

# A Comparison of Nurse's Expected and Realized Benefits of Computerized Provider Order Entry

St. Jude Children's Research Hospital

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# Objectives

- Review the purpose of this survey
- Review the survey methods
- Discuss the findings of the survey
- Discuss survey implications

# Background

- St Jude Children's Research Hospital demographics
  - 60 inpatient beds, 250+ outpatient encounters each day
  - Non-profit, pediatric oncology research hospital
  - Teaching hospital
  - All medical staff employed by the institution
  - Phasing in Computerized Provider Order Entry (CPOE) since 2001.
  - Anticipate full CPOE, including medication and chemotherapy ordering to be in place late 2008

# CPOE Implementation Process

- Phases included
  - Pilot full CPOE implementation in one clinical area
  - Alternating phases of departmental orders house-wide, the full CPOE in primary care clinics over 4 years
  - Full CPOE in all outpatient areas excluding medications/chemotherapy concluded in April, 2007
  - Software limitations impacting the implementation of medication/chemotherapy orders and CPOE for inpatient order entry, expected completion anticipated late 2008.

# Additional Process Keys

- To assist staff in complying with institutional bylaws and improve the success of CPOE being performed by direct care providers, nurses were not given access to enter electronic orders except in the OR and ICU for emergent situations
- For this reason, St. Jude has a very high percentage of orders entered by physicians and physician extenders.

# Unanticipated Adverse Outcomes

- As the nursing staff have become increasingly experienced with CPOE, concerns have been noted related to delays in care due to waiting for providers to enter their orders electronically and errors in order entry related to learning curves, limited use by some providers, and the high number of “defaulted” responses in orders intended to streamline the order entry process.

# Purpose of this Survey

- Determine if the Nursing staff expected the same benefits the institution expected as benefits of CPOE
- Determine if the Nursing staff felt that the expected benefits were realized by the institution.
- Determine if differences in nursing experience, St. Jude experience and duration of experience with CPOE influenced these perceptions.

# Methods

- A survey was sent via e-mail to 415 nursing staff using the Perseus Survey software after obtaining administrative approval.
- The survey consisted of
  - 5 demographic questions related to work experience, work location and education level
  - 24 questions rating expected and realized benefits of CPOE on a 4 point Likert Scale
  - 2 open ended questions
- 90 responses were received for a 22% response rate



# Survey

St. Jude has been implementing Computerized Provider Order Entry (CPOE) using the Milli system in phases since early 2001. Depending on where you work, the nursing staff has had a variety of levels of experience in working with CPOE. We are now interested in determining the perceptions of nurses toward CPOE and how that may change with as experience increases.

Please take the time to answer the attached e-mail survey designed to look at the differing perceptions of St. Jude nurses toward CPOE. Responses will be sent anonymously to an outside survey vendor before they are received for analysis. Many of the demographic questions asked are to identify whether age, years of experience and length of experience with CPOE have any influence on perceptions.

Thank you,

Tina Dieckhaus, RN-BC  
Director, PCS Informatics

## 1. Where do you work?

## 2. What shift do you work most often?

## 3. How long have you been a nurse?

years.

## 4. How long have you worked at St. Jude?

years.

## 5. What is your highest Nursing education preparation?

Rate the following as an EXPECTED BENEFIT of CPOE on a 4 point Likert scale 1 being a very low expected benefit and 4 being a very highly expected benefit.

**6. What do you think the institution expected as benefits from CPOE?**

	1 - Very low benefit	2 - Low benefit	3 - High benefit	4 - Very high benefit
Increased order accuracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improve legibility, preventing errors or legibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improve efficiency of healthcare delivery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improve patient outcomes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase protocol of plan of care - order entry compliance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased speed of order processing by external departments (Pharmacy, Lab, Scheduling)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase speed of delivery of care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase patient safety	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase revenue returns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase nursing time with patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase patient satisfaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase staff satisfaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Rate the following as a REALIZED BENEFIT of CPOE on a 4 point Likert scale, 1 being very low realized benefit and 5 being a very high realized benefit.

**7. What do you think we realized from CPOE?**

	1 - Very low benefit	2 - Low benefit	3 - High benefit	4 - Very high benefit
Increased order accuracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improve legibility, preventing errors or legibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improve efficiency of healthcare delivery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improve patient outcomes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase protocol of plan of care - order entry compliance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased speed of order processing by external departments (Pharmacy, Lab, Scheduling)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase speed of delivery of care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase patient safety	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase revenue returns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase nursing time with patient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase patient satisfaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase staff satisfaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**8. What do you think are the most important realized positive effects of CPOE?**

**9. What do you think are unexpected issues or negative effects of CPOE?**

Submit Survey

# Expected Benefits

- The following expected benefits of CPOE were included in the survey
  - Increased order accuracy
  - Improved legibility, preventing errors of legibility
  - Improved efficiency of healthcare delivery
  - Improved plan-of-care or protocol compliance
  - Improved patient outcomes
  - Increased speed of order processing by external departments
  - Increased speed of delivery of care
  - Increased patient safety
  - Increased revenue returns
  - Increased nursing time spend with patients
  - Increased patient satisfaction
  - Increased staff satisfaction

# Data Analysis

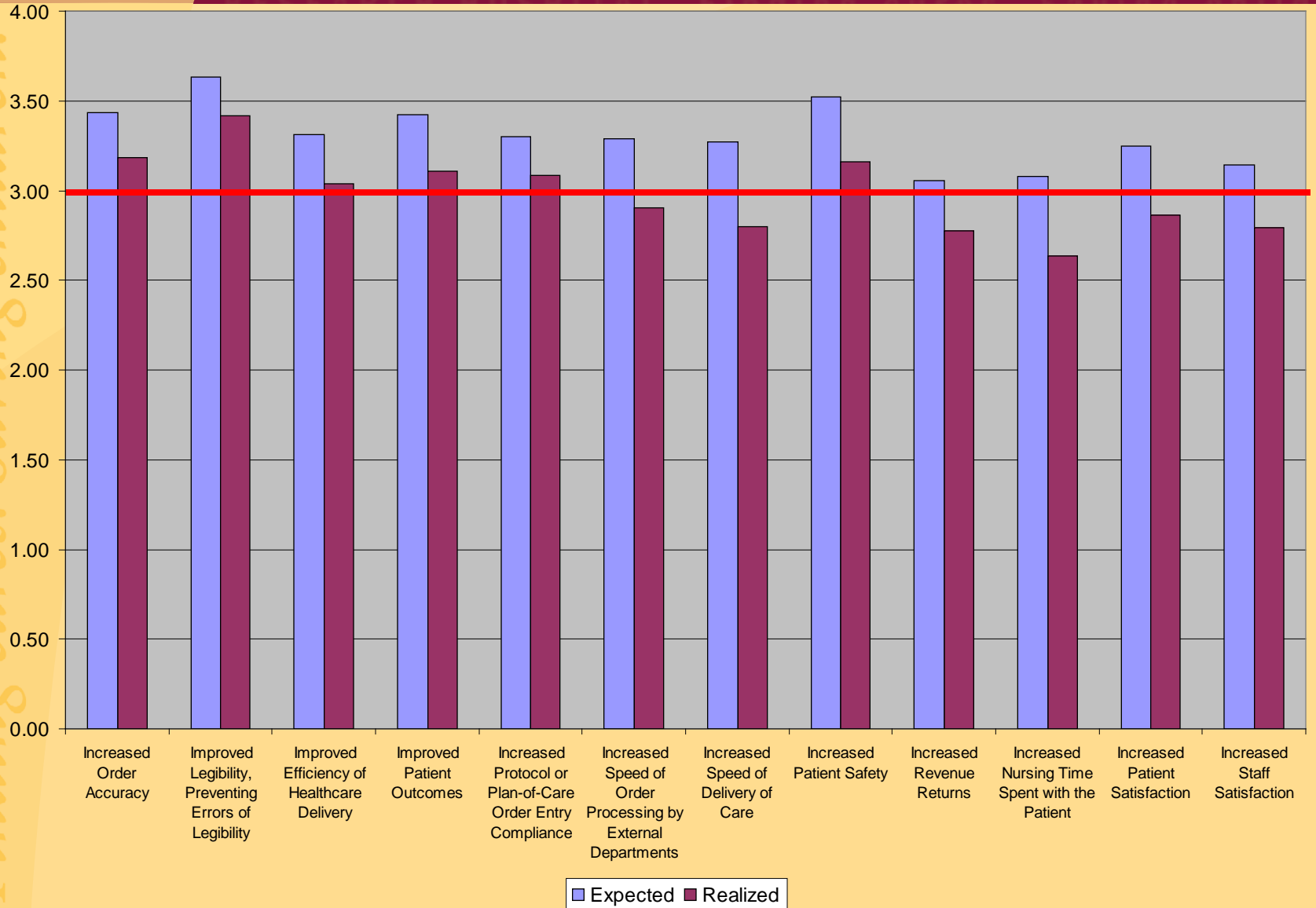
- An  $\alpha=0.05$  was used to determine significance
- A two tailed t-test was used to determine if any difference was noted between each expected benefit and realized benefit for all respondents
- A two tailed t-test was used to determine if any difference was noted with each CPOE experience, St. Jude Experience and nursing experience group between each set of benefits
- Mean responses were compared across subgroups for patterns

# Overall Comparison Results

*Finding cures. Saving children.*

- On average, all nursing staff indicated they had high expectations for each of the benefits of CPOE included in the survey
- Staff indicated they received less than high results of the following benefits:
  - Increased speed of order processing
  - Increased speed of delivery of care
  - Increased revenue
  - Increased nursing time with patients
  - Increased patient satisfaction
  - Increased staff satisfaction

## Comparing the Means Responses of all Staff for Expected and Realized Benefits of CPOE



Finding cures. Saving children.

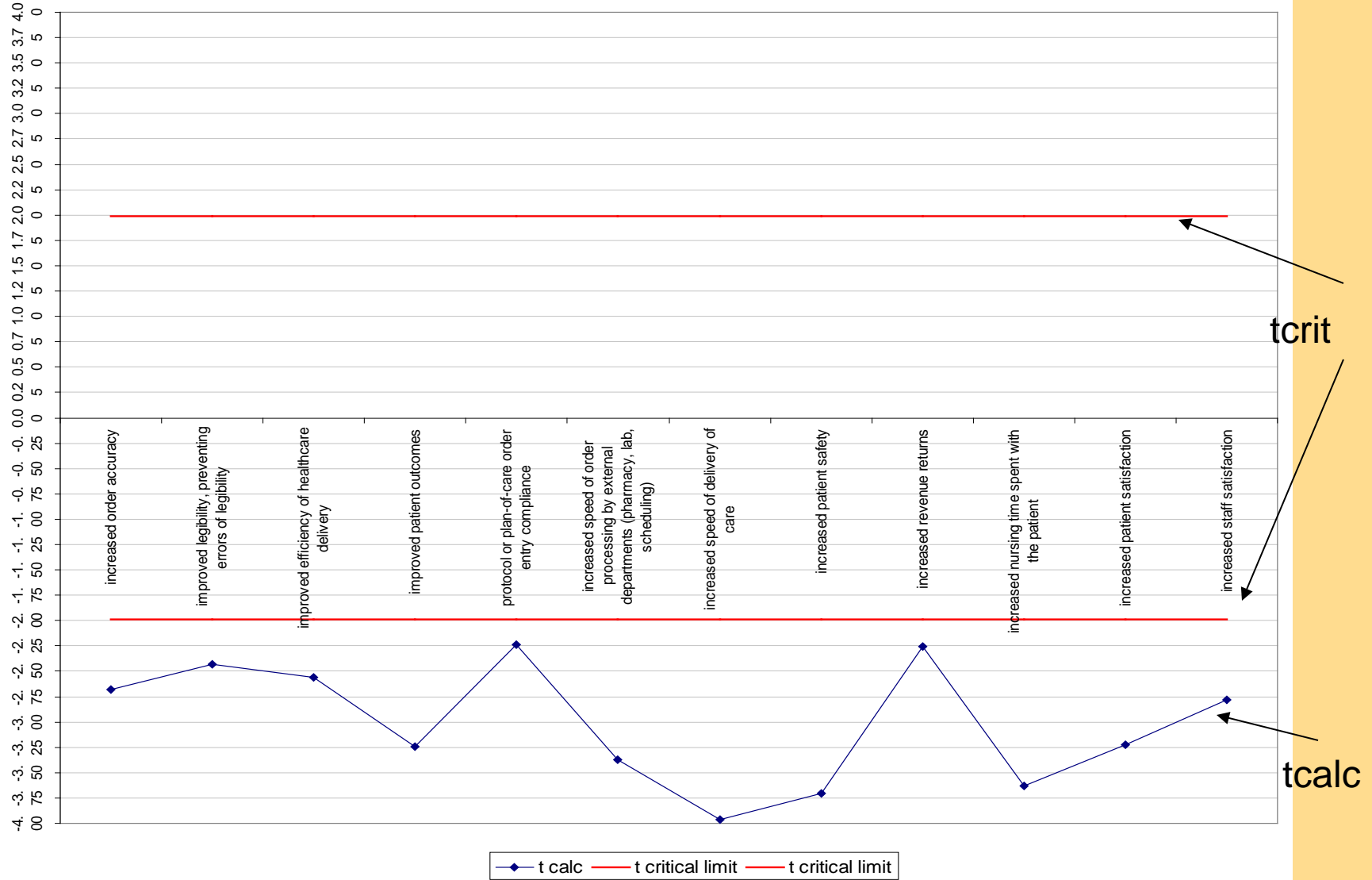
# Overall Comparison Results

- For all pairs of questions, the realized benefit was significantly lower than expectations
- These benefits were ranked lowest as compared to expectations:
  - Improved patient outcomes
  - Increased speed of order processing
  - Increased speed of delivery of care
  - Increased patient safety
  - Increased nursing time spent with patients
  - Increased patient satisfaction



# Overall Comparison Results

Finding cures. Saving children.



# Stratified Results

- Responses were reviewed based on nursing experience and stratified in 5 year increments
- Responses were reviewed based on St. Jude experience and stratified in 5 year increments
- Responses were reviewed based on level of experience with CPOE
  - Work locations using full CPOE for 0-2 years
  - Work locations using full CPOE for 3-6 years
  - Work locations that have had mixed experience with CPOE, increasing in their area as more departments were implemented house-wide
  - Inpatient units that are limited in their experience with CPOE to some orders such as consults, Diagnostic Imaging orders and discharge orders

## Comparison of Results Based on the Number of Years of Nursing Experience

**Significantly lower realized benefits than what was expected.**

### • 6-10 years of Nursing Experience

- Increased order accuracy
- Improved legibility, preventing errors of legibility
- Improved efficiency of healthcare delivery
- Improved plan-of-care or protocol compliance
- Improved patient outcomes
- Increased speed of delivery of care
- Increased patient safety
- Increased patient satisfaction
- Increased staff satisfaction

- 26-30 years experience
  - Improved legibility, preventing errors of legibility
  - Improved plan-of-care or protocol compliance
  - Improved patient outcomes
- (no significant difference for nurses with 1-5 year, 11-20 years or 21-25 years of Nursing experience)

## Comparison of Results Based on the Number of Years of St Jude Experience

**Significantly lower realized benefits than what was expected.**

- 1-5 years
  - Increased patient safety
  - Increased nursing time spend with patients
- 6-10 years
  - Increased order accuracy
  - Improved legibility, preventing errors of legibility
  - Increased speed of delivery of care
  - Increased patient safety
  - Increased nursing time spend with patients
  - Increased patient satisfaction
  - Increased staff satisfaction
- 21-25 years
  - Increased nursing time spend with patients
  - Increased patient satisfaction
- 26-30 years
  - Improved patient outcomes
- No significant difference for nurses with 11-20 years of experience at St. Jude

# Comparison of Results Based on the Level of Experience with CPOE

## Significantly lower realized benefits than what was expected.

• **Limited CPOE Experience** (Inpatient nursing staff using CPOE only for discharge orders and for shared resources – Diagnostic Imaging, Echo/EKG, Behavioral Medicine Consults, Rehab)

- Increased order accuracy
- Improved legibility, preventing errors of legibility
- Improved plan-of-care or protocol compliance
- Increased speed of order processing by external departments
- Increased speed of delivery of care
- Increased patient safety
- Increased nursing time spend with patients

• **Mixed CPOE Experience** (performing departments that receive some orders electronically and others written – procedure room, sedation, recovery, pharmacokinetics, medicine room)

- Improved plan-of-care or protocol compliance
- Increased speed of order processing by external departments
- Increased speed of delivery of care
- Increased patient safety
- Increased revenue returns
- Increased patient satisfaction

• **No significant difference** for those areas using full CPOE for 0-2 years or 3-6 years

# Overview of Stratified Results

- Nurses with less than 6 years of nursing experience tended to have more closely realized the expected benefits of CPOE.
- Similar results were observed for Nurses with less than 6 years of experience at St. Jude.
- Nurses with 6-10 years of nursing experience tended to have higher, but unrealized expectations of the benefits of CPOE.
- Somewhat more diverse results were seen overall in the St. Jude experience groups, with additional experience groups indicating significantly lower realized benefits than were expected.
- Staff groups with limited or mixed experience with CPOE indicated more significantly different levels of realized benefits from expectations than those with more experience.

# Why?

- Setting unrealistic expectations
- The 6-10 year experience range is likely staff who are comfortable with technology, have heard about it's advantages, and in this institution, have been in the process of implementing it for 6 years.
- Long, phased implementations result in poor acceptance during mixed usage.

# Implications

- Verbalizing expectations of CPOE to all staff prior to implementation is critical to the success of the project.
- Measuring the perceptions of nursing staff after implementing CPOE is important to gauging the success of the project.
- Communication of measures of success post implementation to all staff is important to assure staff are aware of realized benefits of CPOE implementation



# Additional Studies

- Additional studies of nursing staff perceptions from other institutions is important. Results of this survey cannot be generalized to other nursing populations.
- A study of the differences in perceptions of these benefits for nursing, physician and other allied health care team members would be interesting as well.