Teams and Teamwork During a Cancer Diagnosis: Interdependency Within and Between Teams

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Abstract

This article discusses the care process among three groups (primary care, radiology, and surgery) aiding a 57-year-old woman during her screening mammography and diagnosis of breast cancer. This is the first in a series of articles exploring principles and topics relevant to teams guiding clinicians involved in cancer care. The challenges demonstrated in this case illustrate how clinicians work within and between groups to deliver this first phase of cancer care. The case helps demonstrate the differences between *groups* and *teams.* Focusing on the patient and the overall process of care coordination can help move groups toward becoming teams who deliver better care by identifying and managing goals, roles, and interdependent care tasks. Care providers and researchers can use the case to consider their own work and essential aspects of teamwork needed to improve care, patient outcomes, and the evidence that supports each.

Introduction

Physicians, their staff, and patients struggle with a shrinking cancer care workforce and the challenge of keeping up with the growing complexity of cancer care delivery, changing guidelines, and the hope of providing evidence-based supportive care in what the Institute of Medicine (IOM) calls a "system in crisis."[1] Forty-five percent of oncologists and a slightly higher proportion of family physicians reported high levels of emotional exhaustion and depersonalization (burnout) in recent surveys,[2] and the problem is likely to increase. The relative supply of oncologists and primary care physicians is decreasing as the numbers of people at risk, people newly diagnosed with cancer, and long-term cancer survivors are increasing.[3] The IOM suggests that teams and teamwork are a needed part of the solution to workforce shortages and the complexity of cancer care delivery (Table 1).[1,4] To apply what we know about teams from other areas of work, this article discusses a patient's diagnosis of breast cancer and three areas of teamwork (including the patient and providers in the team): establishing explicit shared goals, clarifying roles, and managing task interdependency.

One of the challenges of cancer care is that it involves the patient and multiple care groups. Although many do not distinguish between groups and teams, we propose the distinction as a useful heuristic to guide consideration of how care providers manage work that is ultimately completed by other providers.[5,6] Cancer care is a good example of such work when viewed from the perspective of a patient seeking help to manage her disease with the assistance of multiple provider groups.

Groups are defined as two or more people who contribute to a common product and perform their own work relatively independently of each other. *Teams* are defined as two or more people who interact dynamically, interdependently, and adaptively to achieve a common, valued goal.[5,7] To reduce cancer morbidity and mortality, primary care, radiology, and oncology groups and their respective staff need to share information, responsibility, and the tasks of cancer care across the cancer care continuum, from screening through end-of-life care.[8] People seeking cancer care sometimes get lost in these processes and fail to receive needed care.[9,10] For example, there was no documented follow-up in 17% of abnormal mammograms, 12% of abnormal Pap tests, and 41% of abnormal fecal occult blood screening tests in specific populations.[11-13] This lack of follow-up represents a failure in the screening process that undermines the potential benefit from screening and includes some liability risk.

We suggest that these failures may be due in part to inadequate recognition and management by providers of the multiple interdependent tasks required. *Interdependency* refers to situations in which people are mutually reliant on one another in order to complete their work and achieve their goals.[14,15] *Teamwork* refers to the knowledge, behavioral skills, and attitudes that team members use to navigate these interdependent tasks.[14] The recognition and management of distinct but interdependent roles and tasks distinguishes *teams* from *groups* (Table 2). Teams recognize and manage interdepen-

Case Summary

Ms Young is a 57 year-old, mildly obese female executive with hypothyroidism and hypertension. She has a long-standing relationship with her primary care physician, Dr Moore, and a nurse practitioner, Ms Jones, in an office with nine other primary care physicians and their staff. They are members of a primary care group with 30 physicians and three offices that accepts reimbursement from a variety of insurance companies, Medicare, and Medicaid. They refer to two hospitals and several groups of subspecialists within a city population of 200,000.

At one of Ms Young's routine visits focused on her weight, thyroid, and blood pressure control, Dr Moore misses the fact that Ms Young is 6 months overdue for a mammogram. Late in the day, while finishing the write-up in the electronic medical record (EMR), he finds a reminder and also sees a note from his nurse who caught the oversight and recommended ordering the exam. After overcoming many complexities including paper referrals, a radiology scheduling system that necessitates a patient call, and making the appointment as an add-on when the mammography equipment was being calibrated, the screening and diagnostic process establishes a malignancy (Appendix, [online only]; Figure 1).

Delays in the cancer diagnosis occur because of ambiguities about the patient's role in care, confusion among nurses and physicians within and between practices regarding who has responsibility for advancing the screening and diagnostic processes, and a screening referral made 31 months after Ms Young's prior screening exam. Though the delays may not affect the prognosis, Ms Young suffers some sleepless nights while Dr Moore is unavailable to coordinate the evaluation process, the radiologist provides mixed messages about next steps, and neither the surgical practice nor primary care practice activate measures to support and educate her. Despite reassurance from her surgeon and Dr Moore, Ms Young worries about the effects of the delays on her cancer as she prepares for therapy.

Several provider groups are involved in this case: (1) Dr Moore's group includes a receptionist, licensed practical nurse, and nurse practitioner who sees patients from three physicians for routine care. (2) The radiologist care group includes a scheduler, a receptionist, mammography and ultrasound technologists, and a physicist. (3) The surgical care group includes a receptionist, nurse, and physician assistant. (Full case description appears in the Appendix.)

dent tasks such as diagnosing a cancer. Groups do one task and may not link the many tasks that result in coordinated care.[7] The challenge is when groups, or groups of groups, are asked to operate as teams without a clear acknowledgment of the difference. Groups of highly trained experts, however, can be taught to become teams in ways that may improve operational efficiency, quality, professional satisfaction, and patient care.[16]

Table 1. Definitions of Common Terms

Term	Definition
Group	Two or more people contributing to a common product who each perform their own specific work relatively independently of each other and do not depend upon the work of the other to complete their task[6]
Team	Two or more people who interact dynamically, interdependently, and adaptively to achieve a common valued goal, shared within the context of some larger group or organization[7]
Interdependency	The situation in which people are mutually reliant on one another in order to complete their work and achieve their goals[15]
Teamwork	The knowledge, behavioral skills, and attitudes that team members use to manage these interdependent tasks[14]

We explore the interdependencies of the work involved in the diagnosis of a breast cancer and offer initial implications for clinical practice and future research. This article is the first in a series of illustrative case studies examining ways to improve cancer care by applying what is known about teams and teamwork. We offer these insights to assist clinicians and medical societies struggling to realize the hope that health care teams and team-based approaches will help to address some of the challenges of cancer care in the United States.[1,17]

The Key Principle: Effective Teams Identify and Intentionally Manage Interdependent Work

More than 40 years of research has been dedicated to examining and understanding the impact of interdependent work. Early taxonomies identified four general types of task interdependence (pooled, sequential, reciprocal, and team) that help clarify thinking about the relationships of the many groups involved in cancer care delivery.[15,18,19]

- *Pooled interdependence* characterizes tasks in which each group member has the same role and expertise, and can contribute to the group output without directly interacting with other group members. Each individual performs all steps required to complete a given task on his or her own. For example, a pool of data entry clerks can complete the full task of data entry individually, and contribute to the group's output.
- *Sequential interdependence* requires one team member to act or complete his or her portion of a task before another member can complete the next portion (eg, an assembly line). Contributors often have unique expertise and complete different steps in a specific, unidirectional order. Sequential tasks are more conducive to standardization and require some coordination and communication between members, but less communication overall compared with tasks that require reciprocal or team levels of interdependence.

Table 2. Three Critical Elements of Managing Work By Turning Groups Into Teams

Critical Element	Characteristic to Consider	Group	Team	What Members/ Leaders Can Do	Key Citation
Identifying a team or a team of teams	Size of group	≥ 2 people (teams) operating independently	≥ 2 people (teams) managing interdependent tasks	Identify whether tasks are interdependent and therefore need teamwork	Katzenbach, 1993[6] Salas, 1992[31] Marks el al, 2005[24]
Establishing goals	Goals of members and how members work	Diverse and individual	Single and shared	Collaboratively set clear team goals for the work and foster recognition of interdependent tasks	Salas et al, 1992[31] Salas et al, 2013[33]
	Member focus	"Self-centered"	Feel a sense of ownership to shared goal	Provide regular feedback focusing on team & organizational goals	Cohen et al, 1997[7] Salas E, Rosen M[34]
Establishing roles in care	Member's task definition	Task work is associated with an individual	Members collaborate to define the tasks and respective responsibilities	Define roles and responsibilities based on competencies knowledge, skills, and attitudes underlying effective teamwork	Salas et al, 2009[14]
	Member's desired outcome	Conformity to process	Achieving the goal	Provide regular feedback focusing on team goals	Bandura, 1986[34] Salas et al, 2009[14]
	How member performance is evaluated	Individually	Collectively	Collective incentives and acknowledgement	Salas et al, 2007[37]
Managing interdependency	Decision making	Fragmented and limited	Distributed among members	Foster the distribution of decision making and workflow reappraisal across team members	Fussell et al, 1998[36]
	Task performance	Individuals attend to their task	Individuals attend to their task and adapt as needed to achieve the goal	Foster situational awareness and flexibility	Salas et al, 2009[14]
	Awareness of the overall operation	Limited	High	Provide regular feedback regarding team goal achievement	Salas et al, 2005[37]

- *Reciprocal interdependence* is characterized by two-way workflows. The output from team member A (or team A) becomes the inputs to team member B's (or team B's) work, but team member B's output also feeds back as inputs for team member A's work. Team members have specialized roles or expertise; however, they may complete different aspects of the task or contribute to the collective outcome in a flexible order. For example, a primary care referral to radiology for diagnostic imaging usually requires an interpretive report going back to primary care to consider any additional studies or actions. This fluidity requires higher levels of coordination, communication, feedback, and cooperation.
- *Team interdependence* requires members to mutually interact and collectively manage the flow of inputs and outputs between members. This often requires all team members to interact in a dynamic way, with significant effort invested in coordination and communication to effectively complete the global task.

The interdependency of work shared within and across teams can be highlighted by defining the team's clear collective goal. Explicitly defining such a shared goal focuses attempts to optimize processes, resources, and effort (eg, for effectiveness and efficiency). Further, clarifying the skills needed for each task, who is responsible, and who will monitor task completion (and overall system performance), helps to highlight the interdependency of teams. Subsequent sections describe how interdependence, goals, and roles are involved in Ms Young's case and can guide groups to becoming teams (Table 2).

Understanding Teams Through the Case

Ms Young's care is an example of the delays and confusion that the IOM reports have identified as contributing to a cancer care system in crisis.[1,20] Although her cancer is still early stage, and she has a high likelihood of being treated successfully, her screening occurred outside recommended intervals, there were missed opportunities to offer screenings, she suffered delays in results notification, she experienced unnecessary anxiety, and she was overwhelmed by the choices she faced while waiting to discuss results with her physicians (Figure 1).

Breakdowns such as these in Ms Young's care (Table 3) are often attributed to a breakdown in communication. The teamwork perspective, however, suggests that breakdowns in communication are actually the product of unclear or neglected interdependent activities.

One point of serial interdependence within the team was Ms Young's need for a screening mammogram. Dr Moore had to order the mammogram and talk with Ms Young for her to have it performed. Ms Young was a regular patient, and any one of several people within the primary care team could have recognized that she was due for screening during the prior 6 months. Ms Young could have also been mailed a reminder about mam-

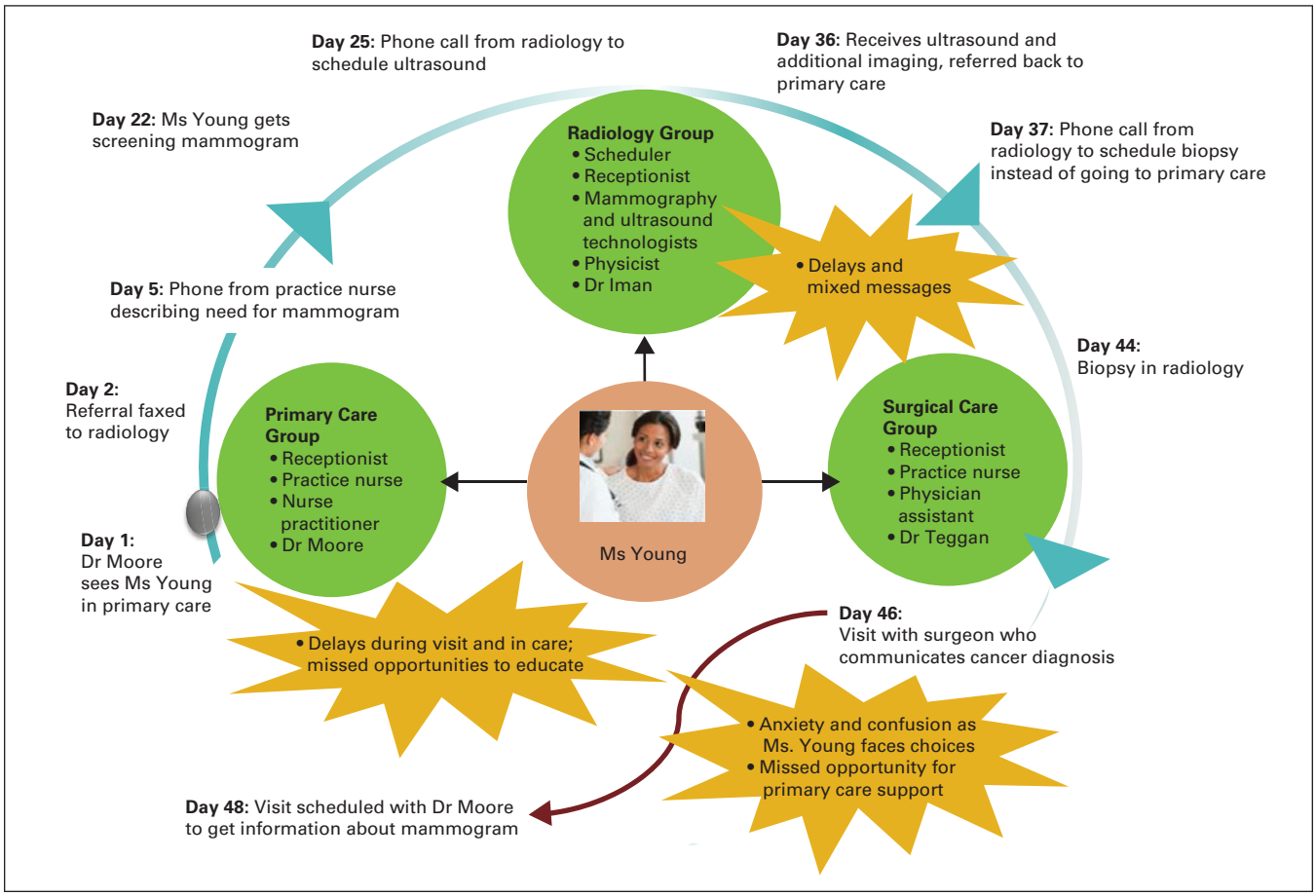

Figure 1. Ms Young's care path and its challenges.

mography, or she herself could have raised questions about it with her clinicians. Ms Young and her primary care group did not manage the interdependent task of considering screening mammography.

After the mammogram, two points of interdependence between teams occurred when an abnormality that required biopsy was found (Figure 1). Serial interdependent teamwork was needed to ensure reliable referral to screening by primary care and the correct performance and interpretation of mammography by radiology. If it is not clear who is responsible for directing the evaluation of the abnormal mammogram, then reciprocal interdependence exists, and the radiologist needs to send a report to the primary care doctor who guides the next steps in care. An explicit discussion and agreement within Dr Moore's group about how to manage screening abnormalities, or between Dr Moore's group and the radiology group, could have anticipated the situation and avoided delays. Such examples of interdependence within and between teams illustrate how intentional management offers an opportunity to minimize the confusion of care.

We are suggesting the process of care could have been improved if the providers recognized and managed all the points of interdependence and began operating as a team and as a team of teams. Groups must undertake three critical tasks to begin moving from groups to teams: (1) establish explicit goals, (2) establish roles, and 3) manage interdependent work. When groups undertake these tasks, they may begin operating as teams (Table 2).

Establishing Explicit Goals of Care

The groups involved in Ms Young's care show elements of teamwork within groups but are not consciously functioning as a whole team (as a team of teams). A team emerges when two or more people share a common goal and manage interdependent tasks to achieve it.[15] The goal does not need to be negotiated for every case, but can be established to guide the management of the interdependence of the tasks shared repeatedly within and across groups so that they begin operating as a team or team of teams (Table 2). Dr Moore's group may see offering cancer screening as its goal in this process, whereas the radiologists may see obtaining and reviewing images as their goal. However, achieving these narrow goals alone is not sufficient to achieve the patient's goal and a coordinated, efficient, and effective care process. Establishing a shared goal of efficient evaluation of abnormal mammograms in a team that includes primary care and radiology could help motivate discussion of referral and evaluation protocols for mammography follow-up and guide the groups to become teams and a team of teams.

Once a general policy is established, its implementation can be aided by tracking individuals with abnormal

Table 3. Task Interdependencies in Ms Young's Care

Nature of Task	People Involved	Limitation
Self-care	Patient and their family	Could have been proactive in asking for screening to be performed when recommended.
	Primary Care	
Placing the patient in the examination room	Nurse or receptionist	Patient's early arrival offers an opportunity to educate her about screening and potential results.
Education	Nurse, receptionist, leadership	Receptionist and nurse could respectively provide information and educate about mammography.
Preparation and shared care	Receptionist, nurse, physician	Consulting the electronic record and establishing the screening status and/or making the referral could be standardized processes.
Shared care	Nurse practitioner, physician	Any clinician could offer screening during previous visits.
Education	Nurse, physician	Could have explained and/or written down whom to call to schedule mammogram.
	Nurse, staff	Could educate about mammogram by phone, but it is additional time that could have been avoided by educating during her visit.
Follow-up	Physician, nurse practitioner	Could have a standard protocol within primary care and between primary care and radiology to manage follow-up of abnormality.
Communicating need for biopsy	Physician, nurse, surgical office	Primary care physician and surgeon could standardize their respective roles in the evaluation of a positive mammogram and reduce the need for phone messages.
	Radiology	
Scheduling	Receptionist, manager	Receptionist and radiology group members could clarify phone protocol to reduce holds and delays in service. Could add 7:30 A.M. appointment to make it possible to see the patient.
Appointment progress	Scheduler, physicist	Awareness of all activities of across the group would prevent scheduling an appointment at the time of a regularly-scheduled machine calibration.
Appointment progress	Receptionist, technician	Providing supportive commentary about colleagues when with patient is present reinforces teamwork
Preparing the patient	Technician, leader	Providing materials to explain procedure while patient waits at machine or in waiting room takes advantage of the down time.
Communicating results	Technician, leader	Eliciting preferences from patient for results reporting and establishing and communicating the approach for this patient could reduce anxiety.
Managing results	Radiologist, surgeon, primary care	Surgeon takes responsibility and performs biopsy without waiting for primary care, making care better for patient but ignoring reciprocal interdependence.
Communicating results	Radiologist, primary care	A negotiated and standardized protocol for abnormal mammograms would reduce confusion.
	Surgery	
Communicating results	Surgeon, nurse	Recognize reciprocal interdependence by providing information, and communicating with primary care regarding plan and asking for assistance communicating it to patient.

mammograms and helping teams know who has not been evaluated. Measuring the proportion with an associated evaluation, and incenting high rates of complete evaluation could further encourage policy implementation and reduce the risk of liability for failure. One key to creating incentives is rewarding the desired behavior.[14] For example, rates of discussing rather than achieving screening mammography may be the desired goal in this age of shared decisions, so that the patient's choice not to undergo screening does not penalize the care team. Furthermore, creating a reward for the team as a whole reinforces teamwork.[14] Finally, while cash incentives may be important, knowing care is complete provides relief and satisfaction that may also incent teamwork.

Clarifying Roles in Care

Roles could have been more clearly specified for Ms Young within and between groups involved in her care. With a clear and common goal of achieving screening and follow-up, team members could be given specific and flexible roles. Clearly defining who should identify candidates for screening (eg, the patient, clerical staff, nurse practitioner, the physician, or everyone involved), provide associated educational materials (eg, clerical staff, nurse, or nurse practitioner), answer patient's questions (eg, nurse practitioner or physician), and make the referral frees individuals to focus on their relevant tasks that support that team's goal. A patient who is early for a visit could be evaluated for her screening status by the receptionist, and given associated educational materials while she is waiting. Fur-

thermore, when seen by the nurse practitioner or the physician twice annually for hypertension, she could be identified as eligible for a mammogram and referred 6 months earlier. Finally, having the physician write standing orders and an explicit protocol for the mammogram supports the goal and makes it clear that any of several specific members of the team can take the initiative in making the referral. Similar approaches of standardizing the evaluation process could also be put in place to address the mammographic findings and clarify the desired roles of the radiology and primary care group once an abnormality is found. This approach can reduce ambiguity, rework, variation, and errors. Team members understand the reciprocal roles of each member of the team and continually evaluate their processes against that goal. Establishing standardized protocols also facilitates performance of role functions.[21]

A critical question that was recently addressed by the IOM is the exact role and responsibility of the patient.[22] The report notes that people become members of a team when (1) they communicate information that directly helps guide the work of other team members; (2) take action that contributes directly to the teams' products, services, or desired outcomes; (3) are acknowledged as a member of the team by other team members; and (4) help the team carry out actions, goals, and aims that are centered on the unique needs of the person seeking care. The IOM also suggests that involving patients as partners in the delivery of health care and establishing the role they want to play in their care, including diagnostic and preventive care, should be explicitly discussed to reflect their preferences, values, goals and capacities. An alternative in this case, therefore would be an explicit discussion with Ms Young about her preference regarding screening and whether she wanted reminders when they were due. Establishing this understanding reframes the decision to perform screening as an interdependent task involving multiple members of the primary care team and the patient.

Managing Interdependent Tasks Within Groups

The steps that the IOM proposes as the definition of becoming a team member are also the ones the clinicians in this case could use to manage its interdependent tasks (eg, ordering tests, obtaining results, understanding that each groups' work is part of a larger process, communicating results, and establishing a plan; Figure 1, Table 3). Absent clear, shared care goals or standardized processes, including the possibility of reminders sent directly to the patient, Ms Young did not receive the timely recommendation for screening, or timely information regarding follow-up. The primary care team missed opportunities to demonstrate teamwork that anticipated the care process, the patient's needs, and her potential anxiety. The scenario demonstrates how systems that are not intentionally designed to address interdependence and teamwork can blur lines of responsibility and accountability, and lead to breakdowns in the care process.

Similarly, the radiology group members did not sufficiently recognize themselves as part of a bigger process. Ms Young's appointment conflicted with the machine calibration. The radiologist noted that the primary care physician would provide results. The radiologist performed the biopsy and arranged care with the surgeon but failed to communicate with the primary care staff. Although each oversight seems understandable, the cumulative effect contributed to frustrations and failures in care. A conscious framework whereby each member of the team hears feedback from others (particularly the patient) about suboptimal processes (eg, communication handoffs) can help teams improve the quality of their work.[23]

Managing Interdependent Tasks Across Groups

The pooled, sequential, reciprocal, and team-interdependence taxonomy described above focuses on the tasks of a single team. A fifth type of interdependence, identified as "complex interdependence," characterizes situations in which multiple teams' tasks, goals, and outcomes interact.[16] This combination is characteristic of what Mathieu and others have called a multiteam system, and its success may be threatened by potentially unmanned "gaps, disconnections, boundaries, weak ties, and spaces" between the differing teams.[24,25] Patients often perceive and complain about these gaps and the ways clinicians and administrative staff fail to work together.[1,30]

One possible exception is multidisciplinary teams that bring together clinicians and staff from various disciplines, departments, and systems to discuss care planning and management for individual patients with cancer. An associated article suggests these multidisciplinary cancer care teams improve treatment planning, but their evaluation remains rudimentary.[26]

The challenge of addressing the interdependence of the cancer care delivery described in this case requires recognizing there are potential tensions and conflicts between the goals of different groups. The primary care, radiology, and surgical teams function as separate businesses, subject to separate organizational policies, incentive structures, cultures, rhythms, and norms. The group's responses to care process challenges are not necessarily synergistic, and indeed they can at times be antagonistic. The resolution of these tensions comes from clearly perceiving and openly acknowledging the goal of maximizing Ms Young's health. The business unit and the organizational structures and policies should be subsumed in a consistent fashion under this goal, from which they and the patient all stand to benefit.

Thus, a shared understanding of goals and interdependencies across teams is the key characteristic that allows the teams in multiteam systems to anticipate one another's actions, adjust their own behavior accordingly, and communicate these adaptations more efficiently. As the extensive literature examining interdependence and coordination demonstrates, lack of shared understanding about the demands of coordination (ie, interdependencies) often results in misunderstandings, inefficiencies, or delays, unintentional duplication, lack of synchronization, and ineffective communication among and between groups asked to do the work.[27]

Implications for Practice

Clinicians and staff can reconceptualize, design, and manage care and exercise teamwork once they have a common goal and understand who, when, where, and how team members need to coordinate their actions and communicate in an accurate and timely fashion. Table 2 includes suggestions of ways that groups can begin to practice as teams, based on evidence from other settings, and Table 3 suggests specific approaches to the care in this case that would actively manage opportunities and interdependencies. The first step is to recognize when a team (or teamwork) is needed. Once it is clear that there are interdependent tasks, then it may be helpful to step back and clarify the team's consensus on the immediate and patient-centered goals for care.

The breakdowns in Ms Young's care are all too familiar to both patients and clinicians and may represent a liability risk in some situations. Disturbing evidence suggests that half the late-stage breast and invasive cervical cancers in populations with at least 3 years of access to health care are not screened within the appropriate time interval.[9,10] From 17% to 41% of abnormal screening examinations are not evaluated in general.[28] The purpose of evolving from a group to a team is not to pursue some idealized structure, but to address deficiencies in care that have been articulated by clinicians and patients alike. New health care quality initiatives, such as the National Center for Quality Assurance Patient Centered Specialty Practice initiative, are beginning to formally recognize the value of teams and teamwork in optimizing patient care and outcomes, and provide support and incentives for centers to develop supportive structures and processes.[29] We suggest that intentionally managing interdependent tasks within and between groups is a necessary step to becoming teams and achieving the goals of these initiatives.

Implications for Research

Much of what is proposed makes common sense and has a basis in team literature, but nonetheless needs more empiric testing. Clinicians should proceed to make improvements based on what is known, but more research is needed to demonstrate the value and impact of various aspects of teams and teamwork in the context of cancer care: (1) whether (and how) setting shared goals (across teams or practices) leads to demonstrated improvements in coordination, care effectiveness, and efficiency; (2) how multiple teams interact and share care that supports a patient-centered goal; and (3) how outcomes of teamwork are measured. Another area that was not explicitly addressed in this case is the need to explore the meaningful use of health information technology (HIT). Questions might include not only how HIT currently supports or interferes with interdependent work, but also how it can best be leveraged to support teamwork that we want in the future. It is easy to imagine the opportunities for HIT to engage and educate patients in shared goal setting and care planning, and to keep patients and other team members informed about where they are in a care trajectory. However, this assumption needs testing. Finally, there is the issue of interdependency and teamwork between groups working in different systems, with different reimbursement structures, and different work rhythms How can we create a path to an efficient diagnostic process both within and across connected health care systems and, perhaps of even greater importance, across networks that are more often than not fragmented and located at independent clinical sites?

Conclusion

The screening process for breast cancer is an inherently emotionally laden undertaking, compounded by complexities in the interactions among at least three different practicing groups. It is time to recognize that they perform interdependent tasks and will practice better as teams and a team of teams. However, expert teaming does not happen naturally in medicine, any more than it does in professional sports. It is not sufficient to invoke teams as the solution to care. Clinicians should seek training and practice in teamwork. There is ample evidence that such training is effective when implemented in a supportive organizational setting or incorporated into practitioners own settings.[21,30] Meanwhile, we must also learn more through carefully studying how teams contribute to the process of cancer care delivery, and therefore encourage readers to consider what we know and need to know about cancer care delivery.

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Teams and Teamwork During a Cancer Diagnosis: Interdependency Within and Between Teams

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Appendix

Diagnosis Case Study

Ms Young is a 57-year-old, slightly obese business executive with a history of hypertension. She checks in at the primary care office 15 minutes early for evaluation of her hypertensive control. She greets the receptionist, who knows her well because she has been seen every 6 months for 10 years by either the nurse practitioner (Ms Jones) or the physician (Dr Moore) for the review of her thyroid medications and her weight loss efforts. She has increased the frequency of her visits in the last 3 years because of the onset of hypertension and the need to maintain hypertensive control. Ms Young has been happy with her relationship with Ms Jones and Dr Moore and finds them compassionate, helpful, and professional. Ms Young is otherwise relatively healthy and has experienced only intermittent periods of health concern typical of her age group.

Ms Young is led in to the examining room about 15 minutes behind her appointed time because the patients ahead of her took more time than expected and allowed for in the schedule. She reports experiencing fatigue since starting her beta blocker originally prescribed to her 7 months ago. Although Ms Young's blood pressure is controlled on the combination of diuretic and the beta blocker, she has not lost weight because she has been too tired to exercise and her family has not wanted to adapt to her diet. After discussing the importance of diet and exercise, Dr Moore sends the patient to the laboratory to check her potassium levels.

After directing Ms Young towards the laboratory, the practice nurse (Ms Jones) reviews the patient's record and looks for any other orders. As she proceeds with the review she notes a flag on Ms Young's record indicating that she is 6 months overdue for her screening mammogram. Ms Jones walks back to the physician's office and leaves a sticky note on his monitor saying Ms Young is late for her mammogram. Day 1: Dr Moore finds the sticky note at the end of the day when he finally is updating the incomplete records for the day. He notes the red flag on the online record as well when he finally gets to it. He adds an order for the mammogram online, completes a paper referral and tosses it in his outbox. When he leaves the office at 7:30, he takes the contents of the outbox to the nurse's station. The next day (day 2), the nurse notes the referral and faxes it to the radiology clinic, but she doesn't have time to call Ms Young. . First thing the next day (day 3), she calls Ms Young's home, but she is not there, so she leaves a message for Ms Young to call back. . When Ms Young calls back 2 days later (day 5) Ms Jones tells her she is due for a mammogram. Ms Jones reminds Ms Young what a mammogram involves and provides information about mammograms and the address of the radiology facility.

Ms Young appreciates the call from her doctors' office and is pleased that she has chosen such a conscientious group, but then realizes she is not sure who is making the appointment. She calls Dr Moore's office, and after being put on hold three times, finally gets through to Ms. Jones who clarifies Ms Young must place the call (day 5). Ms Young calls the radiology clinic on her noon break 3 days later and is put on hold there as well. After waiting 10 minutes, she gets through to a receptionist at the front desk, who then passes her to the scheduler, who makes an appointment for a mammogram in 2 weeks. The scheduler grumbles a bit that it is their policy to get women in within 2 weeks, and says she is therefore adding a 7:30 a.m. appointment to the schedule (day 22). When Ms Young arrives for the mammogram on time, she is greeted by a receptionist who asks her to sit down in the waiting room, and says someone is calibrating the mammogram machine so the appointment will be delayed slightly. Twenty minutes later, a woman, Ms Platt, calls her name and takes her to a dressing room while apologizing for being late. She says that she hopes the receptionist said something about the delay. Ms Young changes into a gown and then waits in the chair provided. Ms Platt returns in 10 minutes, performs the mammogram and sends Ms Young on her way, apologizing again for being late but saying that her patience and cooperation were helping them get back on schedule. Ms Platt notes that the results of the exam will be mailed directly to Ms Young within a week.

Three days later (day 25), Ms Young is called by someone she does not remember meeting at the radiology office and is informed she has an abnormal mammogram that needs additional evaluation. The caller reassures her that this is common but that she needs to schedule another appointment at the radiology office.

Ms Young has to leave town for business, and although anxious, she notes that the woman from radiology was not too worried. She calls (day 25) and makes an appointment about 2 weeks (day 36) after the original mammogram. She checks in with a receptionist 10 minutes early and then waits 10 minutes past her appointment until the technologist is ready to examine her. The technologist performs the ultrasound but does not say anything directly to Ms Young. The technologist then calls in the radiologist, Dr Iman, who performs the study again and then orders some additional mammograms. Dr Iman also does not say anything but notes on her report that there is a solid 1-cm mass close to the chest wall and behind the areola. Dr Iman then tells Ms Young that she will send the mammogram report to her primary care physician, Dr Moore, and that it is important for her to talk with Dr Moore regarding the results. Meanwhile, Dr Iman decides to contact a surgeon to discuss the mass. He calls Dr Teggan, in a nearby private practice that accepts Ms Young's insurance, and they decide Ms Young needs an ultrasound-guided needle biopsy.

Ms Young leaves the radiology office feeling a little anxious, so she calls her primary care physician's office as soon as she has a moment the next day (day 37). Dr Moore is on vacation that week so she makes an appointment 10 days later (day 47). Meanwhile, Dr Moore's office receives a written report from the radiology practice indicating that the patient has an abnormal mammogram and has been recommended for an ultrasound and additional imaging. The radiologist is recommending an ultrasound-guided biopsy in his suite and has made referral to a surgeon who Dr Moore also knows. The written report goes to the central mail center in the office, where it is

placed in a pile with other reports that need to be entered into the electronic medical record (EMR) by the records personnel.

When Dr Moore returns from vacation, he has a backlog of patients to see and eventually gets to reviewing notices on his EMR late in the day of his return. Dr Moore sees that Ms Young had an abnormal mammogram and is now being recommended for a biopsy. He notes on the EMR that Ms Young has been scheduled for an appointment with him in 2 days, but he feels uncomfortable that it has now been more than 5 weeks since the original mammogram. He has many options for contacting Ms Young to discuss the mammography results and biopsy recommendation, including sending an e-mail, calling the patient, or having the nurse call the patient. He chooses to call Ms Young himself because he is not completely clear whether she has already had the biopsy. He cannot reach her on the first try. Feeling uncomfortable about communicating about the biopsy in a message, Dr Moore simply notes in the answering machine that he will see her in the office in 2 days.

Five days before the phone message from Dr Moore (day 40), Ms Young receives a phone call from someone in the radiology department saying that they have decided she needs to return to them for an ultrasound-guided biopsy. She schedules the biopsy and has it performed between business trips, 4 days later (day 44). The results are sent to Dr Teggan, the surgeon, whom she revisits in 2 days (day 46) between her next business trips. The tests show an invasive cancer, and Ms Young is devastated. She has had this abnormality for several weeks and fears the time it has taken to make the diagnosis may threaten her range of treatment options and recovery. That fear is quickly buried by the volume of information she is given regarding choices for treatment, including lumpectomy plus radiation, mastectomy, and possible presurgical chemotherapy. Dr Teggan, the surgeon, recommends that Ms Young schedule appointments with both an oncologist and radiation therapist in order to work through all of her options. Ms Young leaves the office with the phone numbers to call and a sense that her life is getting much more complicated. She knows she has an appointment with Dr Moore in a day (day 48) and a busy week ahead with no time to schedule more appointments.

As the next day (day 47) progress Ms Young ponders her busy life and wishes she had set aside her work and made appointments more quickly. She begins to worry about being a burden to her family and friends. Who will help her and her husband keep the household functioning when she doesn't feel well enough to care for herself? She also wonders if she understood all she was told and whether it was a good decision to exclude family and friends from the doctor appointments. She did not have anyone record what the surgeon was saying, and she did not ask all the additional questions that are now popping up in her head. She suddenly feels isolated and alone. It seems like a long time until her appointment with Dr Moore the next day.

Timeline

Day 1: Appointment with Dr Moore; sticky note about missed mammogram placed on record.

Day 1 end: Dr Moore finds the sticky note; adds an order for the mammogram online; places at nurse's station.

Day 2: Nurse notes the referral and faxes it to the radiology clinic.

Day 3: Nurse calls Ms Young and leaves a message.

Day 5: Mrs Young calls back; places a follow-up call to Dr Moore's office to clarify who makes appointment.

Day 8: Ms Young calls the radiology clinic and makes an appointment for a mammogram in 2 weeks.

Day 22: Mammogram appointment.

Day 25: Ms Young is called by someone at the radiology office and informed of abnormal mammogram.

Day 25: Ms Young makes an appointment for additional evaluation at radiology center (day unclear; it would be day 22 if she made the appointment the day the radiology representative called).

Day 36: Ms Young is seen in the radiology office for an ultrasound.

Day 37: Ms Young receives a phone call from radiology asking her to return for biopsy.

Day 37: Ms Young calls Moore's office and makes appointment for 10 days later (day 47).

Day 44: Ms Moore has biopsy.

Day 45: Dr Moore tries to call Ms Young but leaves a voicemail.

Day 46: Ms Moore sees Dr Teggan, the surgeon, and is told she has cancer.

Day 48: Date of the appointment with Dr Moore.