., Liou, K. T., Gehrman, P., Spiguel, E., MacLeod, J., Walker, D. A. H., Glosik, B., Seluzicki, C., Barg, F. K., & Mao, J. J. (2021). Multi-stakeholder perspectives on managing insomnia in cancer survivors: recommendations to reduce barriers and translate patient-centered research into practice. *J Cancer Surviv*, *15*(6), 951-960. https://doi.org/10.1007/s11764-021-01001-1

Green, L. A., Gorenflo, D. W., Wyszewianski, L., & Michigan Consortium for Family Practice, R. (2002). Validating an instrument for selecting interventions to change physician practice patterns: a Michigan Consortium for Family Practice Research study. *J Fam Pract*, *51*(11), 938-942. https://www.ncbi.nlm.nih.gov/pubmed/12485547

Green, L. W. (2008). Making research relevant: if it is an evidence-based practice, where's the practice-based evidence? *Fam Pract*, *25 Suppl 1*, i20-24. https://doi.org/10.1093/fampra/cmn055

Green, L. W., Ottoson, J. M., Garcia, C., & Hiatt, R. A. (2009). Diffusion theory and knowledge dissemination, utilization, and integration in public health. *Annu Rev Public Health*, *30*, 151-174. https://doi.org/10.1146/annurev.publhealth.031308.100049

Gupta, D. M., Boland, R. J., Jr., & Aron, D. C. (2017). The physician's experience of changing clinical practice: a struggle to unlearn. *Implement Sci*, *12*(1), 28. https://doi.org/10.1186/s13012-017-0555-2

Hillman, A. L., Ripley, K., Goldfarb, N., Nuamah, I., Weiner, J., & Lusk, E. (1998). Physician financial incentives and feedback: failure to increase cancer screening in Medicaid managed care. *Am J Public Health*, *88*(11), 1699-1701. https://doi.org/10.2105/ajph.88.11.1699

Keating, N. L. (2017). Peer Influence and Opportunities for Physician Behavior Change. *J Natl Cancer Inst*, *109*(8). https://doi.org/10.1093/jnci/djx009

Khullar, D., Chokshi, D. A., Kocher, R., Reddy, A., Basu, K., Conway, P. H., & Rajkumar, R. (2015). Behavioral economics and physician compensation--promise and challenges. *N Engl J Med*, *372*(24), 2281-2283. https://doi.org/10.1056/NEJMp1502312

Lean, M. E., Mann, J. I., Hoek, J. A., Elliot, R. M., & Schofield, G. (2008). Translational research. *BMJ*, *337*, a863. https://doi.org/10.1136/bmj.a863

Macintyre, S. (2012). Evidence in the development of health policy. *Public Health*, *126*(3), 217-219. https://doi.org/10.1016/j.puhe.2012.01.026

Marincola, F. M. (2003). Translational Medicine: A two-way road. *J Transl Med*, *1*(1), 1. https://doi.org/10.1186/1479-5876-1-1

Pober, J. S., Neuhauser, C. S., & Pober, J. M. (2001). Obstacles facing translational research in academic medical centers. *FASEB J*, *15*(13), 2303-2313. https://doi.org/10.1096/fj.01-0540lsf

Pollack, C. E., Soulos, P. R., Herrin, J., Xu, X., Christakis, N. A., Forman, H. P., Yu, J. B., Killelea, B. K., Wang, S. Y., & Gross, C. P. (2017). The Impact of Social Contagion on Physician Adoption of Advanced Imaging Tests in Breast Cancer. *J Natl Cancer Inst*, *109*(8). https://doi.org/10.1093/jnci/djw330

Rubio, D. M., Schoenbaum, E. E., Lee, L. S., Schteingart, D. E., Marantz, P. R., Anderson, K. E., Platt, L. D., Baez, A., & Esposito, K. (2010). Defining translational research: implications for training. *Acad Med*, *85*(3), 470-475. https://doi.org/10.1097/ACM.0b013e3181ccd618

Schumock, G. T., & Pickard, A. S. (2018). Comparative effectiveness and patient-centered outcomes research: enhancing uptake and use by patients, clinicians and payers. *J Comp Eff Res*, *7*(2), 177-180. https://doi.org/10.2217/cer-2017-0057

Shah, N. D., Mullan, R. J., Breslin, M., Yawn, B. P., Ting, H. H., & Montori, V. M. (2010). Translating comparative effectiveness into practice: the case of diabetes medications. *Med Care*, *48*(6 Suppl), S153-158. https://doi.org/10.1097/MLR.0b013e3181d5956c

Soni, A. (2015). *Trends in the Five Most Costly Conditions among the U.S. Civilian Noninstitutionalized Population, 2002 and 2012*.

Sox, H. C., & Greenfield, S. (2009). Comparative effectiveness research: a report from the Institute of Medicine. *Ann Intern Med*, *151*(3), 203-205. https://doi.org/10.7326/0003-4819-151-3-200908040-00125

Sussman, S., Valente, T. W., Rohrbach, L. A., Skara, S., & Pentz, M. A. (2006). Translation in the health professions: converting science into action. *Eval Health Prof*, *29*(1), 7-32. https://doi.org/10.1177/0163278705284441

The Lancet Planetary Health. (2021). A Pandemic Era. *The Lancet Planet Health*, *5*(1), e1. https://doi.org/10.1016/S2542-5196(20)30305-3

Tunis, S. R., Benner, J., & McClellan, M. (2010). Comparative effectiveness research: Policy context, methods development and research infrastructure. *Stat Med*, *29*(19), 1963-1976. https://doi.org/10.1002/sim.3818

Ubel, P. A., & Asch, D. A. (2015). Creating value in health by understanding and overcoming resistance to de-innovation. *Health Aff (Millwood)*, *34*(2), 239-244. https://doi.org/10.1377/hlthaff.2014.0983

Weissman, J. S., Westrich, K., Hargraves, J. L., Pearson, S. D., Dubois, R., Emond, S., & Olufajo, O. A. (2015). Translating comparative effectiveness research into Medicaid payment policy: views from medical and pharmacy directors. *J Comp Eff Res*, *4*(2), 79-88. https://doi.org/10.2217/cer.14.68

Whippen, D. A., & Canellos, G. P. (1991). Burnout syndrome in the practice of oncology: results of a random survey of 1,000 oncologists. *J Clin Oncol*, *9*(10), 1916-1920. https://doi.org/10.1200/JCO.1991.9.10.1916

Woolf, S. H. (2008). The meaning of translational research and why it matters. *JAMA*, *299*(2), 211-213. https://doi.org/10.1001/jama.2007.26