

Interfaces Across the Cancer Continuum Offer Opportunities to Improve the Process of Care

Stephen H. Taplin, Steve Clauser, Anne B. Rodgers, Erica Breslau, Daniel Rayson

Correspondence to: Dr Stephen H. Taplin, MD, MPH, Applied Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute, 6310 Executive Blvd, MSC 7344, EPN 4005, Rockville, MD 20852-7344 (e-mail: taplins@mail.nih.gov).

There is little question that medical care delivery in the United States and Canada struggles to achieve its full potential to reduce morbidity and mortality (1,2). The Institute of Medicine's 1999 report titled *Ensuring Quality Cancer Care* and its 2001 report *Crossing the Quality Chasm* galvanized interest in improving cancer care specifically and health-care delivery in general (3,4). Although the chasm between what we know and what we do in medical care was described by the Institute of Medicine at the turn of the millennium, systematic assessment of quality has been a concern for more than a generation (4–6). Donabedian (7) wrote about the complexities of health-care quality in the early 1980s and defined it as the ability of the care system to deliver the health benefits of treatments while reducing their adverse consequences. In this supplement, we explore the processes involved with comprehensive cancer care and emphasize the interfaces between providers, providers and patients, and health-care organizations. Consistent with Donabedian's conception of the health-care process, these interfaces are affected by the structure of the environment in which they arise as well as by the practices, organizations, and communities where the processes occur. This concluding article summarizes how the supplement identifies the challenges at the interfaces of cancer medical care practice and proposes how further research regarding these interfaces could have implications for the goal of achieving a system of cancer care that is safe, effective, patient centered, timely, efficient, and equitable (4).

Supplement Review

The supplement is divided into three sections. The introductory article (2) entitled, *Toward Improving the Quality of Cancer Care: Addressing the Interfaces of Primary and Oncology-Related Subspecialty Care*. (section I), defines terminology and discusses types and transitions in care that occur across the cancer continuum. Types of care, including detection, diagnosis, treatment, survivorship, and end of life, are the broad areas of the cancer continuum that focus on achieving a specific therapeutic goal. Transitions in care refer to the activities that connect these broad types of care. We further delineate types and transitions as collections of discrete processes called steps and interfaces. Steps in care usually involve a provider visit, whereas interfaces are the patient and provider interactions that link steps and involve transferring information and responsibility. Actions at the interfaces of care include appointment scheduling and communicating about test results, therapy, and/or the next step in care. The articles in section II summarize the challenges that arise at the interfaces of care during four major phases of the cancer

care continuum—disease presentation to diagnosis, diagnosis through primary treatments, treatment through survivorship in curative settings or palliation in noncurative situations, and end-of-life care (8,9,10,11). The articles in section III begin by exploring how the care environment affects the interfaces during cancer screening (12,13). Section III also examines ways to implement and evaluate systematic approaches such as multidisciplinary care teams and information technologies that directly address the problems of communicating information and transferring care responsibilities along the care pathway (14,15,16,17). Taken as a whole, this supplement considers what is known about problems at the interfaces of cancer care and suggests avenues for further research. We suggest that consideration of these interfaces provides insight into care systems and a way to identify potential for improvement in the care process that will not be achieved by continuing to focus on the steps in care alone.

Answering Five Questions

In the supplement's introductory article, we posed five questions summarized here and elaborated below: 1) whether there is evidence of a problem at the interfaces of care, 2) whether there are tested solutions, 3) how the environment of care affects the problem, 4) what research is needed, and 5) design implications for needed research. Here, we examine the answers to those questions.

Is There Evidence That the Interface Between Primary and Subspecialty Care Affects the Quality of Cancer Care or Health Outcomes?

Yes. There is evidence that problems exist at the interfaces of cancer care, including between providers and patients, primary and subspecialty care providers, and their respective organizations. There is an intuitive association between problems and potential improvements in care processes, but how to measure the impact of these issues on specific quality metrics and whether they can be influenced remain to be tested.

Table 1 summarizes some of the problems within each part of the cancer care continuum as described in the articles in sections II and III. Anhang Price et al. (12) and Zapka et al. (13) not only suggest that organizational structures can influence interfaces between screening and disease detection but also note that the proportion of patients lost to screening and follow-up at the various interfaces in these processes is unknown. During the symptoms to diagnosis phase of care, Nekhlyudov and Latosinsky note

Table 1. Problems and needed research at interfaces of care across the cancer continuum

Type of care (reference)	Major problems	Research needed
Symptoms through diagnosis [Nekhtyudov and Latosinsky (8)]	Alarm symptoms are nonspecific, and only 10% actually turn out to reflect cancer There are no established metrics for optimal care at this interface and "delay" alone is unlikely to affect mortality, though it may affect patient psychosocial well-being Appropriate incentives to optimize care are needed once optimal care is defined	Test predictors of cancer among individuals with symptoms in representative primary care practice settings Define and test metrics of care that reflect an optimal interface (eg, days to resolution of findings, patient satisfaction, guidelines for optimal care across the interface) Test communication techniques and interventions that facilitate accurate and efficient diagnoses
Diagnosis through treatment [Sussman and Baldwin (9)]	40% of patients have unmet informational and psychosocial needs at the time of diagnosis No definition of collaborative care exists Information technology is just emerging as a tool for practice	Test effects of financial incentives for appropriate referral and communication Define and test critical components of shared care during treatment
Treatment through survivorship [Grunfeld and Earle (10)]	Patients are lost at the transition from oncology care back to primary care Characteristics of care plans need to be defined and tested	Test the effects of bidirectional information exchange during diagnostic process Use existing conceptual models tested in other diseases to build and test collaborative care models during cancer treatment Identify who should prepare the plan to achieve optimal outcomes
End of life [Han and Rayson (11)]	Coordination of care at the end of life addresses a major patient need Roles of primary and subspecialty care overlap, and responsibility at the end of life is ambiguous	Define the necessary components of a care plan and test them in practice Identify patient's views of care plans Identify patient preferences for primary and oncology care provider involvement?
Screening [Anhang Price et al. (12)]	Screening occurs in the context of health-care organizations, but organizational influences have been incompletely studied	Identify how primary care/subspecialty care interactions affect the quality of end-of-life care Identify predictors of the start of end-of-life care Identify provider preferences for involvement in end-of-life care Test models of intervention to clarify responsibilities and shared care requirements at the end of life Define the denominator of care for primary care practices
Follow-up abnormal screening [Zapka et al. (13)]	Follow-up after an abnormal screen is incomplete in a substantial minority of patients Communication, scheduling, and education all are critical activities during the transition between screening and diagnosis Challenges at interfaces vary with the screening tests and change as technology and recommended guidelines evolve	Test interventions that evaluate how changes in organizations affect the screening rates of the people they serve Develop and test appropriate measures of organizational factors that affect the care of individuals Test changes in health-care organizations that facilitate the use of outreach reminders Test the effect of care plans at the time of the initial referral for evaluation of an abnormality Test changes in health-care organizations that address the communication, scheduling, and transfer of responsibility needed at the primary care/subspecialty care interface after an abnormal screen Test interventions in diverse organizational settings with diverse populations using innovative feasible research designs

that 90% of cancer-consistent symptoms presenting to primary care providers are not actually associated with a subsequent cancer diagnosis (8). That creates a huge clinical challenge for the interaction between primary and subspecialty care (Table 1) [Nekhlyudov and Latosinsky (8)]. From diagnosis through treatment, Sussman and Baldwin (9) note that approximately 40% of patients have unmet needs for information about their disease or treatment or psychosocial support. During treatment through survivorship, Grunfeld and Earle (10) note that we know little about the details of the survivorship care plans that are widely recommended but rarely used. At the end-of-life phase, Han and Rayson (11) note that the overlapping functions, knowledge, and responsibilities of physicians during end-of-life care increase their role ambiguity. Furthermore, the ambiguity can be exacerbated by the emotional and situational stress the patient and their family suffer at this critical stage of their life. The reviews demonstrate some of the challenges at the interfaces of care and also emphasize that there is a great deal of research left to be done within each part of the cancer care continuum that may begin to ameliorate the problems.

But there are common problems across the continuum as well (Table 2). Almost all authors note the need for better knowledge of where breakdowns occur within the steps and interfaces of primary and specialty cancer care. The authors realize that we need validated and specific metrics of good care at the various interfaces. There seems to be universal concern about role ambiguity among providers. Providers vary in skill, and cancers vary in how they are diagnosed, evaluated, and treated. Who is responsible for each step in care and how necessary information is communicated among providers and between providers is a concern at each phase of care. The authors also note the need to better understand how structural characteristics of organizations and practices influence the interfaces of care. Together, these issues support the overall thesis of this supplement, suggesting that the interfaces of care are a window into care structures and processes. The challenges at these interfaces, and their potential evaluation and solutions, could profoundly affect care delivery because they appear to have the following effects: 1) role confusion, 2) inadequate exchange of verbal or written information critical to completing the next step in care

and/or the management of comorbid conditions, 3) inappropriate or missed referrals, and 4) inefficient diagnosis and treatment of the cancer. We suggest that efforts directed toward understanding how to objectively assess and measure care at the interfaces and subsequently resolve the ambiguities and inadequacies arising in the process of cancer care should be a high-priority research and programmatic agenda for many years to come.

Are There Any Tested Systematic Solutions to Problems at the Primary Care/Specialty Care Interface?

No, but there are observational studies and some relevant comparisons.

Observational comparisons of large systems of care do not show major differences in stage at diagnosis among capitated and indemnity plans within the United States, so the effect of insurance type on the overall process of care is unclear. Educational interventions regarding appropriate workup of symptomatic presentations have been suggested but not rigorously tested. A randomized trial of shared care in Denmark tested the effect of specialty–primary care communication regarding therapy and side effects during initial treatment and reported increased numbers of primary care visits and greater patient satisfaction but no major differences in technical quality of the care delivered (18). Several trials of care plans suggest the potential for improvement in the transition from treatment to survivorship [Grunfeld and Earle (10)]. Some evidence among long-term survivors also indicates that clearly communicated guidelines for follow-up and survivorship care from specialists to primary care physicians result in similar cancer care and outcomes as that delivered by specialists [Grunfeld and Earle (10)]. This is what the authors could find. Although there may be more, it is apparent that tested interventions that affect the interfaces of care are rare.

How Does the Environment in Which Care Is Being Delivered Affect Coordination and Communication Across the Interfaces of Care?

By environmental influence, we mean not only the immediate environment of the practice but also the wider environment of

Table 2. Crosscutting problems and research at the interfaces of care

Problem	Research
Need more knowledge of where breakdowns occur and their consequences for outcomes of care Provider roles and responsibilities are ambiguous and/or assumed when care is complex	Conduct observational studies that clarify issues and consequences of problems at the interfaces of care Test methods of explicitly identifying and negotiating roles and documenting responsibilities of providers and patients Test the importance of care plans at the beginning and end of the diagnosis and treatment phase Test multidisciplinary care models and their component parts Define needed functions and test effects of information technology on quality of care
Electronic health records play a minor role in care today	Test role of information technology in multidirectional communication
Information exchange to manage cancer care steps, comorbid conditions, and psychosocial consequences needs to be multidirectional	Test effects of policy changes within organizations and at broader levels to incent information exchange and collaborative models of care
Reimbursement incentives and professional norms do not encourage integrated care across providers and steps in the care process	Conduct methodological studies that measure critical processes at the interfaces of care
There are few measures of the organizational structures and processes that facilitate care at the interfaces	Conduct observational and interventional studies that reduce problems at the interfaces of care
Organizational and other contextual influences that affect interfaces need to be identified	

the organization and community. An overarching theme of this supplement is that progress along the cancer care continuum is affected by contextual factors, including provider characteristics, family structure, health-care organization composition, and national policy. Nekhlyudov and Latosinsky first raise the issue of environment when they point out the structure–process–outcome paradigm of Donabedian and apply it to the diagnosis to treatment phase of care (8). Anhang Price et al. (12) return to this issue in section III where they link an ecological model of influences across the continuum through the description of predisposing, enabling, and reinforcing factors that influence the behavior of both providers and patients. This conceptualization allows us to begin classifying targets for intervention and demonstrates how manipulations of the care context could influence the overall process in a way that can be communicated and shared.

Many have described relevant contextual factors including social and environmental conditions, care settings, and systems, as well as individual resources (6,7,19). The challenge has been to understand and conceptualize how these factors might affect care or guide improvement efforts. Wagner (20) introduces the important consideration of encouraging patient self-management, information systems, and decision support as ways to improve care, and Anhang Price et al. describe potential methods to identify and communicate these influences and focus interventions. Fennell et al. (16) propose an explicit model of multidisciplinary team care that links organizational theory and Donabedian’s conceptualization of structure, process, and outcome. They note that ultimately team performance must be linked to care processes and patient outcomes, and we agree. Throughout this supplement, we contend that efforts to improve care must consider environmental factors, such as those suggested by Fennell et al. But this consideration cannot simply exist in the abstract. We need to examine whether and how policies and organizational structures translate into effects that predispose, enable, or reinforce the behavior of individuals. It is the behavior of patients and providers throughout the process of cancer care that must be affected to improve patient outcomes.

Consideration of the effect of environmental factors needs to include understanding how incentives work to predispose, enable, or reinforce care. We have seen in studies of the larger US environment that the insurance type (eg, fee-for-service, managed care) does not necessarily change the stage at diagnosis of cancers in the populations served. We have also seen through this supplement that having a single-payer medical system such as that exists in Canada also does not solve the problems at the interfaces of care. Perhaps stage at diagnosis is the wrong metric for comparing the effect of incentives and structures of the health-care system, so there is a need for research on metrics that will reflect their effects consistently. Or perhaps, we need to understand whether broad system structures like fee-for-service, capitation, or single-payer systems influence improvements at the level of interfaces in the cancer care processes. Increases in information exchange and care coordination involve committing scarce resources, including the *time* of busy providers. Whether more targeted incentives directly addressing, for example, referral and communication during diagnosis or collaboration during initial treatment, will serve to improve care processes remains to be explored.

Fennell et al. suggest that external factors affect team focus, structure, and process in ways that lead to better treatment pro-

cesses and patient outcomes. But Fennell notes that these relationships need to be tested. Does multidisciplinary team care lead to better treatment? Can primary and specialty care be held jointly responsible for outcomes in a population of patients? How much do regulatory and payment incentives serve as barriers and facilitators to improving health care provider interfaces? We suspect that promoting unrealistic policies and mandating providers to do additional work on top of busy schedules will be resisted, so it is clear that identifying appropriate structures and incentives to address the problems is an area for future research.

Sussman and Baldwin emphasize that much of the research in alternative models/solutions of enhancing care interfaces is performed in settings outside the United States. Grunfeld points out the need to understand how care plans ought to be tailored or “detailed” to the realities of the delivery system or context in which they are delivered; a care plan in Canada where access is assured but waiting times for a visit may be prolonged will look different from a US plan where access has been a challenge but, for those with access, waits for care may be shorter than in Canada. We need to learn more about the translation of innovative care models, such as the collaborative care model developed and researched in health systems such as Canada and Australia, where primary care serves as the foundation of the system. These processes and structures need to be tested in the US health-care system where specialists are more numerous and collaborative care encounters are not incented. Integrated care systems with strong research infrastructures, like the Cancer Research Network and the Veterans Health Administration, may have optimal data capabilities to support complex research designs separating the effects of approaches directed to individuals, providers, and the care organization. But the conclusions must be generalized to single-payer systems and the new reality of care in the United States. Clearly, a great deal more must be done to test interventions, and these tests must consider the effects of the health-care systems in which they are undertaken.

What Research Is Needed Regarding the Interfaces and Their Effect on Patients and Care?

The effect of the environment on the cancer care process is one of many rich opportunities for research into improving interfaces and care across the cancer care continuum.

The specific challenges across the cancer continuum are summarized in Tables 1 and 2 along with some suggested research. For example, additional study of the symptoms leading to a cancer diagnosis may enable the primary care provider to more appropriately target a diagnostic intervention to improve diagnostic yield and its cost-effectiveness. Also shown in Tables 1 and 2 is that we need to test means of communication and other supports for primary care during the evaluation of symptomatic cases. Conceptual models of collaborative care developed in other diseases need to be evaluated in cancer care, including the value of primary care involvement (21). One might also consider whether the value of primary care involvement differs at different phases of multidisciplinary cancer treatment (ie, establishing treatment plan, managing symptoms, or active surveillance) in an effort to target informational and supportive needs where they are most likely to improve care processes. Informational technology solutions to problems at

the interfaces of care and their role in bidirectional communication and the designation of responsibilities need to be a high research priority, given the potential to target communication issues along the entire cancer care continuum. There also needs to be rigorous evaluation as to how patients can best access disease-specific, content-relevant, and comprehensible information addressing their specific needs at different points in the continuum.

Not mentioned in the tables are a variety of broader notions, including issues raised by Fennell et al. (16), Murray et al. (14), and Hade et al. (15) in their respective articles. For example, researchers may need to identify and incorporate a broad set of outcome measures that are sensitive to changes in the care process. These measures must be identified before they can be incorporated into the design of future studies, but we know now that studies need to include clinical endpoints (eg, survival, mortality), patient-reported outcomes (eg, health-related quality of life, satisfaction with care, expectations vs experiences), and economic impact (eg, costs, cost-effectiveness), including the costs to the patients and their families (22,23,24). Information regarding which types of shared care models are cost savings or cost producing and to whom these savings or costs accrue (patient, provider, organization, and insurer) will be an important component in the implementation of any novel model of cancer care studied.

Fennell et al. noted that many community cancer centers are transitioning to multidisciplinary care teams even though there is little published work showing characteristics that are critical to success, or that the proposed links between team performance and patient outcomes reflect that success. Are there physical structures that facilitate the care team process? Are there scheduling approaches that make it easier for a variety of participants? Is there tested information technology that would encourage a common record and designation of responsibility? Does patient access to all or some of this record facilitate care? Hesse et al. (17) note that information technology can potentially address problems at the interface of cancer but that the solutions will be stronger and more likely to lead to improvements in processes if there is clarity around what functions are needed and providers are involved in developing the processes and/or solutions. All this work remains to be done.

Finally, we need better conceptual and theoretical methods that help make sense of the complex influences on the interfaces of care. Those models need to guide research strategy, measurement, and method. Han and Rayson, for example, articulate six fundamental questions at the end of life that need to be adequately conceptualized if we are to begin exploring the types of models needed to define “best practices” in shared coordinated care at the end of life. Many cancers are increasingly treated with long-duration, palliative, intent-involving targeted therapies, which are generally well tolerated and involve some level of specialty care for years. The opportunity to examine these cancer-related interfaces in the context of a chronic disease model may offer opportunities to translate conceptual work done in other chronic diseases to cancer care processes as a means of improving research designs in this area. Multiple authors suggested that conceptual clarity is needed to understand the multilevel influences in primary and specialty care interfaces. We agree with Han et al., Zapka et al., and Anhang Price et al. that these multiple levels are interdepen-

dent, not independent, and research designs are needed to evaluate these influences in single studies.

How Would Research Need to Be Designed to Affect the Types of Care, Steps in Care, and the Interfaces Between Providers Involved in the Process of Care?

Murray et al. (14) identify an array of potential research designs that can be used for observational studies and randomized trials exploring the issues raised in this supplement. They point out that some strategies will be better for describing the problems at the interface but others will be more appropriate for testing solutions. Quasi-experimental designs that take advantage of “natural experiments” in care delivery systems are also recommended. There must be clarity regarding the denominator of interest (providers? patients? health-care professionals?) and the measures of effect. Designs that allow for the comparison of organizational characteristics influencing care at the interface are needed. Anhang Price et al., for example, note the dearth of organizational measures relevant to health-care processes. The research designs to address the effects described in this supplement are likely to be complex and expensive because they must accommodate measurement of practices and organizations as a unit of study. Murray notes that randomized trials are desirable when between-group statistical evidence for causal inference is needed and that we cannot assume that nonrandomized designs would be any less expensive, given the need for adequate measures on which to draw valid conclusions. Hade et al. also note that they may be feasible in the realm of screening, given current measures and intraclass correlations.

The Implications of Considering the Interfaces of Care

Through this supplement, we have begun to answer the five questions posed at the outset. These answers have implications for future work to improve cancer care systems. Though there is still a great deal of work ahead, it is possible to consider how that work might affect cancer care processes.

Only thinking about the steps in care and how to assure, for example, that the primary care physician knows how to perform a needle aspiration well or the appropriate options for chemotherapy are considered and administered in oncology is not sufficient to improve the process of care overall. We are suggesting that the interfaces between providers, providers and patients, and health-care organizations across the cancer continuum are just as important as the many steps in health care because they link these steps together creating a complete care process focused on individual patient outcomes and satisfaction. It takes the entire care process to achieve optimal cancer care. Screening is of no value without a diagnosis, and diagnosis does not improve outcome without access to comprehensive and effective treatment. This seems obvious but the care process is not studied that way. Although there is a large body of evidence about what physicians should do at each step in care, the authors in this supplement found a dearth of study about the interfaces that connect the steps in care and a near absence of interventions to address the problems therein.

In their classic report, *Crossing the Quality Chasm*, the Institute of Medicine recommended considering six characteristics of an

optimal care system for the 21st century, one that is safe, effective, patient centered, timely, efficient, and equitable (4). In closing this supplement, we want to suggest how consideration of the interfaces of care could contribute to achieving that vision.

Safe

Inappropriate, untimely, or lack of communication at the interfaces of care can cause avoidable delays in care and lead to potential misdiagnoses or testing that is not required. All of which can lead to harm. Improving communication across the interfaces could improve patient safety by ensuring that each provider seeing a patient knows what has been done before. This knowledge increases the likelihood that unnecessary repeat testing is avoided and the correct next step is undertaken.

Effective

Addressing problems of communication at the interfaces of care could reduce problems of omission (failing to do what is needed): The lack of bidirectional communication means that comorbid conditions may not be cared for effectively or at all. The specialty provider's focus on the cancer may limit their view of the patient's hypertension or cardiovascular disease simply because they do not have the experience and insight of the patient's. Similarly, the primary care provider dealing with a new symptom may not understand its potential relationship to prior cancer therapy.

Patient Centered

The passing of the patient from one provider to the next addresses the complexity of cancer treatment because no single provider has all the answers. However, it creates confusion and alienation when information is not passed and responsibility is not clear. Finding methods to pass necessary information among providers, clarify who is responsible for each step of the care, and convey the message that there is a common plan could reduce confusion and relieve a common current perception that the patient is at the center of care by default because no one else knows all that are needed. Addressing the interfaces of care to achieve a more effective system would also improve patient-centeredness if the definition of effectiveness included the entire array of conditions being treated and not just the cancer. Addressing the interface issues so that comorbid conditions are also addressed would increase the likelihood that the entire universe of patient concerns was treated and not just the cancer.

Timely

Delays at the interfaces are likely when the action that providers and patients need to take is not clear and not well executed. Nekhlyudov and Latosinsky point out the need to define timely diagnosis in a way that makes sense to patients. Improving interfaces of care is likely to affect care at the start of the continuum as well as consideration throughout the continuum, a necessary metric [Nekhlyudov and Latosinsky (8)].

Efficient

The lack of communication at the interfaces of care also leads to problems of commission when tests are repeated because the next doctor does not know what was done or the results are unavailable. Sussman and Baldwin point out that the primary care physician

appears to disappear from the picture once cancer therapy begins. Whether this perception is accurate needs closer examination because evidence from the Canadian care system suggests that primary care providers see patients more than oncologists during the course of cancer therapy (25). If in fact primary care visits are occurring, then communication is both possible and necessary. Addressing the interfaces could reduce repeat testing and wrong actions based on incorrect assumptions or incomplete knowledge and make cancer care more efficient.

Equitable

We have not considered whether problems at the interfaces of care are evenly distributed across populations, but it is not likely. We know, for example, that patient navigation programs in the United States have begun to address the extraordinary problem of access to care in low-income groups (26). Even when there is access to care, it is unlikely that all systems achieve the same cancer care or the same outcome. So the question becomes whether a focus on the interfaces improves our understanding of the differences in care.

It is apparent that research with regard to the interfaces of care could raise issues relevant to every aspect of the Institute of Medicine's goals for health-care systems. Addressing these issues could move us closer to an integrated cancer care system.

Conclusions

The articles presented in this supplement document numerous problems at the interfaces of providers, providers and patients, and health-care organizations that should become a high-priority subject for cancer research for multiple reasons: Provider role definitions are ambiguous, information exchange is always challenging and often nonexistent, and the provider and patient needs for information exchange are critical. Furthermore, the problems at the interface differ across the continuum of care and are affected by multiple factors, including individual and institutional relationships and policies. But despite the differences in the problems, three crosscutting themes should be explored further and tested with interventions. To achieve equitable care and improve the likelihood of delivering safe, patient-centered, efficient, and effective care, we need to understand the following: 1) methods and effects of bidirectional information exchange at the interface between primary and subspecialty care, 2) methods and effects of explicit transfer of responsibility at the interface between primary and subspecialty care, and 3) methods and effects of organizational and policy change that would provide guidance and incentives for primary and subspecialty care providers to collaborate in cancer care. Failure to address the challenges at the interfaces may be contributing to wasted resources, ongoing anxiety for patients and providers, and suboptimal clinical outcomes.

The question we raise is whether addressing the interfaces of care can provide a focus for improving the cancer care process. Although the issues at the interfaces of care are complex, well-designed studies can provide systematic information on methods and models to clarify roles, break down information barriers, and manage the interfaces more efficiently and effectively while establishing their connection to the health outcomes that providers and patients aspire to achieve. Research can also inform which organization and

policies facilitate and sustain best practice. This work is inherently multilevel, drawing evidence from the patient, provider, organizational, and health system environment. It also is inherently multidisciplinary, drawing upon not only the clinical, behavioral, and social sciences but also the fields of statistical modeling and organizational and engineering science. We hope that this supplement of the Journal provides a critical starting point for gathering information and finding better ways to improve the primary and specialty care interfaces that affect care across the cancer continuum.

References

1. Ginsburg JA. Achieving a high-performance health care system with universal access: what the United States can learn from other countries. *Ann Intern Med.* 2008;148(1):55–75.
2. Taplin SH, Rodgers AB. Toward improving the quality of cancer care: addressing the interfaces of primary and oncology-related subspecialty care. *J Natl Cancer Inst Monogr.* 2010;40:3–10.
3. Institute of Medicine, Commission on Life Sciences National Research Council. *Ensuring Quality Cancer Care.* Washington, DC: National Academy Press; 1999.
4. Committee on Quality Health Care In America, Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the 21st Century.* Washington, DC: National Academy Press; 2001.
5. Donabedian A. The quality of care: how can it be assessed? *JAMA.* 1988; 260(12):1743–1748.
6. Aday LA, Begley CE, Lairson DR, Balkrishnan R. *Evaluating the Healthcare System: Effectiveness, Efficiency, Equity.* 3rd ed. Chicago, IL: Health Administration Press; 2004.
7. Donabedian A. *Explorations in Quality Assessment and Monitoring.* Vol I. Ann Arbor, MI: Health Administration Press; 1980.
8. Nekhlyudov L, Latosinsky S. The interface between primary oncology specialty care: from symptoms to diagnosis. *J Natl Cancer Inst Monogr.* 2010;40:11–17.
9. Sussman J, Baldwin LM. The interface between primary and oncology specialty care: from diagnosis through primary treatment. *J Natl Cancer Inst Monogr.* 2010;40:18–24.
10. Grunfeld E, Earle C. The interface between primary and oncology specialty care: treatment through survivorship. *J Natl Cancer Inst Monogr.* 2010;40:25–30.
11. Han PKJ, Rayson D. The interface between primary and oncology specialty care at the end of life. *J Natl Cancer Inst Monogr.* 2010;40:31–37.
12. Anhang Price R, Zapka J, Edwards H, Taplin SH. Organizational influences on screening through diagnosis. *J Natl Cancer Inst Monogr.* 2010;40:52–71.
13. Zapka J, Taplin SH, Anhang Price R, Cranos C, Yabroff R. Factors in Quality Care—The Case of Follow-Up to Abnormal Cancer Screening Tests—Problems in the Steps and Interfaces of Care. *J Natl Cancer Inst Monogr.* 2010;40:38–51.
14. Murray DM, Pennell M, Rhoda D, Hade EM, Paskett ED. Designing studies that would address the multilayered nature of health care. *J Natl Cancer Inst Monogr.* 2010;40:90–96.
15. Hade EM, Murray DM, Pennell ML, et al. Intraclass correlation estimates for cancer screening outcomes: estimates and applications in the design of

- Group Randomized Cancer Screening Studies. *J Natl Cancer Inst Monogr.* 2010;40:97–103.
16. Fennell ML, Prabhu Das I, Clauser S, Petrelli N, Salner A. The organization of multidisciplinary care teams: modeling internal and external influences on cancer care quality. *J Natl Cancer Inst Monogr.* 2010;40:72–80.
17. Hesse BW, Hanna C, Massett HA, Hesse NK. Outside the box: will information technology be a viable intervention to improve the quality of cancer care? *J Natl Cancer Inst Monogr.* 2010;40:81–89.
18. Nielsen JD, Palshoff T, Mainz J, Jensen AB, Oelsen F. Randomised controlled trial of a shared care programme for newly referred cancer patients: bridging the gap between general practice and hospital. *Qual Saf Health Care.* 2003;12(4):263–272.
19. Coffey RJ. Engineering and the Health Care System. In: Reid PP, Compton WD, Grossman JH, Fanjiang G eds. *Building a Better Delivery System; A New Engineering/Health Care Partnership.* Washington, DC: The National Academy Press; 2005;107–111.
20. Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J, Bonomi A. Improving chronic illness care: translating evidence into action. *Health Aff (Millwood).* 2001;20(6):64–78.
21. Foy R, Hempel S, Rubenstein L, Suttrop M, Seelig M, Shanman R, Shekelle PG. Meta-analysis: Effect of interactive Communication Between Collaborating Primary Care Physicians and Specialists. *Ann Intern Med.* 2010;152:274–258.
22. Reeve BB, Burke LB, Chiang Y, et al. Enhancing measurement in health outcomes research supported by Agencies within the US Department of Health and Human Services. *Qual Life Res.* 2007;16:175–186.
23. Yabroff KR, Schrag D. Challenges and opportunities for use of cost-effectiveness analysis. *J Natl Cancer Inst.* 2009;101(17):1161–1163.
24. Yabroff KR, Warren JL, Knopf K, Davis WW, Brown ML. Estimating patient time costs associated with colorectal cancer care. *Med Care.* 2005; 43(7):640–648.
25. Del Giudice L, Bondy SJ, Zhonglian C, Maaten S. Physician care of cancer patients. In: Jaakkimainen L, Upshur EG, Klein-Geltink JE, et al., eds. *Primary Care in Ontario.* Toronto, ON: Institute for Clinical Evaluation Services (ICES); 2006:162–174.
26. Robinson-White S, Conroy B, Slavish KH, Rosenzweig M. Patient navigation in breast cancer: a systematic review. *Cancer Nurs.* 2010; Feb 5 [epub ahead of print].

Funding

National Cancer Institute (S.H.T., S.C., A.B.R., E.B.); Doulhousie University (D.R.).

Affiliations of authors: Applied Research Program/Behavioral Research Program (SHT), Outcomes Research Branch, Applied Research Program (SC), and Applied Cancer Screening Research Branch, Behavioral Research Program (EB), Division of Cancer Control and Population Sciences, National Cancer Institute, Bethesda, MD; Falls Church, VA (ABR); Division of Medical Oncology, Dalhousie University, Halifax, NS, Canada (DR); Beatrice Hunter Cancer Research Institute, Atlantic Clinical Cancer Research Unit (ACCRU), Halifax, NS, Canada (DR).