

**HHS PUBLIC ACCESS**

Author manuscript

*Eur J Cancer Care (Engl)*. Author manuscript; available in PMC 2018 July 01.

Published in final edited form as:

*Eur J Cancer Care (Engl)*. 2017 July ; 26(4): . doi:10.1111/ecc.12628.**Oncologists' Perspectives on Post-Cancer Treatment  
Communication and Care Coordination with Primary Care  
Physicians**

Carrie N. Klabunde, Ph.D.<sup>1</sup> [Senior Advisor], David Haggstrom, M.D., M.A.S.<sup>2</sup> [Core Investigator], Katherine L. Kahn, M.D.<sup>3</sup> [Professor], Stacy W. Gray, M.D.<sup>4</sup> [Member], Benjamin Kim, M.D., M.Phil.<sup>5</sup> [Assistant Professor], Benmei Liu, Ph.D.<sup>6</sup> [Mathematical Statistician], Jana Eisenstein, M.S.<sup>7</sup> [Research Associate], and Nancy L. Keating, M.D., M.P.H.<sup>8</sup> [Professor]

<sup>1</sup>Disease Prevention, Office of Disease Prevention, Office of the Director, National Institutes of Health, 6100 Executive Boulevard, Suite 2B03, Bethesda, MD, USA. Phone: 301-827-5574. klabundc@od.nih.gov

<sup>2</sup>Center for Health Information and Communication, Richard L. Roudebush VA Medical Center, 1481 W. 10<sup>th</sup> Street, 11H, Indianapolis, IN, USA; Associate Professor of Medicine, Indiana University School of Medicine, Department of Medicine, Division of General Internal Medicine and Geriatrics, Indianapolis, IN, USA. Phone: 317-988-2067. dahaggst@iupui.edu

<sup>3</sup>Medicine, David Geffen School of Medicine, University of California Los Angeles, 200 UCLA Medical Plaza, Suite 420, Los Angeles, CA, USA; Senior Natural Scientist, RAND Corporation, Santa Monica, CA, USA. Phone: 310-206-6232. kkahn@mednet.ucla.edu

<sup>4</sup>Division of Medical Oncology, Dana-Farber Cancer Institute, 450 Brookline Avenue, BP332A, Boston, MA, USA; Assistant Professor of Medicine, Harvard Medical School, Boston, MA, USA. Phone: 617-632-2199. stacyw\_gray@dfci.harvard.edu

<sup>5</sup>Clinical Medicine, School of Medicine, University of California San Francisco, 3333 California Street, Laurel Heights, San Francisco, CA, USA. Phone: 415-353-2421. bkim@medicine.ucsf.edu

<sup>6</sup>Division of Cancer Control and Population Sciences, National Cancer Institute, 9609 Medical Center Drive, Rockville, MD, 20850, USA. Phone: 240-276-6718. liub2@mail.nih.gov

<sup>7</sup>Division of Cancer Control and Population Sciences, National Cancer Institute, 9609 Medical Center Drive, Rockville, MD, 20850, USA. Phone: 203-560-2215. eisensteinjs@gmail.com

<sup>8</sup>Health Care Policy and Medicine, Department of Health Care Policy, Harvard Medical School and Division of General Internal Medicine, Brigham and Women's Hospital, 180 Longwood Avenue, Boston, MA, USA. Phone: 617-432-3093. keating@hcp.med.harvard.edu

**Abstract**

---

Correspondence to: Carrie N. Klabunde.

CONFLICT OF INTEREST: The authors declare they have no conflicts of interest.

Post-treatment cancer care is often fragmented and of suboptimal quality. We explored factors that may affect cancer survivors' post-treatment care coordination, including oncologists' use of electronic technologies such as e-mail and integrated electronic health records (EHRs) to communicate with primary care physicians (PCPs). We used data from a survey (357 respondents; participation rate 52.9%) conducted in 2012–2013 among medical oncologists caring for patients in a large U.S. study of cancer care delivery and outcomes. Oncologists reported their frequency and mode of communication with PCPs, and role in providing post-treatment care. Seventy-five percent said that they directly communicated with PCPs about post-treatment status and care recommendations for all/most patients. Among those directly communicating with PCPs, 70% always/usually used written correspondence, while 36% always/usually used integrated EHRs; telephone and e-mail were less used. Eighty percent reported co-managing with PCPs at least one post-treatment general medical care need. In multivariate-adjusted analyses, neither communication mode nor intensity were associated with co-managing survivors' care. Oncologists' reliance on written correspondence to communicate with PCPs may be a barrier to care coordination. We discuss new research directions for enhancing communication and care coordination between oncologists and PCPs, and to better meet the needs of cancer survivors post-treatment.

### Keywords

healthcare provider communication; care coordination; cancer care delivery; cancer survivorship; primary care physician

---

## INTRODUCTION

Post-treatment care of cancer survivors is complex and may involve monitoring for recurrence, managing long-term or late effects of cancer treatment and co-morbid conditions, and providing overall health promotion and preventive care. Survivors receive care from a variety of providers, including cancer specialists, primary care physicians (PCPs), nurses, mental health care professionals, and other clinicians (Institute of Medicine, 2006).

Expert groups have called for shared models of post-treatment cancer care, in which PCPs and other non-oncologist providers collaborate with oncologists to deliver survivors' health care (Institute of Medicine, 2006). However, poor communication and lack of coordination by those involved in survivors' care can contribute to fragmented care delivery and adverse patient outcomes (Criscitelli 2013; Dawson 2011; Dunn and Markoff, 2009; Earle and Neville, 2004; Epstein 1995; Haldis and Blankenship, 2002; Shannon 2012). Reasons for poor communication and collaboration are varied and include lack of time, interest, or knowledge; lack of reimbursement for time spent communicating with other providers; unclear treatment goals; inadequate discharge planning; lack of clarity about the respective roles of PCPs and specialists; differences in values; and preferences of the patient and family (Dworkin et al., 1998; Earle and Neville, 2004; Shannon 2012; Sutcliffe et al., 2004; Wood and McWilliam, 1996).

The issue of fragmented survivorship care delivery is important because the number of cancer survivors and constraints on the cancer care system continue to grow. An estimated 14.5 million cancer survivors are living in the United States today, and the number is expected to increase to almost 19 million by 2024 (American Cancer Society, 2014; DeSantis et al., 2014). At the same time, workforce shortages among the providers who care for cancer survivors are growing, training programs are not expanding rapidly enough to accommodate demand, and the costs of cancer care are escalating (Institute of Medicine, 2013; Yang et al., 2014). The convergence of these trends requires new approaches to coordinated, evidence-based care.

Relatively few studies have examined effective approaches to improving provider communication and enhancing coordination in cancer care. One study of PCPs' and specialists' perceptions of communications about referrals and consultations showed that three practice characteristics were related to better reported communication: adequate visit time with patients, receipt of quality reports on patients' chronic conditions, and nurse support for monitoring patients with chronic conditions (O'Malley and Reschovsky, 2011). Two Canadian studies addressed collaboration between family physicians and oncologists in cancer care. Dworkin et al. (1998) found that family physicians wish to be more involved in all stages of cancer care but desire face-to-face or telephone communications to negotiate roles and discuss patients' care. Wood and McWilliam (1996) documented that oncologists considered collaboration to be desirable but were hampered by their own variable interest, poor communication with family physicians, and patients' preferences for follow-up care. A U.S. study showed that PCPs are more engaged in sharing or co-managing cancer survivors' care than are oncologists (Klabunde et al., 2013).

The goal of the present study is to explore factors that may affect cancer survivors' post-treatment communication and care coordination. We used data from the Cancer Care Outcomes Research and Surveillance (CanCORS) consortium, a U.S. initiative to study the care and outcomes experienced by approximately 10,000 patients diagnosed with lung or colorectal cancer between 2003–2005 (Ayanian et al., 2004), to (1) examine oncologists' methods of communicating with PCPs about cancer patients post-treatment, (2) characterize oncologists' involvement in post-treatment care, and (3) assess factors—including use of electronic communication technologies such as e-mail and integrated electronic health records (EHRs)—that may be associated with oncologists' co-management with PCPs of survivors' post-treatment care.

## METHODS

### Study Design

The study setting is the CanCORS initiative, which collected data from cancer patients, their caregivers, and their physicians from 2003–2013. CanCORS participating sites included eight counties in Northern California, Los Angeles county, the states of Iowa and Alabama, 22 counties in central/eastern North Carolina, five integrated delivery systems, and 15 Veterans Affairs (VA) medical centers. Two surveys of physicians were conducted. The first (CanCORS I) was fielded in 2005–2006 among 6871 physicians named by CanCORS patients as filling one or more key roles in their care (Keating et al., 2008). The second

(CanCORS II) was conducted in 2012–2013 among 679 medical oncologists who had participated in the first survey or were identified as care providers in medical record abstractions or in a separate survey of CanCORS patients with advanced cancer that was fielded in 2010–2011 (Kehl et al., 2015; Cancer Care Outcomes Research and Surveillance Consortium, 2016). The survey protocol was approved by the Institutional Review Boards of all participating sites. Our study uses data from the CanCORS II medical oncologist survey.

Medical oncologists were mailed a self-administered questionnaire during June–August 2012. They also could participate in the survey through a secure website. A \$50 incentive check was included in the questionnaire mailing. Nonrespondents were sent up to two additional mailings of the questionnaire and received up to four telephone contacts to verify receipt of the mailing and encourage participation in the survey. Attempts to follow-up nonrespondents concluded in May 2013. The survey’s participation rate among oncologists whose contact information could be verified was 52.9%. Comparison of responding and nonresponding oncologists on selected characteristics (i.e., sex, U.S. or Canadian medical school graduation, years since medical school graduation) revealed no statistically significant differences.

### Survey Instrument

The CanCORS II questionnaire included a section addressing oncologists’ opinions and practices concerning delivery and coordination of follow-up care for patients completing active treatment. Information about oncologists’ personal and practice demographics also was collected; these items were adapted from the CanCORS I physician survey. The full instrument underwent two rounds of cognitive testing with nine practicing medical oncologists. Cognitive testing results were used to refine the instrument and reduce its length. The final instrument is available at <https://www.cancors.org/public/servlets/open/home/home.cmd?itab=2>.

To explore oncologists’ perspectives and involvement regarding cancer patients’ post-treatment care, we asked respondents about the number of patients whose PCPs they had directly communicated with about the patient’s status and post-treatment recommendations (“all patients,” “most patients,” “some patients,” and “no patients”). Respondents who indicated that they directly communicated with PCPs for at least some of their patients were asked about the modes by which they communicated clinical information to PCPs: “phone conversation,” “written correspondence,” “e-mail,” and “alerts or correspondence through integrated EHRs.” For each communication mode, respondents indicated whether they “never,” “sometimes,” “usually,” or “always” used it.

We also asked respondents about their role versus that of the PCP in managing patients’ post-treatment general medical and cancer-related care needs. These care needs included: 1) routine screening for other cancers, 2) newly diagnosed hypertension requiring treatment, 3) new 15-pound weight gain in a previously overweight patient, 4) development of depression, 5) smoking a half-pack or more of cigarettes per day, 6) new sexual dysfunction, 7) regular surveillance for lung or colon cancer, 8) new iron deficiency anemia in a colorectal cancer survivor, 9) new diarrhea in a rectal cancer survivor who does not have an ostomy, 10) new cough of four weeks’ duration in a lung cancer survivor, and 11) progressive shortness of

breath in a lung cancer survivor. The scenarios were developed to assess the extent to which oncologists assumed the general medical care needs of cancer survivors. Clinical policy highlights the broad range of ongoing needs, both cancer and non-cancer related, that cancer survivors face. We chose a diverse range of scenarios—cancer screening, surveillance, healthy behaviors, symptom management, and urgent care—to better understand how oncologists' involvement in clinical management may vary across different clinical domains. For each care need, respondents were asked to indicate whether they would take responsibility for managing it, the PCP or another physician would take responsibility, they would share responsibility with the PCP or another physician (i.e., co-manage), or handle it in some other way. We classified scenarios 1–6 as fulfilling patients' general medical care and scenarios 7–11 as fulfilling patients' cancer-related care needs.

## Measures

We created two composite measures of oncologists' methods of communicating with PCPs. The first (measure 1) was intended to assess whether the mode of communication, specifically use of electronic technologies such as integrated EHRs and e-mail, is associated with co-managing post-treatment care with PCPs. The second (measure 2) was intended to examine whether intensity of communication is associated with co-managing care. For measure 1, we assigned oncologists to one of four categories: those indicating that they more often use electronic technologies (integrated EHR and/or e-mail), those responding that they more often use traditional technologies (written correspondence and/or telephone), those with no dominant pattern of use, and those who do not directly communicate with patients' PCPs using these modes. For measure 2, we assigned oncologists to one of three categories: those indicating that they always/usually use more than one of these modes to communicate with PCPs, those responding that they always/usually use one mode, and those always/usually using none of these modes.

Oncologists responding that they “share responsibility with the PCP or another physician” for one or more of the survey's six post-treatment general medical care scenarios were classified as co-managing care. To characterize the extent to which oncologists co-manage patients' general medical care needs with PCPs, we summed the number of roles that the respondent reported co-managing; this measure ranged from 0 (i.e., co-manages no roles) to 6 (i.e., co-manages all roles).

## Data Analysis

We used descriptive statistics to summarize oncologists' demographic and practice characteristics; their beliefs about follow-up care for cancer patients post-treatment; their practice style, including communication frequency, mode, and intensity; and their reported involvement in managing patients' post-treatment care needs. We used ordinal logistic regression modeling to examine factors associated with oncologists' engagement in co-managing patients' general medical care needs with PCPs. To assess whether mode and/or intensity of communication were associated with co-managing care, we estimated two models. The first included the mode of communication composite variable (measure 1), and the second included the intensity of communication composite variable (measure 2). The dependent variable in both models was the number of general medical care needs that were

co-managed. Physician demographic, practice setting, beliefs, and practice style variables were included as independent variables in both models. All analyses were conducted with SUDAAN software version 11.0.1 (RTI International; Research Triangle Park, NC, USA) and a survey dataset in which multiple imputation was used to impute missing data for most survey items (He and Zaslavsky, 2007; Little and Rubin, 2002).

## RESULTS

### Characteristics, beliefs, and practices of respondents

The majority of oncologists were male, non-Hispanic white, U.S. or Canadian medical school graduates, and board-certified (Table 1). One-quarter were less than 20 years from medical school graduation, while almost half had graduated from medical school 30 years ago or longer, consistent with the fact that most of these fellowship-trained physicians in our cohort had originally cared for patients who were diagnosed with cancer in 2003–2005. Most oncologists were in office-based practices that did not include a PCP and that used a full EHR system. Sixty-one percent were in practices that had ten or fewer physicians. About half saw from five to 20 newly diagnosed lung or colorectal cancer patients in a typical month. Less than half were engaged in teaching medical students or residents. Relatively few (<25%) expressed the belief that early-stage lung or colorectal cancer survivors should continue regular follow-up visits to the oncologist indefinitely.

### Communication with PCPs

About half of oncologists reported that they directly communicated with their patients' PCPs about post-treatment status and recommendations for *all* patients completing adjuvant chemotherapy within the prior three months (Table 1). One-quarter indicated that they directly communicated with the PCP for *most* patients, while 13 percent reported that they did so for *some* patients. Twelve percent of oncologists said that they did not directly communicate with PCPs about patients' post-treatment status and recommendations.

Oncologists who directly communicated with PCPs about patients post-treatment reported on the modes of communication they used (Figure 1). Overall, written communication was the most frequently identified mode (86.3%), followed by telephone (76.8%), integrated EHR (57.9%), and e-mail (43.9%). Of the communication modes that oncologists reported always or usually using, written correspondence was mentioned by more than two-thirds, and integrated EHRs by about one-third. Only 15% identified e-mail and <10% reported telephone as communication modes that they always/usually used. Sixty-eight percent reported sometimes using telephone. More than 50% indicated that they never used e-mail, and 42% said that they never used integrated EHRs.

Examination of communication patterns across the four modes showed that the majority of oncologists (59%) always/usually used one mode of communication, while 24 percent always/usually used more than one mode to communicate with PCPs (Table 1). Forty-seven percent more often used the traditional modes of written correspondence or telephone, while 21 percent more often used the electronic technologies of integrated EHRs or e-mail. Twenty-one percent reported no dominant mode of communicating with PCPs. The response



patterns of 17% of oncologists indicated that they did not routinely communicate with PCPs with these modes.

### **Involvement in managing patients' post-treatment care needs**

The majority of oncologists reported that they personally managed their patients' post-treatment cancer-related care needs, including regular surveillance for the patient's lung or colorectal cancer (82%), and addressing new iron deficiency anemia in a colorectal cancer survivor (80%), new cough of four weeks' duration (67%) or progressive shortness of breath (64%) in a lung cancer survivor, and new diarrhea in a rectal cancer survivor (57%) (Table 2). Less than a third indicated that they co-managed any of these cancer-related care needs with PCPs.

In contrast, one-quarter or fewer of oncologists reported leading the management of patient's post-treatment general medical care needs (Table 3). Co-managing with the PCP was a dominant pattern for active smoking (58%) and development of depression (51%), while the PCP or other physician as lead was a dominant pattern for newly diagnosed hypertension (83%), new 15-pound weight gain (63%), and routine cancer screening (45%). For managing new sexual dysfunction, 51% of oncologists indicated that the PCP or other physician was responsible, while 42% co-managed this care with the PCP.

The mean number of patient's six post-treatment general medical care needs that oncologists reported co-managing with PCPs was 2.2 (95% CI: 2.0–2.4). Eighty percent (95% CI: 75.4–84.0) of oncologists indicated that they co-managed at least one general medical care need (data not shown).

Factors associated with co-managing patients' post-treatment care needs with PCPs

Results from ordinal logistic regression modeling of factors associated with co-managing a greater number of patients' post-treatment general medical care needs are shown in Table 3. Oncologists located in northern California, Los Angeles county, North Carolina, or practicing in VA medical centers were more likely than Iowa oncologists to co-manage care needs with PCPs. Oncologists' mode of communicating patients' post-treatment clinical information with PCPs was not associated with greater co-management. In a separate model, intensity of communicating with PCPs (i.e., always/usually using more than one communication mode) also was not associated with co-managing care (data not shown).

## **DISCUSSION**

Using information obtained from medical oncologists practicing in diverse locations and settings in the United States, we explored factors that may affect post-treatment communication and care coordination between medical oncologists and PCPs. We found that not all oncologists directly communicate with patients' PCPs about post-treatment status and recommendations. For those who do, written correspondence is a preferred communication mode, despite growing emphasis on and availability of electronic communication technologies such as e-mail and integrated EHRs. We also found that more than 80 percent of oncologists co-manage post-treatment general medical care with the patient's PCP, but

their engagement in co-management is limited to one or two care needs. We further examined whether oncologists' use of e-mail or integrated EHRs was related to greater engagement in co-management with PCPs, but this potential association was not demonstrated in our multivariable modeling.

Given the heightened attention that provider communication and care coordination in cancer survivorship care has received in recent years (Aiello Bowles et al., 2008; Grunfeld and Earle, 2010; Institute of Medicine, 2006), our finding that 13% of oncologists reported directly communicating with patients' PCPs for only some patients, and 12% did not directly communicate with the PCP for any of their patients is both notable and concerning. Prior studies have documented oncologists' lack of confidence in PCPs' ability to manage cancer survivors' post-treatment care (Potosky et al., 2011), as well as the expectations of many survivors that their cancer specialist—and not their PCP—should be their main provider for follow-up care (Chubak et al., 2014). These factors, along with limited or inadequate office systems to assist the oncologist in locating and communicating with PCPs, may contribute to a lack of communication on the part of some oncologists. As few studies have examined provider communication strategies and barriers in survivorship care, future research to explore reasons that oncologists may not directly communicate with PCPs is warranted.

We also found that, among oncologists who do directly communicate with patients' PCPs post-treatment, most rely on a single mode of communication, and written correspondence is a preferred mode. Notably, less than one-quarter of oncologists reported using EHRs or email to communicate with PCPs, despite the fact that 70% of the oncologists in our study were in practices with full EHRs. Our results may reflect a lack of integration of EHR systems across practice settings—not unusual for small practices in the U.S.— which would be a major barrier for oncologists who need to communicate with PCPs outside of their practice and/or who do not share an integrated EHR system (Fasola et al., 2014; Sada et al., 2011). Two-thirds of the oncologists in our study were in practices that did not include PCPs, suggesting that lack of interoperability of EHR systems may be a factor impeding communication using electronic technologies. Moreover, there is growing recognition that EHRs have created greatly expanded information capture on patients and that it can be time-consuming and difficult for clinicians to extract useful information from them (Clynch and Kellett, 2015; Woods et al., 2008). The capabilities and effectiveness of EHR systems as an oncologist-PCP communication mode require further investigation. Participation of both oncology specialty and primary care practices in regional health information exchange programs would be one way to connect EHRs and practices (Haggstrom and Doebbeling, 2011). Future research is also needed to assess oncologists' and PCPs' preferences for and perceived barriers to communication modes, such as face-to-face, written correspondence, telephone, email, integrated EHRs, and others.

Consistent with our finding that the extent and mode of oncologists' communication with PCPs is variable and often limited, we documented that oncologists' engagement in co-managing patients' post-treatment care needs with PCPs is modest. Prior studies have reported similar results (Klabunde et al., 2013; Rose et al., 2012). In our study, co-management was more common for general medical care than cancer-related care needs and



most often reported for addressing active smoking and development of depression, with slightly over one-half of oncologists indicating that they co-manage these needs. Contrary to our expectation, use of electronic communication technologies such as e-mail and integrated EHRs was not associated with greater engagement by oncologists in co-managing survivors' care. Although shared-care models have been proposed as an optimal strategy for addressing cancer survivors' many needs (Cohen 2009; McCabe et al., 2013; Sada et al., 2011), they require further development and evaluation. With the cancer survivor population in the U.S. continuing to grow at the same time that oncologist workforce shortages are becoming more acute, identifying efficient and effective ways to promote co-managed or shared survivorship care among oncologists, PCPs, and other clinicians is a critical area for new research. One promising tool that merits further investigation is the use of "care coordination agreements", which delineate in writing the specific responsibilities of two or more parties for ensuring coordinated care (Carrier et al, 2012).

In our multivariable modeling, oncologists' practice setting (i.e., geographic location, VA medical center setting) was the only characteristic associated with co-management. This finding parallels studies of co-management during hospitalization that have shown variability in use across patients and hospitals (de Vries et al., 2014). Our results may indicate that professional community norms, rather than communication or technology modes, have the greatest influence on levels of co-management, and suggest the need for further research that incorporates more comprehensive patient- and practice-level data to assess factors associated with co-management.

Our study has several strengths, including its sample of oncologists from diverse geographic regions and practice settings throughout the U.S., most of whom were engaged in caring for cancer patients in the CanCORS initiative for a decade or longer. There are also several limitations. Although the study sample was a census of all the medical oncologists in the targeted sites, the relatively small sample size (n=357) may have contributed to a lack of statistical power to detect associations between oncologists' personal and practice characteristics, communication mode and intensity, and engagement in co-managing care. We surveyed oncologists only; future studies should examine approaches to communication and care coordination for cancer survivors that explore the perspectives of PCPs and other relevant clinicians. Our survey addressed four communication modes (written correspondence, telephone, integrated EHR, and e-mail), but did not capture others that may be important and useful to oncologists in the future. For example, social media networks may be a new way for providers to interact efficiently with each other, and with patients, but more interactively (Kolowitz et al., 2014). The structured survey format did not enable us to assess in depth what oncologists mean when they report that they co-manage or share responsibility for survivorship care with PCPs or other clinicians. Finally, because many of the physicians in our cohort were practicing in 2003–2005, younger physicians—who may have different communication practices—were underrepresented.

The Institute of Medicine has referred to the cancer care system in the U. S. as being "in crisis", and identified coordinated, comprehensive, patient-centered care as a critical need (Institute of Medicine, 2013). Other influential groups have called for creative strategies for leveraging the oncology workforce to meet this need, including collaborating and

coordinating with PCPs (American Society of Clinical Oncology, 2014). The results of our study, which summarizes direct reports from medical oncologists in the U.S. and focuses on their post-treatment communication and care coordination with PCPs, point to several challenges in achieving these goals. Future efforts to assess and facilitate communication and care coordination between oncologists and PCPs could capitalize on practice redesign efforts, such as patient-centered medical homes and implementation of EHRs and other health information technology systems, that are underway in oncology and in primary care. There also is need for assessment of evolving clinician communication devices and technologies, such as tablets and smartphones (McElroy et al., 2013), which are largely unstudied but may play a growing role in enhancing communication and care coordination among providers. As advances in cancer detection and therapeutics continue to expand the cancer survivor population, identification and implementation of optimal communication and care coordination approaches will be imperative to better meet survivors' post-treatment care needs and ultimately improve outcomes.

## Acknowledgments

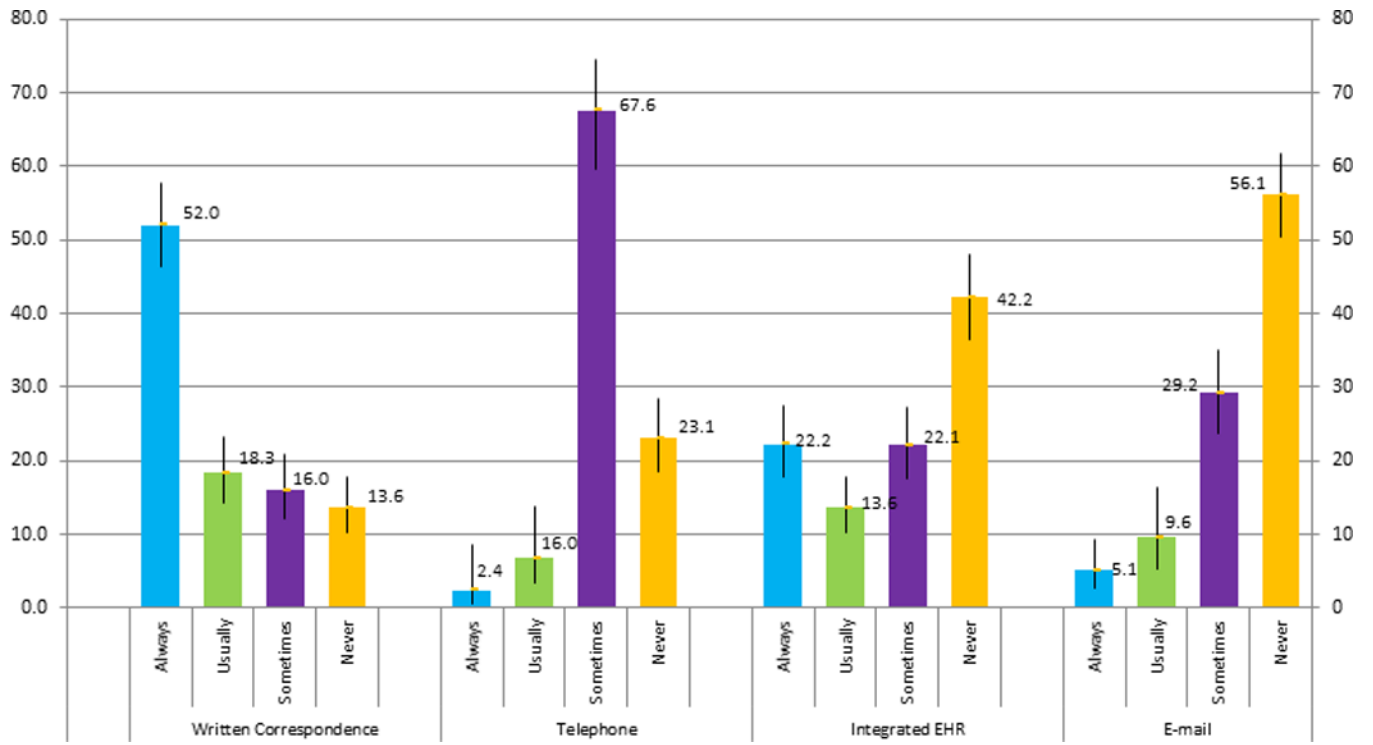
This study was funded by grant 5U01CA093344-08 from the National Cancer Institute (NCI) of the National Institutes of Health to the Cancer Care Outcomes Research and Surveillance (CanCORS) Consortium Statistical Coordinating Center. Dr. Keating is also supported by K24CA181510 from NCI. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the National Institutes of Health.

## REFERENCES

- Aiello Bowles EJ, Tuzzio L, Wiese CJ, et al. Understanding high-quality cancer care: a summary of expert perspectives. *Cancer*. 2008; 112:934–942. [PubMed: 18181099]
- American Cancer Society. Atlanta: ACS; 2014. Cancer treatment and survivorship: Facts and figures, 2014–2015. <http://www.cancer.org/acs/groups/content/@research/documents/document/acspc-042801.pdf> [Accessed July 29, 2016]
- American Society of Clinical Oncology. The state of cancer care in America: 2014 a report by the American Society of Clinical Oncology. *Journal of Oncology Practice*. 2014; 10:119–142. [PubMed: 24618075]
- Ayanian JZ, Chrischilles EA, Fletcher RH, et al. Understanding cancer treatment and outcomes: The Cancer Care Outcomes Research and Surveillance Consortium. *Journal of Clinical Oncology*. 2004; 22:2992–2996. [PubMed: 15284250]
- Cancer Care Outcomes Research and Surveillance Consortium. Main study documentation. [Accessed July 29, 2016] Available at: <https://www.cancors.org/public/servlets/open/home/home.cmd>.
- Carrier E, Dowling MK, Pham HH. Care coordination agreements: barriers, facilitators, and lessons learned. *American Journal of Managed Care*. 2012; 18:e398–e404.
- Chubak J, Aiello Bowles EJ, Tuzzio L, et al. Perspectives of cancer survivors on the role of different health care providers in an integrated delivery system. *Journal of Cancer Survivorship*. 2014; 8:229–238. [PubMed: 24352871]
- Clynch N, Kellett J. Medical documentation: part of the solution, or part of the problem? A narrative review of the literature on the time spent on and value of medical documentation. *International Journal of Medical Informatics*. 2015; 84:221–228. [PubMed: 25547194]
- Cohen HJ. A model for the shared care of elderly patients with cancer. *Journal of the American Geriatrics Society*. 2009; 57:S300–S302. [PubMed: 20122034]
- Criscitelli T. Safe patient hand-off strategies. *AORN Journal*. 2009; 97:582–585.
- Dawson LE. Communication failures across facilities and at hospital discharge. *Continuum*. 2011; 17:1124–1128. [PubMed: 22809986]

- DeSantis CE, Lin CC, Mariotto AB, et al. Cancer treatment and survivorship statistics. *CA Cancer Journal for Clinicians*. 2014; 64:252–271.
- de Vries S, Jeffe DB, Pruitt SL, et al. Patient, hospital, and geographic disparities associated with comanagement for colorectal cancer surgery. *Journal of Hospital Medicine*. 2014; 9:226–231. [PubMed: 24493477]
- Dunn AS, Markoff B. Physician-physician communication: What’s the hang-up? *Journal of General Internal Medicine*. 2009; 24:437–439. [PubMed: 19172364]
- Dworkin M, Towers A, Murnaghan D. Communication between family physicians and oncologists: Qualitative results of an exploratory study. *Cancer Prevention & Control*. 1998; 3:137–144.
- Earle CC, Neville BA. Under use of necessary care among cancer survivors. *Cancer*. 2004; 101:1712–1719. [PubMed: 15386307]
- Epstein RM. Communication between primary care physicians and consultants. *Archives of Family Medicine*. 1995; 4:403–409. [PubMed: 7742962]
- Fasola G, Macerelli M, Follador A. Health information technology in oncology practice: a literature review. *Cancer Informatics*. 2014; 13:131–139. [PubMed: 25506195]
- Grunfeld E, Earle CC. The interface between primary and oncology specialty care: Treatment through survivorship. *Journal of the National Cancer Institute Monographs*. 2010; 2010:25–30. [PubMed: 20386051]
- Haggstrom DA, Doebbeling BN. Quality measurement and system change of cancer care delivery. *Medical Care*. 2011; 49(Suppl):S21–S27. [PubMed: 20940654]
- Haldis TA, Blankenship JC. Telephone reporting in the consultant-generalist relationship. *Journal of Evaluation in Clinical Practice*. 2002; 8:31–35. [PubMed: 11882099]
- He, Y., Zaslavsky, AM. Proceedings in Health Policy Statistics. American Statistical Association; 2007. Imputation in a multiformat and multiwave survey of cancer care.
- Institute of Medicine. From cancer patient to cancer survivor: Lost in Transition. Washington DC: National Academies Press; 2006.
- Institute of Medicine. Delivering high-quality cancer care: Charting a new course for a system in crisis. Washington (DC): National Academies Press; 2013.
- Keating NL, Landrum MB, Klabunde CN, et al. Adjuvant chemotherapy for stage III colon cancer: do physicians agree about the importance of patient age and comorbidity? *Journal of Clinical Oncology*. 2008; 26:2532–2537. [PubMed: 18487570]
- Kehl KL, Gray SW, Kim B. Oncologists’ experiences with drug shortages. *Journal of Oncology Practice*. 2015; 11:e154–e162. [PubMed: 25549653]
- Klabunde CN, Han PKJ, Earle CC, et al. Physician roles in the cancer-related follow-up care of cancer survivors. *Family Medicine*. 2013; 45:463–474. [PubMed: 23846965]
- Kolowitz BJ, Lauro GR, Venturella J. Clinical social networking—a new revolution in provider communication and delivery of clinical information across providers of care? *Journal of Digital Imaging*. 2014; 27:192–199. [PubMed: 24149968]
- Little, RJ., Rubin, DB. *Statistical Analysis with Missing Data*. New York, NY: Wiley; 2002.
- McCabe MS, Partridge AH, Grunfeld E. Risk-based health care, the cancer survivor, the oncologist, and the primary care physician. *Seminars in Oncology*. 2013; 40:804–812. [PubMed: 24331199]
- McElroy LM, Ladner DP, Joll JL. The role of technology in clinician-to-clinician communication. *BMJ Quality and Safety*. 2013; 22:981–983.
- O’Malley AS, Reschovsky JD. Referral and consultation communication between primary care and specialist physicians. *Archives of Internal Medicine*. 2011; 171:56–65. [PubMed: 21220662]
- Potosky AL, Han PKJ, Rowland J. Differences between primary care physicians’ and oncologists’ knowledge, attitudes and practices regarding the care of cancer survivors. *Journal of General Internal Medicine*. 2011; 26:1403–1410. [PubMed: 21785923]
- Rose DE, Tisnado DM, Tao ML, et al. Prevalence, predictors, and patient outcomes associated with physician co-management: findings from the Los Angeles Women’s Health Study. *Health Services Research*. 2012; 47:1091–1116. [PubMed: 22171977]
- Sada YH, Street RL, Singh H. Primary care and communication in shared cancer care: a qualitative study. *American Journal of Managed Care*. 2011; 17:259–265. [PubMed: 21615196]

- Shannon D. Effective physician-to-physician communication: An essential ingredient for care coordination. *Physician Executive*. 2012; 38:16–21.
- Sutcliffe KM, Lewton E, Rosenthal MM. Communication failures: An insidious contributor to medical mishaps. *Academic Medicine*. 2004; 79:186–194.
- Wood ML, McWilliam CL. Cancer in remission. *Canadian Family Physician*. 1996; 42:899–904. [PubMed: 8688693]
- Woods, DM., Holl, JL., Angst, D. Advances in patient safety: New directions and alternative approaches. Vol. 3: Performance and Tools. Henriksen, K. Battles, JB. Keyes, MA., Grady, ML., editors. Rockville (MD): Agency for Healthcare Research and Quality; 2008.
- Yang W, Williams JH, Hogan PF, et al. Projected supply of and demand for oncologists and radiation oncologists through 2025: an aging, better-insured population will result in shortage. *Journal of Oncology Practice*. 2014; 10:39–45. [PubMed: 24443733]



**Figure 1.** Oncologists’ methods of communicating clinical information with PCPs about patients completing adjuvant chemotherapy

**Table 1**

Characteristics, beliefs, and practices of participating oncologists (n=357)

	N (%)
<b>Physician characteristics</b>	
Gender: (Male)	266 (74.7)
Years since graduation from medical school:	
<20	85 (24.4)
20–29	107 (30.6)
30	157 (45.0)
Race/ethnicity:	
Non-Hispanic White	238 (66.7)
Non-Hispanic Asian	83 (23.2)
Other	36 (10.1)
Board certified: (Yes)	345 (97.7)
US or Canadian medical school graduate: (Yes)	270 (76.5)
<b>Practice Setting Characteristics</b>	
Primary practice location:	
Office (non-hospital based)	216 (62.3)
Hospital	118 (34.0)
Community health center	13 (3.8)
Practice size:	
1–5 physicians	148 (42.2)
6–10 physicians	65 (18.5)
11–20 physicians	53 (15.1)
21–100 physicians	47 (13.4)
>100 physicians	38 (10.8)
PCPs are part of practice group: (Yes)	116 (32.5)
Type of medical record used:	
Paper	37 (10.4)
Partial EHR or in transition from paper to full EHR	70 (19.8)
Full EHR	247 (69.8)
CanCORS Site:	
5 HMOs	22 (6.2)
8 counties in northern California	79 (22.1)
State of Alabama	27 (7.6)
Los Angeles county	93 (26.1)
State of Iowa	41 (11.5)
23 counties in North Carolina	42 (11.8)
Veterans Affairs medical centers	53 (14.9)
<b>Physician Beliefs and Practice Style</b>	



	N (%)
Teaches medical students and/or residents: (Yes)	168 (47.2)
Number of newly-diagnosed colorectal or lung cancer patients seen per month:	
<5	111 (31.1)
5–9	103 (28.9)
10–19	85 (23.8)
20	54 (15.1)
Believes that early-stage colon cancer survivors should continue regular follow-up visits to the oncologist indefinitely	58 (16.3)
Believes that early-stage lung cancer survivors should continue regular follow-up visits to the oncologist indefinitely	81 (22.7)
<b>Physician Communication</b>	
Number of patients completing adjuvant chemotherapy for whom the oncologist communicated with patients' PCPs about status and post-treatment recommendations	
All	177 (49.6)
Most	90 (25.1)
Some	46 (12.9)
None	44 (12.4)
Mode of communication	
More often uses new technologies (integrated EHR, e-mail)	75 (21.0)
More often uses traditional mode (written correspondence, telephone)	167 (46.7)
No dominant pattern	53 (15.0)
Does not routinely communicate with PCP using these modes	62 (17.3)
Intensity of communication with written correspondence, telephone, integrated EHR, or e-mail	
Always/usually uses >1 mode	86 (24.2)
Always/usually uses 1 mode	209 (58.5)
Always/usually uses 0 modes	62 (17.3)

PCP: primary care physician; EHR: electronic health record; US: United States; HMO: health maintenance organization; CanCORS: Cancer Care Outcomes Research and Surveillance Consortium

**Table 2**

Oncologists' reported involvement in managing their patients' post-treatment general medical care and cancer-related cancer needs

	<b>I lead % (95% CI)</b>	<b>I co-manage % (95% CI)</b>	<b>PCP/other physician leads % (95% CI)</b>	<b>Other % (95% CI)</b>
<b>General medical care</b>				
Routine screening for cancers other than colon or lung	21.5 (17.4, 26.2)	30.6 (25.9, 35.7)	45.5 (39.9, 51.3)	2.4 (0.7, 7.9)
Newly-diagnosed hypertension	2.9 (1.4, 6.0)	12.3 (8.9, 16.6)	83.0 (78.3, 86.8)	1.8 (0.4, 8.5)
New weight gain	7.8 (5.1, 11.7)	26.8 (22.4, 31.7)	62.6 (57.0, 67.9)	2.7 (1.0, 7.5)
Development of depression	13.3 (9.6, 18.2)	50.7 (44.9, 56.4)	34.8 (29.8, 40.3)	1.2 (0.1, 12.0)
Smoking	23.0 (18.6, 28.0)	57.7 (52.2, 63.0)	18.2 (14.4, 22.8)	1.1 (0.1, 13.8)
New sexual dysfunction	5.6 (3.6, 8.6)	41.6 (36.2, 47.2)	50.9 (45.6, 56.3)	1.9 (0.8, 4.7)
<b>Cancer-related care</b>				
Surveillance for colon or lung cancer	81.8 (76.4, 86.2)	12.8 (9.1, 17.9)	4.3 (2.5, 7.3)	1.1 (0.1, 20.1)
Anemia (colon)	79.5 (74.5, 83.7)	17.5 (13.7, 22.0)	2.6 (1.1, 5.7)	0.5 (0.1, 3.7)
Diarrhea (colon)	57.1 (51.6, 62.5)	30.8 (26.0, 36.0)	11.5 (8.3, 15.6)	0.7 (0.2, 2.6)
Persistent cough (lung)	67.4 (62.1, 72.3)	28.0 (23.3, 33.2)	4.6 (2.7, 7.6)	0
Shortness of breath (lung)	64.1 (58.7, 69.2)	31.7 (26.8, 37.0)	4.2 (2.4, 7.1)	0

**Table 3**

Factors associated with oncologists who report co-managing a greater number of post-treatment general medical care roles with PCPs

	OR (95% CI)
<b>Physician characteristics</b>	
Gender: (Male)	1.17 (0.74, 1.86)
Female	1.00
Years since graduation from medical school:	
<20	0.57 (0.32, 1.01)
20–29	1.00
30	0.89 (0.56, 1.42)
Race/ethnicity:	
Non-Hispanic White	0.81 (0.44, 1.51)
Non-Hispanic Asian	0.82 (0.39, 1.75)
Other	1.00
Board certified: (Yes)	2.53 (0.52, 12.40)
No	1.00
US or Canadian medical school graduate: (Yes)	0.65 (0.38, 1.12)
No	1.00
<b>Practice setting characteristics</b>	
Primary practice location:	
Office (non-hospital based)	1.00
Hospital	0.72 (0.42, 1.22)
Community health center	1.50 (0.60, 3.77)
Practice size:	
1–5 physicians	1.00
6–10 physicians	0.83 (0.45, 1.52)
11–20 physicians	1.02 (0.52, 2.03)
21–100 physicians	0.69 (0.33, 1.45)
>100 physicians	0.89 (0.42, 1.88)
PCPs are part of practice group: (Yes)	0.84 (0.49, 1.44)
No	1.00
Type of medical record used:	
Paper	1.00
Partial EHR or in transition from paper to full EHR	0.87 (0.37, 2.09)
Full EHR	1.42 (0.66, 3.07)
CanCORS Site:	
5 HMOs	2.63 (0.90, 7.68)
8 counties in northern California	<b>2.63 (1.24, 5.59)</b>
State of Alabama	1.49 (0.57, 3.92)

	<b>OR (95% CI)</b>
Los Angeles county	<b>2.11 (1.00, 4.47)</b>
State of Iowa	1.00
23 counties in North Carolina	<b>3.72 (1.58, 8.75)</b>
Veterans Affairs medical centers	<b>3.21 (1.41, 7.29)</b>
<b>Physician Beliefs and Practice Style</b>	
Teaches medical students and/or residents: (Yes)	1.16 (0.71, 1.91)
No	1.00
Number of newly-diagnosed colorectal or lung cancer patients seen per month:	
<5	1.00
5–9	1.24 (0.72, 2.12)
10–19	1.01 (0.55, 1.86)
20	0.90 (0.50, 1.64)
Believes that early-stage colon cancer survivors should continue regular follow-up visits to the oncologist indefinitely: (No)	1.33 (0.62, 2.84)
Yes	1.00
Believes that early-stage lung cancer survivors should continue regular follow-up visits to the oncologist indefinitely: (No)	0.60 (0.31, 1.15)
Yes	1.00
Mode of communicating clinical information with PCPs, post-treatment	
Prefers new technologies (integrated EHR, email)	0.93 (0.47, 1.83)
Prefers traditional mode (written correspondence, telephone)	1.44 (0.71, 2.91)
No dominant pattern	1.60 (0.75, 3.41)
Does not routinely communicate with PCP	1.00

PCP: primary care physician; EHR: electronic health record; US: United States; HMO: health maintenance organization; CanCORS: Cancer Care Outcomes Research and Surveillance Consortium