Clinical practice guidelines are an important result of evidence-based research. However, current clinical practice remains out of step with the rapid pace of research advancements. Often, decades pass before research is translated into clinical practice. The National Comprehensive Cancer Network (NCCN) has created evidence-based clinical guidelines to promote effective clinical practice. Formerly, the NCCN established guidelines to reduce cancer-related infections only for neutropenic patients; however, they have expanded their guidelines beyond neutropenia to prevent and treat cancer-related infections. Implementing scientific evidence into clinical practice is challenging and complex, and healthcare professionals should understand barriers to implementing clinical practice guidelines to ensure successful translation into practice. This article provides a brief review of NCCN guidelines and describes common barriers encountered during implementation. In addition, a conceptual framework is offered to help identify and address potential concerns before and after adoption of guidelines.

Translating scientific evidence into clinical practice remains challenging and complex. According to Bach (2005), evidence-based practice (EBP) in the care of the general population is provided only 50% of the time. In cancer care, best practice is provided only 66% of the time (Browman, Makarski, Robinson, & Brouwers, 2005). Current clinical practice remains out of sync with the rapid pace of research advancements. An estimated 17 years are needed before research is implemented into clinical practice; the translation of research into sustainable improvements in clinical practice remains a major obstacle toward improving patient outcomes (Chesla, 2008). Major health organizations and research agencies have focused their efforts on dissemination and translational research (Kerner, 2006; Minasian et al., 2010; Rabin, Brownson, Haire-Joshu, Kreuter, & Weaver, 2008).

David Sackett, MD, a pioneer of evidence-based medicine, characterized EBP as integrating individual clinical expertise and the best evidence to guide mutual decision making and patient preference (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). Clinical practice guidelines are an important result of evidence-based health care that create a scientifically researched foundation to achieve consistency, efficiency, effectiveness, quality, and safety in providing care (Moore, 2009). However, the guidelines are a knowledge tool to assist in clinical decision making and are not intended to take its place.

In addition to improved patient care, concerns for the high cost of quality cancer care and variations in practice are significant factors driving development of clinical practice guidelines (Bach, 2007; Foster, Abdolrasulnia, Doroodchi, McClure, & Casebeer, 2009; Romanus et al., 2009; Soper, 2009). Escalating costs of care have caused payers to pursue ways for standardizing care, increasing predictability, and decreasing costs by support and use of clinical guidelines in an effort to improve outcomes for all stakeholders (Shaffer, 2009). Some payers are linking reimbursement for oncology therapies coverage to provider compliance of established clinical practice guidelines (Soper, 2009). Despite compelling advances in guideline development, one should be mindful of the reality that the full impact of guideline implementation in a community-based oncology practice has not been measured. Unfortunately, efforts to translate rigorous high-quality research into clinical practice too often are met with only partial adoption or failed adoption into practice (Bradley et
al., 2004; Shaffer, 2009). Closing the gap between what is known through research and what is used in daily practice remains elusive. The purpose of this article is to describe the challenges frequently encountered when implementing clinical guidelines and to propose a theoretical framework useful in directing the dissemination process.

Cancer-Related Infections

Cancer is a leading cause of death worldwide. The American Cancer Society and LIVESTRONG (2010) estimated that cancer has the greatest economic impact from premature death and disability. Cancer-related infection contributes significantly to morbidity and mortality and causes delays in cancer treatment and dose reductions, impacting the success of treatment, as well as survival (Lyman, 2009; Mohammed et al., 2011; Segal et al., 2008). Practitioners are challenged with unique complexities in the prevention, diagnosis, and treatment of cancer-related infections.

The scope of cancer-related infections are complex, given the heterogeneity of patients with cancer and their susceptibility to infection because of the nature of malignancy and treatment (Segal et al., 2008). Patients with cancer can have multiple risk factors that contribute to the net state of immunosuppression. The risk factors include, but are not limited to, underlying disease or tumor burden, disease-related and chemotherapy-induced neutropenia, immunosuppressive therapeutic agents, mucosal barriers breached, implantable devices, stem cell transplantation or graft-versus-host disease (GVHD), renal or hepatic insufficiency, splenectomy or functional asplenia, nutritional status, performance status, and comorbid conditions (National Comprehensive Cancer Network [NCCN], 2011). Research continues to show that the epidemiology of cancer-related pathogens have changed dramatically since 1990 and multidrug-resistant organisms are a serious problem (Maschmeyer & Haas, 2008; Tamma & Cosgrove, 2011). The high prevalence of cancer-related infection in the cancer population has significant epidemiologic impact for the broader population as well (Hamburg, Levi, Elliott, & Williams, 2008). Current research has identified knowledge gaps demonstrating inadequate prophylactic strategies, inadequate or inappropriate antimicrobial therapy, and improper infection control practices (Dellit et al., 2007; Tamma & Cosgrove, 2011).

Guidelines for Cancer-Related Infection

NCCN is a not-for-profit alliance of 21 leading cancer centers in the United States and is a source of authority for evidence-based, high-quality cancer care (NCCN, 2011). NCCN has created numerous evidence-based clinical guidelines to promote effective clinical practice. Previously, NCCN established guidelines to reduce cancer-related infections specifically for neutropenic patients. Although neutropenia remains a key risk factor for infections, other cancer non-neutropenic immunocompro-
expectancy. Conflicts in clinical practice recommendations between multiple evidence-based guidelines devalue their use simply because of confusion (Fervers et al., 2005; Friedman et al., 2009; Zafar et al., 2010). Although similar strategies are used in guideline development, many guidelines on the same topic may have variable quality and duplication that could be avoided if existing guidelines are improved (Fervers et al., 2006; Pentheroudakis, Stahel, Hansen, & Pavlidis, 2008). This has prompted the development of the AGREE (Appraisal of Guidelines Research and Evaluation) instrument, an international endeavor for assessing and improving the quality of practice guidelines (Brouwers, Kho, et al., 2010). The lack of up-to-date guideline recommendations is another common user complaint (Somerfield et al., 2008). Guidelines also need to be adaptable to the local context of use across clinical settings and fit within existing models of delivery (Harrison, Legare, Graham, & Fervers, 2010; Zafar et al., 2010).

**Knowledge translation:** A common barrier among healthcare providers is lack of awareness. Unfortunately, research suggests publication and dissemination of research through continuing medical education for awareness and knowledge has not been translated into consistent clinical practice changes (Kerner, 2006). To promote the translation of scientific evidence into practice, some understanding of the adoption process that recognizes basic science of human cognition in expert learning is necessary. However, the understanding of how adoption takes place remains poor (Green & Seifert, 2005). Consistent application of guidelines requires a learning curve over time, which must be considered when planning an implementation initiative.

**Interchange between producers and users:** Clinical practice guidelines must be meaningful and usable. A two-way flow of information between the producers of knowledge and the users of knowledge is a critical factor (Baumbusch et al., 2008; Browman et al., 2005; Minasian et al., 2010). Responsiveness from experts providing rigorous evidence-based research and the contributions from experienced clinicians must be blended to produce relevancy for guideline use in the context of clinical circumstances seen in daily practice. That not only improves guidelines, but facilitates their ultimate adoption and integration into practice (Browman et al., 2005).

**Healthcare environment and organizational infrastructure:** Currently, clinicians are in the midst of a systemic healthcare crisis while simultaneously trying to provide high-quality health care. They are bombarded with massive amounts of available guidelines and research data, multiple complex healthcare choices, navigation through convoluted administrative healthcare delivery systems, changing regulatory burdens, and constrained financial resources (Fervers et al., 2005; Minasian et al., 2010). Additional organizational barriers are met when any type of change is introduced within an organization. Therefore, appraisal of the organizational cultures’ readiness for change is a critical factor when trying to implement change in practice or process (Gale & Schaffer, 2009). Clinicians and administrators who are dedicated to translating research into practice, are open to changes in their organizational culture, have the ability to coordinate changes across disciplines or departments, and possess strong clinical leadership can overcome those organizational barriers (Bradley et al., 2004; Gale & Schaffer, 2009). Resources of the adopting organization and the degree to which people believe that innovation improves the immediate and significant pressures in their environment also are key factors (Bradley et al., 2004).

**Implementation process:** Based on systematic reviews, interventions to implement clinical practice guidelines on average impact process and outcomes with only a modest effect of about 10% (Brouwers, Stacey, & O’Connor, 2010). In addition, literature suggests the overall benefit and compliance with guideline use is variable and dependent on factors such as the characteristics of clinicians, guidelines, and health systems; the clinical intervention chosen; and specific implementation strategies used to implement the guidelines (Chesla, 2008; Gurses et al., 2010; Hoomans, Ament, Evers, & Severens, 2011). Those factors can occur singularly or in combination. Based on what rigorous research has demonstrated and what is actually being delivered to patients, those standards have yet to filter into the delivery of cancer care (Minasian et al., 2010; Zafar et al., 2010). In summary, significant barriers remain prevalent when attempting to implement guidelines. However, with careful assessment for recognizing those barriers unique to a particular practice setting followed by an appropriate plan, successful implementation can be accomplished.

### Implementing Clinical Guidelines in Cancer Care

Implementing clinical guidelines in everyday practice is challenging. Adoption of an innovation requires understanding of the adopter and the organizational culture. Application of a system theory may provide useful evaluation for an effective approach within an organization. An analysis assessing strengths, weaknesses, opportunities, and threats (SWOT) offers a strategy for implementing the innovation unique to a particular practice environment (Internet Center for Management and Business Administration, 2010).

No standards have been established to measure or analyze the capacity to implement guidelines. Assessing the implementation potential should consider the transferability of guidelines, feasibility, and cost-benefit ratio (Polit & Beck, 2008). The Guideline Implementability Appraisal (GLIA) tool may be helpful to evaluate the extent to which specific guideline recommendations are implementable (Brouwers, Kho, et al., 2010). GLIA provides useful elements that analyze the capacity to implement guideline recommendations within a clinical setting. Several elements in the GLIA tool assess the extent for which recommendations are implementable. Important elements include validity of recommendations, decision-making clarity for execution, impact on process of care, succinct formatting, end points for identification of implementation outcomes, and flexibility of recommendation to include alternatives (Brouwers et al., 2010). Computability...
is a significant and timely element of the GLIA tool, relating to electronic information systems and whether guideline recommendations can be operationalized (Brouwers, Stacey, et al., 2010). As electronic health records (EHRs) become more prevalent in the workplace, a key issue will be whether guidelines can be formatted and threaded into EHRs for easy access and use. Guidelines formatted for mobile devices can significantly contribute to improved access and user-friendliness.

Guideline implementation requires planning. A conceptual framework is useful in providing the necessary foundation in which to develop a plan for implementation. Several conceptual models are suggested in the literature, and many are based on the seminal work of Rogers’ (2003) Diffusion of Innovations. A collaborative model of knowledge translation between research and practice in clinical settings developed by Baumbusch et al. (2008) describes sharing emerging research in real time through developing and implementing knowledge translation initiatives for transformative practice. Literature suggests the most commonly used theories for dissemination and implementation include organizational change, individual and organizational decision making, communication-persuasion theories, the RE-AIM (reach, adoption, implementation, and maintenance) framework, and diffusion of innovations (Rabin et al., 2008). These most commonly used theories and conceptual models for dissemination and implementation provide rationale and guidance regarding the interpersonal and environmental forces involved when approaching change to introduce an innovation (Polit & Beck, 2008).

Frameworks for Guideline Implementation

The concept of diffusion of innovations has long endured as a classical theoretical model useful for infusing new ideas of changing the status quo in an organization. In addition, that theory has been proposed to be evolving into a science of dissemination (Dearing, 2008). Using dissemination science with respect to practitioners as adopters requires recognition that implementing an innovation is a process affected by multiple organizational and organizational-environmental variables (Dearing, 2008).

Rogers’ (2003) classical paradigm of diffusion of innovation provided the framework guiding this research project. The theory conceptualizes innovations as being communicated through certain channels among members of a social system over time (Rogers, 2003). Components of those communication channels in the innovation-decision process include knowledge of the innovation, persuasion, decision, implementation, and confirmation (Rogers, 2003) (see Figure 1). An individual (or other decision-making unit) passes through the following stages: knowledge of an innovation, forming an attitude toward the innovation, making a decision to adopt or reject, implementation of the new idea, and finally, confirmation of the decision (Rogers, 2003). Attributes of an innovation that are likely to influence the speed of its adoption are relative advantage, compatibility, observable outcomes, commitment of adopters, and complexity of innovation. The relative advantage and compatibility are most important in influencing adoption rates, whereas complexity negatively correlates with the rate of adoption (Dearing, 2008; Rogers, 2003).

Bradley et al.’s (2004) conceptual framework can provide an organizational construct to implement those guidelines into practice. It describes factors that speed the rate of adoption of innovations within an organizational structure. Those include the innovation, adopting organization, external environment, and dissemination infrastructure (Bradley et al., 2004) (see Figure 2). Best practices identified to facilitate translation of innovations in clinical practice are strong senior management, clinical champions, simple methods, expectation of longer diffusion process when organizational culture or interdepartmental collaboration is required, plan for sustainability at the start of diffusion process, and anticipation of changes.

Knowledge
- Decision-maker characteristics: Socioeconomic, personality, and communication behavior
- Decision maker is exposed to an innovation’s existence and gains understanding of how it works.

Persuasion
- Perceived characteristics of innovation; relative advantage, compatibility, complexity, trialability, and observability
- Decision maker forms favorable or unfavorable attitudes toward the innovation, becomes psychologically involved.
- Past experiences affect attitude toward innovation.

Decision
- Decision maker engages in activities (i.e., partial trial of innovation)
- Leads to choice to adopt or reject the innovation

Implementation
- Decision maker uses innovation and overt behavior change occurs.
- Seeks information, thinks about what problems might occur, and seeks support putting innovation in place

Confirmation
- Decision maker seeks reinforcement of an innovation decision already made.
- Reverses a previous decision to adopt or reject the innovation if exposed to conflicting messages about the innovation.
- Decision maker seeks to avoid state of dissonance.

FIGURE 1. Stages in the Innovation Decision Process

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One Institution’s Experience

The frequent occurrence of cancer-related infections and resultant delays in chemotherapy treatment, frequent hospitalizations, and observed disparities in the clinical approach for prevention and management were key motivating factors to initiate an evidence-based project in a community oncology practice. The NCCN (2011) guidelines for the prevention and treatment of cancer-related infections were chosen because of their broad base of clinical consensus. Discussion with colleagues elucidated areas for practice improvement in the prevention, diagnosis, and treatment of cancer-related infections. That discussion provided opportunities to share observations from all providers and move forward with a practice improvement plan. A SWOT analysis, as described previously, was undertaken to identify factors (e.g., barriers and supports) critical to the development of an implementation strategy. Components from several conceptual frameworks including system theory, Bradley et al.’s (2004) factors determining rate of adoption of research innovations into practice, and Rogers’ (2003) diffusion of innovation were adapted for the development of a plan that could be used within the existing infrastructure.

Implementation of the NCCN guidelines and clinical outcomes were compared before and after the nurse practitioner-led intervention. Guideline implementation improved postintervention, along with infection-related outcomes. However, some incongruities existed among clinicians regarding implementation for some of the guideline components, and some infection-related outcomes did not reach statistical significance. That discordance of use and outcomes may have been related to factors such as disagreement with guideline recommendations, guideline clarity, ease of use, or time in the learning curve for new information and the clinical application process. Those complexities provide rich opportunities for further study to understand the process of guideline usage, knowledge translation, and clinical application for practice improvement.

Conclusions

Guidelines can be conceptualized as a knowledge translation tool that can enhance awareness of current scientific advances underpinning EBP. Critical implications for the prevention and treatment of cancer-related infection exist to improve health during cancer treatment, prevent infectious complications, reduce treatment delay or dose reduction, and prevent hospitalizations for successful outcomes. Those implications can have a significant impact on cancer morbidity and mortality. When used in daily practice, guidelines provide practitioners the unique ability to evaluate their effectiveness in improving patient outcomes, provide input to improve on existing guideline recommendations, and can reduce healthcare costs.

Numerous challenges exist in achieving EBP for optimal outcomes. The resistance to change is inherent in many organizations. Thoughtful planning and preparation within an organization are essential to overcoming organizational resistance. Successful implementation of guidelines requires understanding of a healthcare organization’s existing infrastructure, the organization’s mission, financial resources, cultural behaviors, the willingness and needs of clinicians, and support staff involved to identify potential barriers (both organizational and social) unique to that clinical setting prior to implementation. A two-way flow of information needs to exist between research and actual clinical practice to facilitate an EBP change; in addition, information must flow within and across the organization to implement that change. Organizations need to be receptive to suggestions, concerns, and creative ideas from all individuals to facilitate the implementation of
innovation by the actual adopters within the organization. Identifying key stakeholders and those who hold informal leadership attributes prior to implementation will facilitate the foundation of disseminating practice changes. Understanding the processes involved in diffusion of innovations within an organizational culture may be the most important factor to consider when implementing clinical guidelines to achieve best practices for best outcomes.

References


