### A Rapid Evidence Assessment: The Perceptions of Automated Self-Scheduling by

### Acute Care Nurses

by

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#### **Executive Summary**

Health care organizations (HCOs) are confronting and will continue to face nursing shortages. These continued shortages "reflect fundamental changes in population demographics, career expectations, work attitudes and worker dissatisfaction" (American Hospital Association, 2002, p. 2). To retain and successfully recruit nurses, HCOs must create structures and work environments that empower and support nurses (Laschinger & Finegan, 2005).

The clinical areas that must be staffed by critical care nurses are significantly impacted by the current nursing shortage. This internal shortage is due in part to the expansion of services, particularly within interventional radiology. To address this shortage, the nursing leadership, in their commitment to creating healthy work environments and improving the quality of work life for their nurses, has expressed an interest in learning about automated self-scheduling. MacPhee and Borra (2012) have reported that flexible work options, which include self-scheduling, are associated with nurse retention and job satisfaction.

A rapid evidence assessment (REA) and environmental scan was conducted to learn what nurses perceive to be the strengths, weakness, opportunities, and threats of automated self-scheduling. The literature related to nurses reported perceptions of the strengths, weaknesses, opportunities, and threats were scarce and what was found was judged to be of low evidence. The environmental scan was limited to interviews with three nurses involved with manual self-scheduling. The literature included four articles of nurse leaders reporting on the planning, selecting, training, and implementation of an automated self-scheduling system. The benefits of implementing automated self-

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scheduling included significant cost savings, more efficient and effective staffing and scheduling, time freed for managers to focus on other important issues, increased nurse and patient satisfaction, and better nurse retention and recruitment. Although nurses involved with automated self-scheduling were unable to be located, the environmental scan included interviews with three nurses involved in manual self-scheduling. These nurses were able to report their views of self-scheduling, which highlighted the importance of nurses having control over their work schedules, as it provided them with flexibility in their schedules and gave them a better home and work-life balance. These findings correlated to the literature on manual self-scheduling.

Despite the limitations of the REA and environmental scan, automated selfscheduling does have merits for point of care nurses, nursing leadership, the organizations and patients. This report presents the following recommendations to nursing leadership to facilitate their decision making related to automated self-scheduling for their critical care nursing staff:

- 1. Invest in automated self-scheduling software that can be piloted in a select number of units and eventually spread throughout the organization.
- 2. Work with the provincial nurses' unions.
- 3. Openly share the data reports generated from the self-scheduling software with staff to gain efficiencies and effectiveness in business and staffing and scheduling practices as well as to engage and improve communication between and amongst all stakeholders.

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#### **Chapter 1: Defining the Issue**

Health care organizations (HCOs) have faced many nursing shortages in the past; however, the current shortage is different. This nurse shortage will not be short term, and it will continually worsen (Aiken et al., 2001; Duffield & O'Brien-Pallas, 2002). Caregiver and support personnel shortages "reflect fundamental changes in population demographics, career expectations, work attitudes and worker dissatisfaction" (American Hospital Association, 2002, p. 2). Furthermore, HCOs continue to focus on adopting adaptations of industry productivity improvement models, rather than responding to nursing concerns (Aiken et al., 2001). An example is the deskilling of the nursing workforce to contain costs and the expectations for nurses to be multiskilled, which impacts nurses' confidence and satisfaction with their work, contributing to a poor work environment and resulting in decline in quality patient care (Duffield & O'Brien-Pallas, 2002). To retain nurses, Aiken et al. (2001) advised HCOs to develop "personnel policies and benefits comparable to those in other lines of work and businesses, including opportunities for career advancement, lifelong learning, flexible work schedules, and policies that promote institutional loyalty and retention" (p. 51). Additionally, in their study on fostering respect in the workplace, Laschinger and Finegan (2005) found creating structures in HCOs to empower nurses and cultivate supportive environments are effective strategies for nurse recruitment and retention and result in trusting and respectful working relations.

To further emphasize the issue, in December 2015, Rourke reported that the British Columbia Nurses Union declared a serious nurse shortage crisis comprised of over 1,000 vacancies and emphasized a shortage of specialized nurses, including those in

critical care. In response, the British Columbia (BC) Ministry of Health indicated its willingness to implement strategies such as improved recruitment of foreign nurses and providing investment dollars to educate specialty nurses.

#### The Issue Contextualized

This study was undertaken for a large academic and research-orientated urban tertiary care HCO, recognized globally for research and excellence in care of cardiac, renal, addictions, human immunodeficiency virus (HIV), and acquired immune deficiency syndrome (AIDS) patient populations, many of which are frail and/or vulnerable, are experiencing a critical shortage of critical care nurses. Within its two acute care hospitals the HCO currently includes five intensive care units, two postsurgical recovery areas, a high acuity unit providing care 24 hours each day of the week, and as many as four cardiac and one respiratory interventional radiology outpatient procedures areas providing services 6 days per week. The nurses in these units and outpatient procedures areas must specialize in critical care.

The HCO is competing for critical care nurses with two other large teaching and research institutions, as they both have similar care areas. The nursing leadership determined they needed a plan to enhance their retention and recruitment of critical care nurses. Informed by (a) the American Association of Critical-Care Nurses (n.d.) standards for establishing and sustaining healthy work environments, which were developed in response to research findings that healthy work environments are linked to "patient safety, nurse retention and recruitment"; (b) research related to nurses' quality of work life, indicating that dissatisfaction with autonomy was one of the main reasons why nurses left their jobs (Kutney-Lee, Wu, Sloane, & Aiken, 2013); as well as (c) feedback

from their critical care nursing staff, the nursing leadership agreed to focus on initiatives to create healthy work environments and to improve the quality of work life for their nurses. In a further exploration of the literature, the nursing leadership found,

Nurses want substantive work and they want to balance their many work-life responsibilities. Flexible work options, particularly those reflecting the voluntary choices of nurses, are associated with nurses' greater job satisfaction, organisational commitment and intent to stay. (MacPhee & Borra, 2012, p. 5)

MacPhee and Borra (2012) affirmed the notion that nurses' view the option to choose their work schedules as one of the most important aspects of a healthy work environment. These authors also identified many types of flexible scheduling practices, including self-scheduling and rostering, which they defined as

the process that nurses use to collectively plan and implement their work schedules, typically on a monthly basis. This process requires line manager involvement and scheduling rules and guidelines to address organisational and employee needs. (p. 45)

Supported by this evidence combined with the HCO leadership's experience of a small group of nurses in one of their intensive care units that had engaged in manual self-scheduling, the nursing leadership expressed an interest in learning more about nurses' perceptions of automated self-scheduling.

### Purpose

The aims of this paper were to (a) conduct on a rapid evidence assessment in order to learn the strengths, weaknesses, opportunities, and threats of electronic selfscheduling as reported by nurses who have been involved with electronic self-scheduling

in an acute care hospital inpatient clinical area and (b) undertake an environmental scan within BC to ascertain the strengths, weaknesses, opportunities, and threats of manual or electronic self-scheduling as reported by nurses who have been involved with manual or electronic self-scheduling in an acute care hospital inpatient clinical area. The findings along with recommendations will be provided to the critical care nursing leadership to facilitate their decision making related to automated self-scheduling for their critical care nursing staff. The following sections describe how I formulated the research question.

#### **Formulating the Research Question**

To formulate the research question, I referred to Government of the United Kingdom, Civil Service (2006) *Rapid Evidence Assessment Toolkit*. This government agency recommended researchers determine if the question is an impact or nonimpact question. To facilitate the process the toolkit provided questions to consider (United Kingdom, Civil Services, 2006). The toolkit provides a PICO format to guide the deconstruction of the concepts within the question and the thinking required for researchers to uncover what it is they wish to learn (United Kingdom, Civil Services, 2006). Within the PICO framework the toolkit describes what each letter represents: *P* represents the population of interest, *I* represents the intervention, *C* represents the comparator, and *O* is the outcome (United Kingdom, Civil Services, 2006).

# Table 1

PICO Format of Question

Abbreviation	Description
Р	Nurses in acute care hospitals who have been involved with self-scheduling
Ι	Automated self-scheduling
С	No comparator
0	Strengths, weakness, opportunities, and threats of electronic self-scheduling

### **The Research Question**

The research question for my rapid evidence assessment (REA) was as follows:

What are the strengths, weaknesses, opportunities, and threats associated with electronic

self-scheduling?

#### **Chapter 2: Methods**

To explore the research question, I applied a REA process and an environmental scan. In the following sections I provide a description of the REA process, followed by steps taken to conduct the environmental scan.

#### **Rapid Evidence Assessment**

The REA process enables researchers to obtain a quick overview of existing literature on a defined topic (Government of the United Kingdom, Civil Service [UK Civil Service], 2009). Additionally, a REA is systematic, rigorous, and explicit in methodology; within the REA, literature is searched and analyzed to support quicker evidence-informed decisions related to policy and/or practice. I used the REA process described by the UK Civil Service (2009) to guide the literature search and analysis.

A REA differs from a traditional systematic review, as it limits aspects such as time, resources utilized (peer reviews), and the sources searched for literature (UK Civil Services, 2009). In addition, Hartling et al. (2015) expressed concerns related to "rapid reviews" (p. 17) due to their often "narrow and/or a limited selection and review of the literature" (p. 17). Harling et al.'s concerns included the risk of missing evidence, limited thought processes of authors due to limited timelines and evidence, and the risk of users mistaking a REA for a full systematic review. However, despite these concerns and the fact that the authors found differences in methods between rapid and full reviews, scholars did not oppose "essential conclusions" (Hartling et al., 2015, p. 18) derived from REAs.

#### **Search Strategy**

After consulting with the University of British Columbia medical librarian, I searched the databases Cumulative Index to Nursing and Allied Health (CINAHL), PubMed, and Web of Science for literature to be included in the REA. The filters applied during the searches included the English language, for my readability, and were restricted to the time period from 2006 to 2016 for relevancy to the current health care context and technological trends as well as to provide a sufficient sampling of studies and articles to screen for selection. The PubMed search was also filtered to retrieve only articles that included studies using humans.

The CINAHL database was searched utilizing Boolean or phrase search modes and expanders. The search terms used included the CINAHL subject headings personnel staffing and scheduling or personnel staffing and/or the keywords self-scheduling, electronic self-scheduling, self-rostering, automated self-scheduling, e-self-scheduling; the keywords nurse and self-rostering, or automated self-scheduling, or electronic selfscheduling or computerized self-scheduling, self-rostering or scheduling; and the keywords computerized self-scheduling and nursing, or self-scheduling.

I searched the PubMed database utilizing Boolean/phase and the following medical subject headings: personnel staffing and scheduling and personnel staffing and the keyword self-scheduling, the keywords and/or search terms nurse and self-scheduling, personnel staffing and electronic self-scheduling or self-rostering, personnel staffing and scheduling and e-self-scheduling, nurse and electronic self-scheduling, nurse and selfrostering, self-rostering, electronic self-scheduling, computerized staff scheduling, personnel staffing and scheduling and scheduling information Systems\*.

I searched the Web of Science data base using Boolean/phrase and the search terms and/or keywords personnel staffing and scheduling, personnel Staffing and selfscheduling, nurse and self-scheduling, personnel staffing and electronic self-scheduling or self-rostering, "personnel staffing and scheduling" and "automated self-scheduling," "personnel staffing and scheduling" and e-self-scheduling, nurse and e-self-scheduling, personnel staffing and scheduling, nurse and self-rostering, nurse and automated selfscheduling, nurse and electronic self-scheduling, nurse and computerized and selfscheduling, personnel staffing and computerized and self-scheduling, nursing and computerized and scheduling, computerized self-scheduling and nursing, nursing and computerized and self-scheduling, personnel staffing and computerized and selfrostering, nursing and computerized and scheduling, computerized self-scheduling and nursing, personnel Staffing and automated self-scheduling or automated self-rostering, personnel staffing and computerized self-scheduling or computerized self-rostering, nursing and computerized self-scheduling or computerized self-rostering, nursing and electronic self-scheduling or electronic self-rostering, self-rostering, self-scheduling.

### Search Results and Study and Article Screening

Within the literature, I reviewed a total of 869 abstracts and/or titles: 378 from CINAHL, 107 from PubMed, and 384 from Web of Science. I retrieved or requested a total of 100 papers from the University of British Columbia library sources for scanning. After scanning the papers, I excluded 69 reports, as they did not include the intervention of self-scheduling or were duplicates, leaving 31 papers that I identified for a complete read, as they included scheduling. Of those papers, I chose four to appraise the quality of the evidence. In total, I excluded 27 papers: fourteen were duplicates; one paper was a comparison of two self-scheduling software programs; nine papers did not specify a

population inclusive of nurses; one paper did not deal with self-scheduling; and two

papers did not discuss electronic self-scheduling.

#### **Study and Article Selection**

The four papers I selected for this REA were based on the inclusion criteria listed

in Table 2. I excluded all other studies and articles, including all review articles.

Table 2

Study and Article Selection

Inclusion Criteria

Written in English.

Published between January 2006 and June 2016.

Retrievable online or through the University of British Columbia library request article services in electronic format.

Setting: acute care hospital.

Intervention: nurse electronic self-scheduling.

Outcome: nurse identified strength, weakness, opportunity, or threat related to the intervention.

Quality of evidence appraisal result of low or greater.

#### **Appraisal Tools for Quality of Evidence**

I appraised the selected articles utilizing the tools recommended in the REA

toolkit (UK Civil Service, 2009), which included the following assessments: weight of

evidence (WoE) criteria for all articles (Gough, 2007), the Maryland Scale of Scientific

Methods (MSSM) for quantitative studies (Sherman, Gottfredson, MacKenzie, Eck,

Reuter, & Bushway, 1998), and the Critical Appraisal Skills Programme (CASP) for the

qualitative studies (Government of the United Kingdom, Public Health Resource Unit, 2006).

Developed by the Evidence for Policy and Practice Information and Co-ordinating Centre, the WoE criteria (Appendix A) is a framework for assessing quality and relevance that is organized into three dimensions, A, B, and C (Gough, 2007; UK Civil Service, 2009). These three are then combined into dimension D—the overall WoE judgement (Gough, 2007; UK Civil Service, 2009).

I used the MSSM (Appendix B) to classify the strength of study methodologies based on a 5-point scale (UK Civil Service, 2009). Sherman et al. (1998) initially developed this scale for use in the review of crime prevention interventions. However, due to the generic qualities of the tool, it can be applied across all social sciences and health sciences (Sherman et al., 1998; UK Civil Service, 2009).

The CASP tool was developed by the National CASP Collaboration for Qualitative Methodologies (Government of the United Kingdom, Public Health Resource Unit, 2006), especially for novice researchers. This tool is comprised of 10 questions that are used to guide assessment of the rigour, credibility, and relevance of qualitative studies (Government of the United Kingdom, Public Health Resource Unit, 2006; Appendix C).

#### Analysis of Key Findings Across the Articles

The "SOFT" (Humphrey, 2005, p. 7) analysis framework (satisfactory in the present, opportunity in the future, fault in the present, and threat in the future) initially came out of unpublished research that took place at SRI between 1960–1970, which later evolved into the "SWOT" (p. 7) analysis (internal strengths, external opportunities, internal weaknesses, and external threats). Strengths and opportunities are factors that can

positively impact a project, group, program, or organization, whereas weaknesses and threats are external factors that can negatively impact a project, group, program, or organization (Ifediora, Idoko, & Nzekwe, 2014). Ifediora et al. (2014) stated that understanding these factors can facilitate future state planning, which includes connecting "objectives and strategies to actionable tactics" (p. 24). SWOT is the first step of a multistage change planning process (Humphrey, 2005). I used SWOT to identify and analyze the key reported strengths, weaknesses, opportunities, and threats across the papers.

#### **Environmental Scan**

Organizations must respond to the forces of change in their environment to thrive (Strubhar, 2011). For most organizations, including those in health care, environmental scanning is a component of strategic forecasting (Layman, Bamberg, Campbell, & Wark, 2010). Additionally, environmental scanning is a process of monitoring and assessing an organization's external environment to identify threats and opportunities, as well as analyzing internal environmental resources and capabilities to identify strengths and weaknesses. This process assists organizations to plan effective responses to the forces of change (Strubhar, 2011), which contributes improve organizational performance (Layman et al., 2010).

#### Participant Inclusion Criteria, Search, and Selection

In this study, only nurses who practice in BC and were participating in manual or electronic self-scheduling were eligible for an interview. All other nurses were excluded.

To obtain a good response rate, I arranged for a colleague to send email requests on my behalf to nursing leaders throughout the Province of BC. The email messages

provided background information and detailed the purpose for the request. I also sought participants through colleagues' professional networks.

I identified three acute care hospitals with nurses who participate in selfscheduling, along with a nurse contact at each hospital. I emailed each nurse contact to introduce myself and to explain the purpose of my graduate student project with respect to self-scheduling. Subsequently, three of the contacts agreed to meet me for an interview.

#### **The Interview Process**

Although this project was not an ethics-approved inquiry, I ensured interviewees that I would maintain their confidentiality. Before the start of each interview, I clarified any questions about my project and ensured interviewees' comfort with the process (e.g., taking written notes). Each interview was conducted using an informal iterative process; participants could provide information and I, in the role of interviewer, asked probing questions to gain a richer understanding of what each participant was saying. Appendix D includes my interview guide and questions. I took notes of participants' responses while conducting the interviews. I also informed each participant that he or she would receive a copy of the REA recommendations on completion.

#### **Chapter 3: Results**

I begin this chapter with a review of the papers. I then discuss the study quality appraisal, key cross-article reported outcomes and implications, as well as the results from the environmental scan.

#### Findings

My review of the literature revealed a sparse amount of published literature reporting one or more of the strengths, weaknesses, opportunities, and threats of electronic self-scheduling as described by nurses involved with electronic self-scheduling in acute care hospital inpatient clinical care areas. A total of four papers met my inclusion criteria. These papers are listed in Table 3 alphabetically by the primary author's surname.

Table 3

Author and Publication Date	Article Title	Journal
Alston (2007)	Automation + Scheduling = An Enterprise Win	Health Management Technology
Danello (2008)	Open Shift Management	Nursing Management
Siek (2008)	Superior Scheduling	Health Management Technology
Valentine, Hughes, Nash, and Douglas (2008)	Achieving Effective Staffing through a Shared Decision-Making Approach to Open Shift Management	Journal of Nursing Administration

Articles Included in the REA for Quality Appraisal and Analysis

The included papers are case histories. Although, case histories use a nonexperimental method, they provide a narrative descriptive report of a significant phenomenon that might be of interest to other practitioners (Madea, 2007). Madea (2007)

also pointed out that case reports do not pose questions; however, Yin (2009) noted that they answer questions of how and why. Madea (2007) used the terms case history and case report synonymously. In his discussion of case histories, Madea stated, "The study design of case histories is as simple as possible: it is just a description of special findings without comparison between different study groups" (p. 112). Case histories are appropriate for questions that "deal with operational links needing to be traced over time, rather than mere frequencies or incidence" (Yin, 2009, p. 9). Madea (2007) explained, "Case histories are the supposition for case series where comparable cases are summarized . . . interpretation and conclusions are only possible regarding previous case series" (p. 112). Furthermore, he noted that case histories are located at the lowest level of reliable research methods due to their subjective nature (Madea, 2007). Within the Oxford Centre for Evidence-Based Medicine – Levels of Evidence (Howick et al., 2009) and Glover, Izzo, Odato, and Wang's (2006) evidence-based medicine pyramid, which both depict the quality of evidence provided by research type, case studies and case reports are shown to be a Level 4 or 6, respectively, with only expert opinion being ranked lower (see also Walden University, n.d.). Yin (2009) discussed critiques of case studies (i.e. lack of rigour, randomization, generalizability) and the time they take as contributing to them being evaluated as a less desirable form of research. I believe these critiques might be equally applied to case reports.

#### **Study Quality Appraisal and Description**

I appraised the included papers using the tools recommended in the REA toolkit (UK Civil Service, 2009), which included the WoE framework (UK Civil Service, 2009) and the CASP tool (Government of the United Kingdom, Public Health Resource Unit,

2006). I present my appraisal using the WoE framework (UK Civil Service, 2009) in Table 4 and my analysis using the CASP Tool (Government of the United Kingdom, Public Health Resource Unit, 2006) is provided in Table 5. I created annotated bibliographies (Appendix E) for each of the included papers, which guided me in providing detail within the article descriptions.

Table 4

Studies Weight of Evidence: Appraisal

Citation	WoE A	WoE B	WoE C	WoE D
Alston (2007)	1/Low	1/Low	1/Low	3/Low
Danello (2008)	1/Low	1/Low	1/Low	3/Low
Siek (2008)	1/Low	1/Low	1/Low	3/Low
Valentine, Hughes, Nash, and Douglas (2008)	1/Low	1/Low	1/Low	3/Low

*Note*. WoE = Weight of Evidence.

### Table 5

### Studies CASP Tool Appraisal

	Source			
CASP Tool Question	Alston (2007)	Danello (2008)	Siek (2008)	Valentine et al. (2008)
Was there a clear statement of the aims of the research?	N/A	N/A	N/A	N/A
Is a qualitative methodology appropriate?	N/A	N/A	N/A	N/A
Was the research design appropriate to address the aims of the research?	N/A	N/A	N/A	N/A

	Source			
CASP Tool Question	Alston (2007)	Danello (2008)	Siek (2008)	Valentine et al. (2008)
Was the recruitment strategy appropriate to the aims of the research?	Yes, purposive sampling	Yes, purposive sampling	Yes, purposive sampling	Yes, purposive sampling
Were the data collected in a way that addressed the research issue?	N/A	N/A	N/A	N/A
Has the relationship between researcher and participants been adequately considered?	Director	CNO	CNO	The authors' affiliations are provided
Have ethical issues been taken into consideration?	N/A	N/A	N/A	N/A
Was the data analysis sufficiently rigorous?	N/A	N/A	N/A	N/A
Is there a clear statement of findings?	N/A	N/A	N/A	N/A
How valuable is the research?	All stud impleme includi	ies reported po entation of a so ng nurse partic	ositive nurse out ftware schedulin pipation in self-s	comes with ng program, cheduling.

*Note*. CNO = Chief Nursing Officer; N/A = not applicable.

Alston's (2007) case history did not follow a clear methodological design: there was no description of a study design, methods, or data analysis. Instead, Alston, a nurse director at Duke University in the United States (US), provided a brief overview of the planning, selecting, piloting, and implementation of an automated staffing and scheduling system called ActiveStaffer, a product of Informer Technologies (2016a). This automated system was implemented over a 2-year period, beginning in 2004 for Duke University, a three-hospital system in the Southeastern US. At that time, the automated system

provided baseline schedules for more than 3,000 in-house and agency staff. Alston's paper focused on training across diverse systems levels and staff with many educational and cultural backgrounds. At the end of the report, Alston summarized key goals attained through automated self-scheduling, such as successful management of nurse overtime; introduction of standardized staffing rules to determine appropriate staffing complements; improved communications across departmental levels and across different facilities; maintenance of up-to-date staffing rosters, including licensure and educational histories; and report generation for better organizational audits. Between 2004 to 2006, the replacement of a paper-based self-scheduling system with an automated one spread quickly—from 30% of employees to 80% of employees. As Alston stated, "By replacing the paper-based process, we have eliminated a wide range of staffing-related problems, such as scheduling errors and ineffectual use of costly agency workers" (p. 37). Alston also noted that an automated system freed up managers to focus on other more critical systems operations. This case history, therefore, did not use a formal research design or format; instead, it offered one nurse director's accounts of the roll-out of an automated self-scheduling system and its many advantages.

Danello (2008), the author of this case report, was the Chief Nursing Officer for St. Joseph's Candler in Savannah Georgia, US, a Magnet<sup>™</sup> hospital. At the time of her report, this hospital experienced significant problems staffing specific time periods, known as "open shifts." An automated, Internet-based self-scheduling program was implemented for unfilled open shifts. A special incentive system was put in place at the same time to better engage staff. The automated program was accessible to more than 700 nursing staff, widening the potential staffing pool. The reported outcomes of the Internet-based scheduling approach included improved employee (i.e., nurses and managers) satisfaction and morale, improved patient satisfaction scores, and positive nurse engagement (Danello, 2008). This report did not adhere to a classic research methodology, but it did provide details of one hospital's use of automated self-scheduling to better manage unfilled or open shifts.

Siek (2008) was the Chief Nursing Officer for Hays Medical Centre, a 194-bed hospital in Hays, Kansas, US. This case report was not based on a qualitative methods approach; instead, the report provided a description of how the medical centre executive leadership employed automated self-scheduling to optimize human resource utilization through efficient scheduling and to improve patient care effectiveness through easy-touse tools for staff. An additional bonus for management was the generation of human resource trending and productivity reports. The system selected for nursing and clinical support staff was ActiveStaffer and Payrollmation (Informer Technologies, 2016a, 2016b). At the time of this report, there were no measurable outcomes of implementing the automated self-scheduling system. As Siek stated (2008), "Although we have yet to conduct quantitative studies, we are convinced that nursing managers have saved a substantial amount of time by using automated staff scheduling" (p. 26). Siek also noted how automated systems provide rules that support better equity among nurses who often consider only their own staffing needs when selecting shifts. Although this report had no measurable outcomes to share, the administrative perspective to automated selfscheduling advantages were clearly delineated in this report.

In their case report, Valentine, Hughes, Nash, and Douglas (2008) described the implementation of open-shift management technology for a US Magnet designated three-

hospital system for 3,500 nurses to request offered unfilled shifts. The system allowed managers to offer online, unfilled shifts with related incentives to nurses on home units first and then to nurses across the hospital system. The aim of implementing an open-shift management technology was to enhance structure and provide an automated tool for the staffing and scheduling of unfilled shifts and to optimize open shift management, engage nurses, and improve their job satisfaction and work lives. The reported outcomes included improved staff satisfaction, productivity, human resource utilization, nursing work lives, costs, as well as recruitment and nurse retention (Valentine et al., 2008). This paper did not follow a qualitative research methodology; the report did, however, provide a blueprint for other administrators to implement a similar automated self-scheduling system.

#### **Key Cross Paper SWOT and Implications**

As noted above, these four case reports provided useful information despite their lack of formal research design and methodology. I created a SWOT matrix (see Table 6) to summarize key learnings from the experiences of nurse executive officers and administrators in the four US hospitals that employed automated nurse self-scheduling systems. In this section, I discuss the key similarities and differences next within the categories of strengths, weaknesses, opportunities, and threats.

### Table 6

Summary of Nurse-Identified SWOT Analysis of Electronic Self-Scheduling within the Included Papers of the REA

Internal Strengths	Internal Weaknesses
<ul> <li>Nurse satisfaction: accessibility to schedules and control (e.g., choice, flexibility, accountability, and responsibility).</li> <li>Standardization: scheduling practices fair and equitable.</li> <li>Communication: access to information, transparency, and collaboration.</li> <li>Efficiencies: Managers have more time for clinical issues, including monitoring and evaluation.</li> <li>Human resource utilization (appropriate): forecasting and trending of staff needs and patient changes (available informative data).</li> </ul>	<ul> <li>Staff engagement: resistance to change</li> <li>Poorly defined rules for self-scheduling</li> </ul>
External Opportunities	External Threats
• Recruitment of new staff from outside the organization	Obsolete software     programs

*Note.* REA = Rapid evidence assessment; SWOT = Internal strengths, internal weakness, and external opportunities, and external threats.

**Strengths.** The authors of all four papers identified nurse satisfaction and perceptions of control over staffing and scheduling practices to be key strengths of automated self-scheduling (Alston, 2007; Danello, 2008; Siek, 2008; Valentine et al., 2008). For point-of-care (POC) nurses, having choice in their work schedule allows them control over the hours, days, and shifts they work, which provides them with the flexibility they need to balance both their work and home lives (Alston, 2008; Danello, 2008; Siek, 2008; Valentine et al., 2008). For managers, a key strength included the efficiencies gained through the collaboration and sharing of responsibility and accountability for staffing and scheduling with POC nurses, freeing up time for them to focus on clinical issues (patient and staff needs) and other concerns (Alston, 2008;

Danello, 2008; Siek, 2008; Valentine et al., 2008). For example, the automated scheduling system provided information that facilitated appropriate staff utilization by providing reports related to staffing and scheduling; this saves managers time, enabling them to address other issues (Alston, 2007; Danello, 2008; Siek, 2008; Valentine et al., 2008). Another key strength was the standardization of staffing and scheduling practices enhanced nurses' and managers' perspectives of the entire staffing system, enabling them to see that related processes were fair and equitable (Alston, 2007; Danello, 2008; Siek, 2008; Valentine et al., 2008). Enhanced communication was another key strength reported in all fours papers (Alston, 2007; Danello, 2008; Siek, 2008; Valentine et al., 2008). Nurses in the four studies viewed the increase in communication to be due to the accessibility of information, which improved business and practice processes such as the ability to access the schedules online remotely for POC nurses, collaboration between POC and management within and between units and across facilities, and the transparency in the staffing and scheduling practices (Alston, 2007; Danello, 2008; Siek, 2008; Valentine et al., 2008).

Weaknesses. Valentine et al. (2008) and Siek (2008) identified staff engagement as a key weakness of automated self-scheduling. Valentine et al. reported encountering some resistance in the planning stage that the authors thought they had already resolved; these scholars also noted that, despite providing incentives for managers and staff to use the automated self-scheduling system, some continued to use the manual system. Valentine et al. found, for complete conversion to the use of the open-shift technology to occur, the initiative had to be mandated and monitored by senior leadership for a time. However, in time, all users became strong supporters of the use of the technology. Siek (2008) identified that with the move to an automated self-scheduling system nurses could not view the complete unit schedule, and thus the staff considered their own needs over those of the organization. However, this issue was quickly resolved with education and clearer rules being implemented to guide their scheduling preferences (Siek, 2008). Alston (2007) and Danello (2008) reported including policy development in the planning phase of the initiative.

**Opportunities.** All four papers noted potential recruitment advantages from using automated self-scheduling (Alston, 2007; Danello, 2008; Siek, 2008; Valentine et al., 2008). Valentine et al. (2008), for instance, noted significant reductions in vacancy rates of approximately 26% due to better recruitment and management of staffing schedules.

Threats. Of the reports reviewed, only Siek (2008) noted issues related to the expense and quick turn-over of electronic self-scheduling systems. Any type of electronic system requires a considerable investment of organizational funds; upgrades must be factored in to capital fund budgets when purchasing and implementing automated self-scheduling systems. There are considerable organizational threats, therefore, with respect to the plethora of vendors and self-scheduling systems to review, it is important for administrators and leaders to vet and review any adaptions needed to the hospital system. In addition, executive leadership needs to consider how their investment will be adapted and sustained over time.

#### **Environmental Scan**

I met with three BC nurses involved with self-scheduling. Unfortunately, I could not locate any nurses using electronic self-scheduling. Our interviews, therefore, were based on their perceptions of manual self-scheduling. The three interviewees work in

critical care settings in Lower Mainland Vancouver hospitals. At the time of this study, they had 8 to 22 years of experience. One nurse had been using manual self-scheduling for 20 years, and the other two nurses had used it for approximately 6 years. Each interview was approximately 30 minutes long, conducted during nurse work breaks on their work premises. I took notes and did not record our conversations. The interview guide may be found in Appendix D.

**Interview findings.** The three nurses felt strongly about the importance of selfscheduling, particularly their control over their schedules. They described how selfscheduling enabled them to have greater scheduling flexibility and, consequently, better work-life balance. One nurse stated how self-scheduling was critical to her because of her two small children's care needs. A notable finding from these interviews is that only a select number of nurses were permitted to self-schedule at any one time. In one case, only 43 nurses out of 250 nurses were allowed to self-schedule. All three interviewees, therefore, were in favour of expanding self-scheduling to all nurses (i.e., part and full time). Table 7 provides a modified SWOT of these nurses' identified internal strengths and weaknesses; these nurses were not able to speak to external threats or opportunities given their focus on self-scheduling within their respective self-scheduling groups.

# Table 7

Summary of Nurse-Identified Strengths and Weaknesses Analysis of Manual Self-

Scheduling Within the Interviews

Internal Strengths	Internal Weaknesses
<ul> <li>Flexibility</li> <li>Better work-life balance</li> <li>Equity, based on self-scheduling rules</li> </ul>	<ul> <li>Short time period: schedule must be completed 6 weeks in advance-</li> <li>Labour intensive with paper</li> <li>Difficult to accommodate everyone who wants to self-schedule</li> <li>Time intensive: the coordinator often does this scheduling on their own time.</li> </ul>

#### **Chapter 4: Discussion**

#### Limitations

The REA has limitations and an increased risk for bias. The literature search was limited to three databases, which were searched over a period of 8 weeks, and no additional sources for literature were searched, despite the low yield of published articles. These limitations to the search can create "uncertainty in the findings of the REA" (Hartling et al., 2015, p. 17). I, the author, conducted the literature search, the screening, selection, and appraisal of all studies and articles. No internal or external peer review was conducted. The literature search, paper selection, and appraisal being undertaken by one individual increases the risk of both publication and personal bias (Gough, 2007; Hartling et al., 2015; UK Civil Service, 2006). The environmental scan involved a small, convenience sample of three nurses: I was unable to locate any BC acute care nurses with automated self-scheduling experience. Their comments, therefore, were based on experience with manual self-scheduling.

#### **Conclusions and Recommendations**

The REA papers focused on administrative leadership perspectives of automated self-scheduling (Alston, 2007; Danello, 2008; Siek, 2008; Valentine et al., 2008), while the environmental scan component focused on nurses' perspectives. The greatest advantages to automated self-scheduling for leaders were cost-savings related to better management of nurses' schedules, such as reduction of unfilled gaps and "smoothing" of nurse schedules (i.e., decreased variability in meeting staffing needs over time; Alston, 2007; Danello, 2008; Siek, 2008; Valentine et al., 2008). Other advantages included better recruitment and retention, improved nurse and patient satisfaction, and operational

efficiencies that allowed nurse managers to focus on other systems issues besides staffing (Alston, 2007; Danello, 2008; Siek, 2008; Valentine et al., 2008). Although, the outcomes from the REA and the findings from the environmental scan had limitations, the nursing leaderships' views on automated self-scheduling were supported in the literature (Irvin & Brown, 1999; Vance, 2000). Additionally, nurses' perspectives on manual self-scheduling were well-supported in the literature (Bailyn, Collins, & Yang, 2007; Hung, 2000; Koning, 2014; MacPhee & Borra, 2012; Russell, Hawkins, & Arnold, 2012; Silvestro & Silvestro, 2000).

Based on the REA, the environmental scan, and the supporting literature, I conclude self-scheduling has benefits for POC nurses, nursing leadership, HCOs, and the patients they serve, and that automating the process of self-scheduling has the potential to enhance those benefits. However, it is clear that more published literature related to use of the automated self-scheduling in nursing is needed.

#### Recommendations

Automated self-scheduling has the potential to improve operational efficiencies for administrative leadership and to improve flexibility and work-life balance for nurses. Automated approaches have the capacity to include all nurses because, unlike manual self-scheduling, they are not limited to small groups of nurses at one time. They also have the potential to address some of the other "internal weaknesses" noted by the environmental scan, such as the labour intensive and time intensive problems with manual self-scheduling. A key recommendation for health care leaders and organizations, therefore, is to invest in automated self-scheduling software that can be piloted in a small number of units and eventually spread throughout the organization. Thoughtful planning, frequent communications among stakeholders, and manager and staff engagement throughout the process are important characteristics of successful implementation (Valentine et al., 2008). Planning needs to include a close evaluation of current staffing systems and practices to build on strengths that already exist.

Another recommendation is for health care leaders to work with the provincial nurses' union to ensure that collective bargaining agreements are respected during the development of self-scheduling rules and protocols. In unionized environments, stewards and labour relations officers need to be key stakeholders in the development, implementation, and evaluation processes.

Automated self-scheduling systems generate trending and productivity reports that need to be open and transparent—everybody can learn through data sharing and discussion. As noted in the REA papers, greater staff-manager engagement is a critical potential outcome from using automated systems that produce useful human resource data. Having collaborative, regular reviews and discussions of self-scheduling data may lead to greater appreciation by staff and management of broader staffing issues that impact patients, the organization, and nurses. Better data about staffing needs can also be leveraged as a way to target specific areas for recruitment and retention. Finally, because nurses want more flexibility and work-life balance, used of automated self-scheduling systems can be a real advantage to attract and retain nurses.

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<b>Weight of evidence A: Generic on quality of execution of study</b> Considering the quality of the study/article, e.g. coherency, accuracy, purpose, and methodology, can you trust the study/article results to answer the question(s) posed in the study?	High = 3 Medium = 2 Low = 1
Weight of evidence B: Review specific on appropriateness of method Is the research design and analysis of the study/article appropriate evidence to answer my REA question?	High = 3 Medium = 2 Low = 1
Weight of evidence C: Review specific on focus / approach of study to review question Does the focus/context/ethics of the study/article offer relevant answers to my REA question?	High = 3 Medium = 2 Low = 1
Weight of evidence D In view of the results of WoE A, B, and C, what is the overall assessment of the study/article in contributing to answering my study question?	High = 7-9 Medium = 4-6 Low = 3 or less

# Appendix A: United Kingdom Civil Service Weight of Evidence Scale

*Note*. REA = Rapid evidence assessment; WoE = Weight of evidence.

From "Weight of Evidence: A Framework for the Appraisal of the Quality and Relevance of Evidence," by D. Gough, 2007, *Research Papers in Education*, 22(2), 213–228. Copyright 2007 by D. Gough.

Level 1	Observed correlation between an intervention and outcomes at a single point in time. A study that only measured the impact of the service using a questionnaire at the end of the intervention would fall into this level.
Level 2	Temporal sequence between the intervention and the outcome clearly observed; or the presence of a comparison group that cannot be demonstrated to be comparable. A study that measured the outcomes of people who used a service before it was set up and after it finished would fit into this level.
Level 3	A comparison between two or more comparable units of analysis, one with and one without the intervention. A matched-area design using two locations in the UK would fit into this category if the individuals in the research and the areas themselves were comparable.
Level 4	Comparison between multiple units with and without the intervention, controlling for other factors or using comparison units that evidence only minor differences. A method such as propensity score matching, that used statistical techniques to ensure that the programme and comparison groups were similar would fall into this category.
Level 5	Random assignment and analysis of comparable units to intervention and control groups. A well conducted Randomised Controlled Trial fits into this category.

*Note*. From *Rapid Evidence Assessment Toolkit Index*, by the Government of the United Kingdom, Civil Service, 2006, London, United Kingdom: Queen's Printer. Copyright 2006 by Government of the United Kingdom.

### **Appendix C: CASP Tool: Screening Questions**

- 1. Was there a clear statement of the aims of the research?
- 2. Is a qualitative methodology appropriate?
- 3. Was the research design appropriate to address the aims of the research?
- 4. Was the recruitment strategy appropriate to the aims of the research?
- 5. Were the data collected in a way that addressed the research issue?
- 6. Has the relationship between researcher and participants been adequately considered?
- 7. Have ethical issues been taken into consideration?
- 8. Was the data analysis sufficiently rigorous?
- 9. Is there a clear statement of findings?
- 10. How valuable is the research?

*Note.* From *10 Questions to Help You Make Sense of Qualitative Research*, by the Government of the United Kingdom, Public Health Resource Unit, 2006, London, United Kingdom: Queen's Printer. Copyright 2006 by Government of the United Kingdom.

### **Appendix D: Interview Guide**

### Introduction

Hi [participant's name]. Thank you for taking the time to meet with me today. As I previously explained to you, I am a student enrolled in the Master of Nursing Program with the University of British Columbia. I am in the process of completing my final paper. The topic of the paper is nurses' perceptions of electronic self-scheduling, specifically the strengths, weaknesses, opportunities and threats. I will be reviewing the more recent literature. However, it is important for nurse leaders to be aware if nurse self-scheduling is occurring in British Columbia (BC), what methods nurses in BC are using to self-schedule, and what the perceptions of BC nurses are for self-scheduling, particularly the strengths, weaknesses, opportunities, and threats.

I want to assure you, that your identity will be kept confidential, that is I will not share it with anyone else. I will be taking notes throughout the interview, and you will be identified participant A, B, etc. both in the notes and in the paper. Is that okay?

I understand that we have approximately 30 minutes and we must finish by\_\_\_\_ hours.

I will ask you questions; however, please add anything other information that you think is important for me to know. If I am unclear, I will ask if you can tell me more. Do you have any questions regarding the process?

Can we start?

### Questions

- 1. Can you tell me how long nurse self-scheduling has been occurring within you unit?
- 2. Do you know why nurse self-scheduling was implemented?
- 3. Can you tell me the process for self-scheduling, including any tools, guidelines, or rules that are used or must be followed?
- 4. Can you tell me what your thoughts are in relation to self-scheduling including the strengths, weakness, opportunities, or threats?
- 5. (If not using electronic self-scheduling) Would you be interested in using electronic self-scheduling?
- 6. Is there anything else you would like to tell me?

### Closing

Thank you for taking the time to meet with me and share your experience and thoughts regarding self-scheduling. Would you like a copy of the recommendations once it is completed?

# Appendix E: Annotated Bibliographies

Citation	Alston, S. (2007, January). Automation + scheduling = An enterprise win. <i>Health Management Technology</i> , 36–37. Retrieved from https://www.healthmgttech.com/automation-scheduling-an-enterprise-win.php
About Author	Alston is the Administrative Director at Duke University Health System (p. 37). Alston earned her Bachelor of Science in Nursing from the University of North Carolina at Chapel Hill, her Master of Science in Nursing from the University of North Carolina at Greensboro, and her Master of Business from Duke University. Retrieved from: http://dance.nursing.duke.edu/sites/default/files/Sylvia%20Alston.pdf
Background	Scheduling the right personnel, at the right time, right place, and the right price is a challenge for healthcare organizations (p. 36).
Issue	Traditional manual paper-based scheduling systems in use were ineffective and unfair (p. 36).
Purpose	<ul> <li>To find an electronic solution:</li> <li>1. To eliminate manual scheduling processes by introducing a software solution that integrated with their current time and attendance system, which would automate staffing and scheduling functions to support optimal staff allocation through the ability to identify nurse staffing trends and levels for the assignment of qualified staff and improve their ability to forecast staffing, thus easing their burden of relying on the use of agency staff, which would be more cost effective, but could also reduce scheduling errors (p. 36).</li> <li>2. To increase the use of self-scheduling not only to improve nurses' morale and job satisfaction but also to improve their recruitment and retention of nurses (p. 36).</li> <li>3. Have the capability to be used in departments other than nursing (e.g., pharmacy, radiology, etc.) (p. 36).</li> </ul>
The Question	Not provided.
Intervention	'ActiveStaffer' an automated staffing/scheduling system for API Software Inc. implemented simultaneously across the three hospitals (p. 36).
Tool	Selection Criteria: not provided.
	Planning: Business Plan not fully described.
	Training: Scheduling policies; formulas for staffing levels, Full Time Equivalents (FTEs), staff weekends, off-shift, and type of shift requirements, and allowable paid time off granted per shift; how to schedule, create schedules and run reports; charge nurse daily maintenance issues; web-based training (content and audience not described) (p. 37).

Methodology	Planning, selecting, piloting, training, implementing, and evaluating processes were incompletely described or not described. The planning, selecting, piloting, and implementation team selection was described; however, the participants and their numbers were not described.
Context	Three hospital system that schedules more than 3,000 in-house and agency staff with disparities in culture, policies, coding systems, and training programs (p. 36).
Definitions	Not provided.
Key Concepts	Not provided.
Reported Findings	<ol> <li>"Monitor and control staff overtime" (p. 37):         <ul> <li>a. Reduce costs</li> <li>b. Ensure patient safety</li> </ul> </li> <li>"Eliminate Scheduling of unqualified individuals' (p. 37).</li> <li>"Improve communication" (p. 37):                 <ul></ul></li></ol>
Conclusion	Adoption of an automated scheduling solution streamlined scheduling activities by eliminating inefficient manual processes and facilitated each manager's ability to make the best possible use of available staff resources (p. 37).
Implications for Practice	<ol> <li>Increasing nurses job satisfaction and morale could improve nurse attraction to and retention for their hospitals (not evaluated).</li> <li>Having the right staff at the right place and at the right time could improve patients' quality of care (including safety) and their outcomes.</li> </ol>
Relevance to REA	Expanding self-scheduling is an opportunity within the automated staffing/scheduling system 'ActiveStaffer.' Providing nurses with the functionality to self-schedule online is a strength of the automated staffing/scheduling system 'ActiveStaffer.'

Citation	Danello, S. (2008). Open Shift Management. Nursing Management. 30-32.
About Author	Danello is Vice President of Patient Care Services and Chief Nursing Officer at St Joseph's/Candler in Savannah, GA. (p. 32).

Background	Nurse staffing that is adequate positively impacts patient care, the work environment, and job satisfaction and is supported by research (p. 30).
Issue	Nurse scheduling to meet staffing needs with the current manual systems is inefficient and costly. Particularly costly is the scheduling of unfilled shifts with the use of pay incentives because nurses hold out so that they receive maximum bonus and managers using their time to fill them, which detracts from the time they can spend on professional nursing, physician, and patient-care-related activities (p. 30).
Purpose	To create a more engaged workforce to help ensure safe, cost-effective, and efficient staffing patterns through:
	1. To improve transparency and communication of our staffing needs (vacant shifts) to allow all nurses to participate in the staffing process, and promote shared accountability with point of care nurses for staffing (p. 30).
	<ol> <li>Giving unit nursing managers and staff increased insight and control of scheduling (beyond their core schedules) in a fair and equitable manner (p. 30).</li> </ol>
The Question	Not provided
Intervention	An Internet-based program implemented simultaneously across both hospitals (p. 30).
Tool	
Methodology	Planning for the implementation of the Internet-based program included focusing on evidence-based staffing and analysis of all staffing and scheduling-related procedures for consistency and improvement. Education was provided to the hospital's board of directors, medical staff, and nursing staff by a nurse champion with strong leadership skills (not clear who chose) to gain support and participation (p. 30).
	Implementation included restructuring of the incentive pay program for filling open shifts that were visible and available for all staff through the Internet- based program. Implementation processes were not described. The participants were described as nurses; however, the sample size was not provided. If approximately 550 nurses comprise 75% of the workforce, one can extrapolate the sample size to be approximately (pp. 30–31).
Context	Two-hospital system in Savannah, GA. with a vacancy rate of 14%, and their Magnet nurses floating to work at neighbouring hospitals to fill vacant shifts, while they relied on shift bonus, contract labour, and overtime to fill vacant shifts (p. 30).
Definitions	Not provided.
Key Concepts	Not provided.

Reported Findings	1. Increase employee satisfaction: 550 nurses have requested to work an open shift some to trial working in a new area (p. 31).
	<ol> <li>Medicare and Medicaid Services (CMS) Hospital Consumer assessment of Healthcare Providers and Systems (HCAHPS) patient satisfaction surveys (p. 31):</li> </ol>
	a. Results of nurse-sensitive areas near the 98%.
	<ul> <li>b. Nursing staff continue report significant improvement of overall job satisfaction (significant not quantified).</li> </ul>
	c. Nurses no longer floating in the community to pick up extra shifts has bolstered morale and participation (possibly due to capability to schedule online; nearly 30% of shifts filled by nurses wanting to work on another unit).
	<ul> <li>Nurse managers satisfied with the technology due to process efficiencies gained through a more collaborative approach to effective staffing practices.</li> </ul>
	3. Improved staff retention and recruitment with the use of technology (p. 31-32):
	a. ensures effective staffing practices.
	b. appeals to nursing staff looking for flexibility and choice in balancing their work and home lives (vacancy rates decreased from 14% to 8%).
	4. Significant savings (approximately 3 million which includes, bonus pay, premium pay and contract labour) that was reinvested into patient safety and quality care initiatives to improve the environmental safety for staff and patients (p. 32):
	a. virtually eliminates the use of contract agency staff.
	b. 60% decline in bonus pay.
	5. Staff accountability and responsibility has increased through a shared perspective through real time tracking of vacant shifts that is provided 24/7 by the Internet-based scheduling technology and allows staff to schedule shifts from anywhere (p. 32).
Conclusion	Not provided.
Implications for Practice	Reported findings 1-6 positively impact nurses practice as well has patient outcomes.
Relevance to REA	Danello stated, "Nursing staff continue to report significant improvements in overall job satisfaction" (p. 31). While Danello did explicitly state the factors contributing to nurses' significantly reported improved job satisfaction, the term 'significant' is not quantified.

Citation	Siek, T. (2008). Superior scheduling. <i>Health Management Technology</i> , 24, 26–27. Retrieved from http://www2.healthmgttech.com/features/2008_january/0108_superior.aspx
About Author	Siek is the Chief Nursing Officer for Hays Medical Center in Hays, KS (p. 27).
Background	"Ever-tightening labour force compounded by relentless escalation of labour costs" (p. 24).
Issue	Staff scheduling was a manual process, but for years the organization had been using an automated time and attendance. When the vendor of the time and attendance system announced an expensive upgrade (equal to a cost of a new system), the organization took the opportunity to evaluate available staff scheduling solutions that would facilitate more efficient management of labour resources and would integrate with time and attendance software and their clinical acuity system (p. 24).
Purpose	To make optimal use of human resources including efficient staff scheduling and ensuring optimization of effective patient care by providing: easy to use staffing tools (assign staff per varying census and acuity level) to relieve excessive administrative burdens and allow leadership access to information previously unavailable (e.g. productivity and overtime trending reports) (p. 24).
The Question	Not provided.
Intervention	ActiveStaffer and Payrollmation, API Software Inc.: an automated system that integrated both time and attendance and staff scheduling (including self-scheduling), which could also be used for scheduling clinical support services staff, with an integrated time and attendance package as well its clinical acuity system implemented simultaneously across the enterprise (p. 26).
Tool	System selection criteria not provided.
Methodology	Awareness of the issues; deciding to change approach; selecting the intervention tool using selection criteria and demo attendance; planning (scheduling software customization by inserting rules and parameters); peer training that resulted in inconsistencies and, therefore, recordings were used and training sessions were based on managers' scheduling method for enhanced learning; implementing enterprise-wide and transitioning approximately 6 months with earlier adopters (technology literate) and late adopters who succumbed with the realization of the efficiencies to be gained as well as peer pressure (p. 24-26).
Context	Hays Medical Center is a Midwestern 194-bed facility (healthcare organization) (p. 24).
Definitions	Not provided.
Key Concepts	Not provided.

Reported Findings	No quantitative analysis conducted; however, the organization has gained time and cost efficiencies through: consistent scheduling and alerts to problems (e.g., overtime), census, and patient acuity responsive scheduling including selection of the most appropriate nurse (skills, credentials, resources, and shift preferences). Nurses find automated scheduling more convenient (view and request shifts or time off using the schedule online at work or remotely) and have improved satisfaction and morale due to greater control over the schedule. Possibly improved nurse recruitment and retention as job applicants ask about self-scheduling (p. 26-27)
	One challenge: with this automation nurses considered only their preferences and neglected review of the overall schedule for unfilled shifts, which required adjustments to the self-scheduling rules and providing education to nurses to consider the overall schedule when self-scheduling. Valuable to leadership is the ability to monitor productivity and overtime using one tool as it happens or through the reporting and analysis functions of the system resulting in improvements to staff mix (p. 27).
Conclusion	Using an automated scheduling system has allowed work processes to be streamlined resulting in improved productivity and staff utilization while maintaining a superior level of patient care (p. 27).
Implications for Practice	Nurses perceived benefits to an automated scheduling system. The challenges that arose can be minimized with careful selection, planning, and education; however, post-implementation monitoring and analysis is necessary to identify unforeseen undesirable developments, which can be addressed through informed appropriate responses.
Relevance to REA	A nurse's (the author's) perceptions of using an automated scheduling system, which were relevant to the REA question.

Citation	Valentine, N. M., Hughes, D., Nash, J., & Douglas, K. (2008). Achieving effective staffing through a shared decision-making approach to open shift management. <i>Journal of Nursing Administration</i> , <i>38</i> (7/8), 331–335. http://dx.doi.org/10.1097/01.NNA.0000323941.04888.ed
About Authors	1. Dr. Valentine is the Senior Vice President and Chief Nursing Officer for Main Line Health, Bryn Mawr, PA.
	2. Dr. Nash is the Vice President Patient Services, Paoli Hospital, Paoli, PA.
	3. Hughes is the Director of Nursing, Paoli Hospital, Paoli, PA.
	<ol> <li>Douglas is the Chief Nurse Executive, BidShift Inc., San Diego, CA. (p. 331).</li> </ol>
Background	Leading healthcare organizations use strategies that include creating healthy work environments, using innovative technology, and designing more flexible nursing roles to address the nursing shortage (p. 331).

Issue	Considering the continuing shortage of nurses, controlling care costs while ensuring recruitment and retention of qualified nurses is challenging for healthcare organizations and particularly so for Main Line Health due to the local competitive climate (p. 331).
Purpose	Paper: "To discuss how a successful nursing initiative to apply automation to open-shift scheduling and fulfillment across a three-hospital system had a broad enterprise-wide impact resulting in dramatic improvements in nurse satisfaction, retention, recruitment and the bottom line" (p. 331).
	Change initiative: "To bring more discipline to open-shift scheduling practices cross 3 campuses to ensure effective staffing and give the nursing community an opportunity to make a real impact in supporting ongoing staffing initiatives investing in technology to optimize open-shift management and equitably staff to provide expanding services while improving the satisfaction and work lives of nursing staff" (p. 332).
The Question	Not provided.
Intervention	Open-shift management technology: one solution that healthcare organizations are implementing to optimize the use of the existing workforce, recruit and retain staff, and to gain operational efficiencies, including reduced annual costs (p. 331).
Tool	Education tool: Posted a one-page pamphlet that provided directions in nursing units.
Methodology	Conducting a needs assessment, determining a strategy (implementing open- shift management technology), engaging stakeholders through education to gain support and overcome resistance, educating staff and implementing initially using incentive raffles to facilitate manager use of the system, which eventually required mandating for its use and their complete uptake. To motivate point of care staff to use the system, managers offered shifts to home unit staff first, then to nurses across the system. They also provided various incentives for nurses to fill open shifts (e.g. fixed pay without and with bonus if a shift had more than a 30% vacancy rate, reverse auctions with protected base pay, point rewards to obtain a variety of goods, gift certificates, additional vacation time, etc.).
Context	Main Line Health (MLH) system is composed of three magnet-designated acute care hospitals located in Bryn Mawr, PA, with group of 3,500 dedicated professional nurses (p. 331).
Definitions	Not provided.
Key Concepts	Not provided.

Reported Findings	1. Challenges included:
	a. Manager's resistance to using the system (exposed their unit shifts posted, types of incentives used and per-diem staff utilization or favouritism) (p. 334).
	b. Nurses developing work-arounds to continue to manually sign up for favourable shifts which resulted in low adoption rates (five units) and was not encouragement for use of the new system (p. 334).
	2. Positive outcomes (p. 334-335)
	a. Cost savings of \$885,299 because of salary reductions and dollars per unit of service.
	b. 51% of more open-shifts filled, up to 7,263 shifts from 4,816 shifts.
	c. Improved manager productivity, decrease in 4–5 hours per week devoted to filling open-shifts.
	d. Staff working more hours across campus, including 10% RNs reporting working off their home campus.
	e. Improvements in nurse recruitment (i.e., vacancy rate down from 6.6% to 4.87%, a 26.3% overall decrease).
	f. Improvements in nurse retention (i.e., turnover rates down from 14.2% to 10.9%, a 30% overall decrease).
	g. Nurses love the flexibility and choice from the comfort of home; more than 1,700 RNs and nursing support personnel have bid on shifts (nearly two-thirds of the workforce).
Conclusion	"A nurse driven open-shift management program is a proven strategic tool for developing effective staffing practices that leverage and expand the existing workforce" (p. 335), including nursing and clinical support staff. The hospital system plans to promote expanding the utilization of technology, including exploring technology as a communication resource for disaster response (p. 335).
Implications for Practice	The importance of strong project collaborations/communication between and with top leadership to front-line staff and the ongoing monitoring for compliance and results.
Relevance to REA	The nurse authors provide their perceptions of the use of open-scheduling management program, support with quantified data, which was relevant to the REA question.

*Note.* REA = Rapid Evidence Assessment; RNs = Registered Nurses.