Current Concepts in Pharmacy Automation

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Objectives

- Review automation options available for unit dose dispensing in acute care pharmacies
- Assess automation options for IV admixture compounding
- Discuss pros and cons of various automation choices
- Review a variety of other considerations and system issues

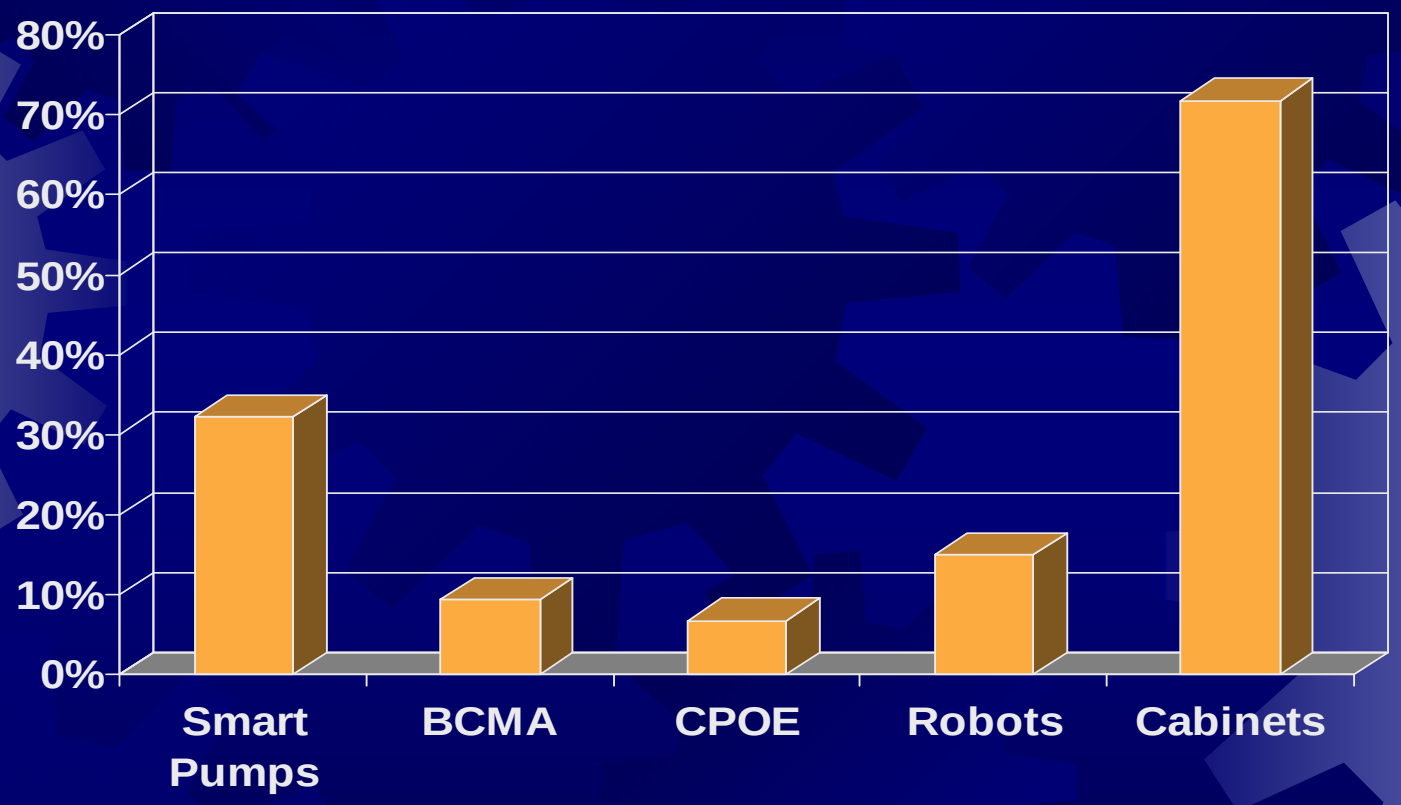
Typical Automation Goals

- Expand pharmacy services
- Redeploy pharmacy staff
- Improve medication turnaround time and pharmacy efficiency
- Reduce medication errors
- Improve charging/billing
- Increase formulary compliance
- Reduce cost of drug therapy for patients
- Improve Adverse Drug Reaction reporting
- Improve pharmacy image, morale, and pharmacist job satisfaction
- Take responsibility for medication use in all patients

Key Technology Drivers

- Profits and entrepreneurial spirit
- Cost Effectiveness
- Patient Safety
- Fewer pharmacists allured by dispensing, compounding, and other manual tasks
- Workforce shortages
- Inherent need for continuity of care

Incorporation of Technology



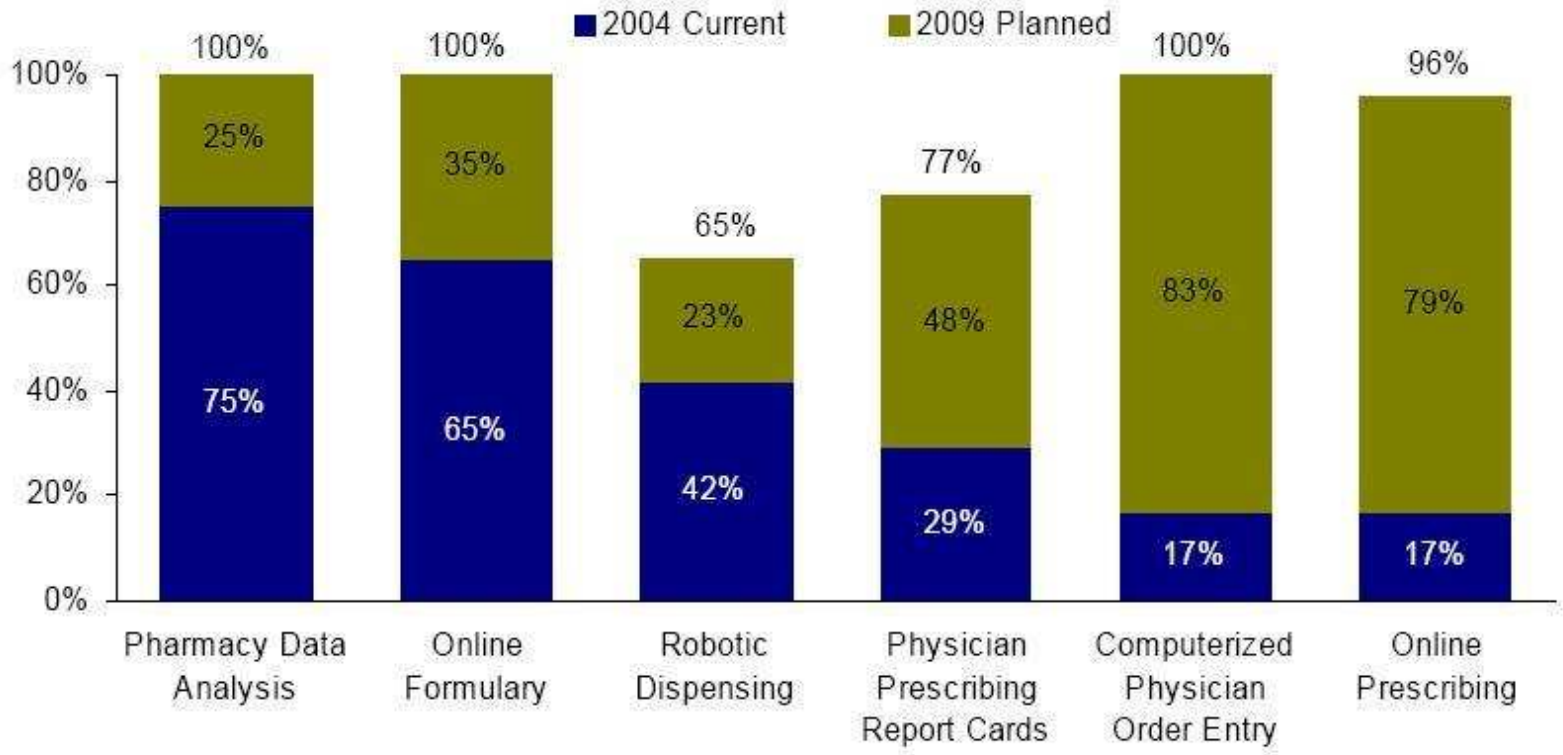
Am J Health-Syst Pharm. 2006; 63:327-45

KLAS, CPOE Digest 2007

Technology and Automation are Major Issues

Figure 6

PHARMACY INFORMATION TECHNOLOGY IMPLEMENTATION ACTIVITY



n=39 respondents.

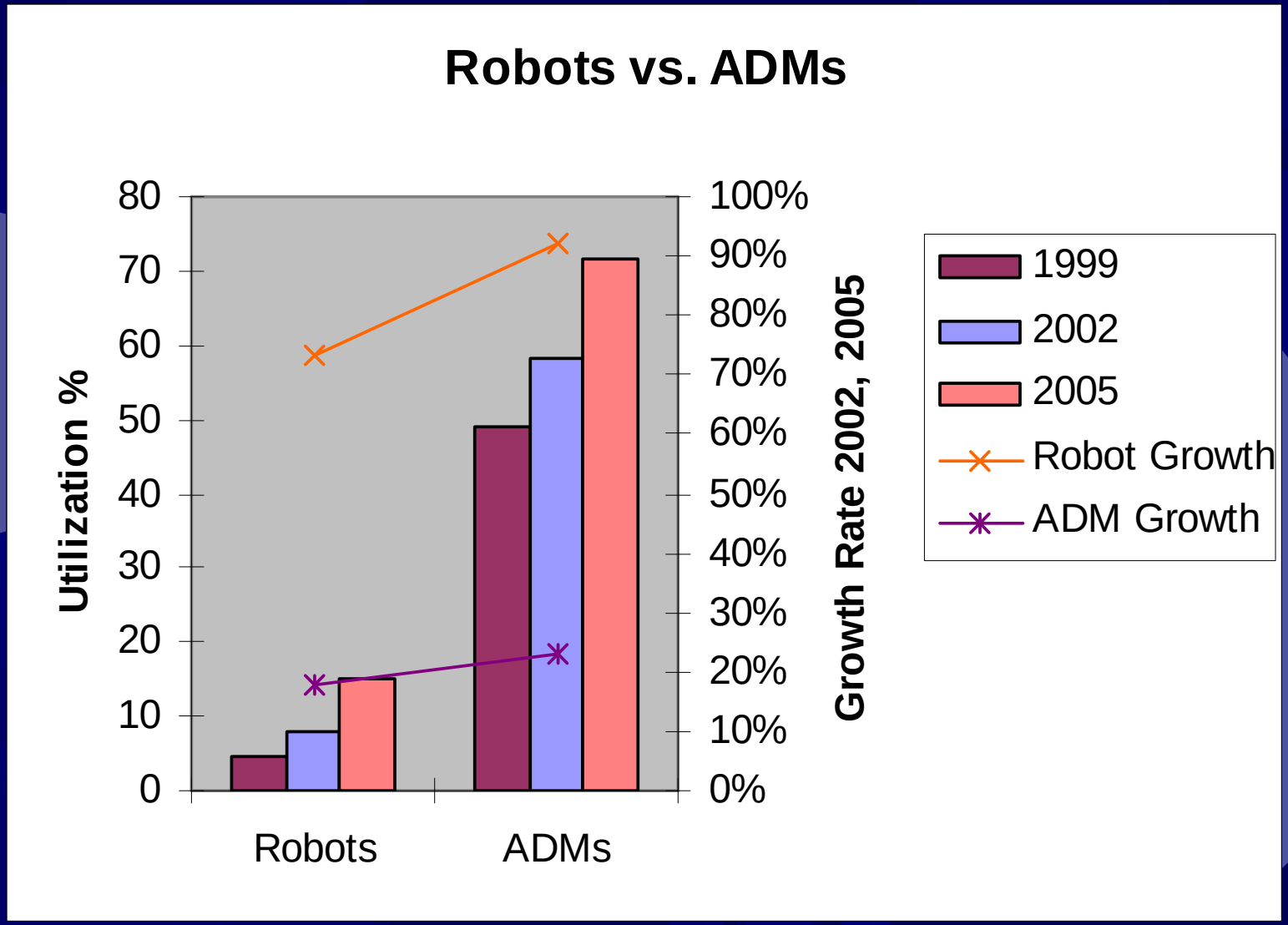
Source: Health Strategies Group, *Institutional Provider Systems*, June 2004.

Unit Dose Automation for Acute Care Hospitals

Automation Options

- Decentralized
  - Automated Dispensing Cabinets (ADC)
- Centralized
  - Inline Packagers
  - Carousels
  - Robots

Technology Changes Over Time



Pedersen CA et al. *Am J Health-Syst Pharm* 2006; 63: 327-345.

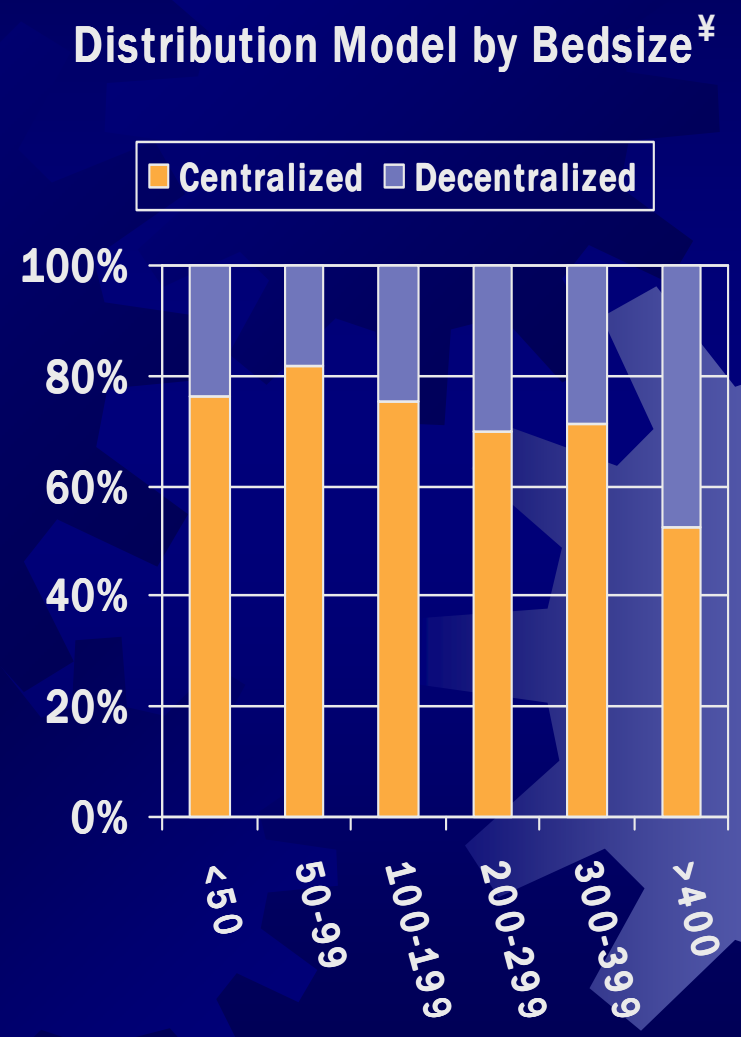
What is the Future of Automated Dispensing?

- Currently 73.9% of hospitals have a centralized system versus 26.1% decentralized ¥
- In the future, 50.1% envision a centralized system versus 50% decentralized ¥
- The truth is likely dependent upon a variety of factors

¥ Pedersen CA et al. *Am J Health-Syst Pharm* 2006; 63: 327-345.

Factors Affecting the Dispensing Model

- Philosophy (Rx and RN)
- Resources
- Logistics
- Patient Flow/Turnover
- Bed size



¥ Pedersen CA et al. *Am J Health-Syst Pharm* 2006; 63: 327-345.

Major Players in Decentralized Automation

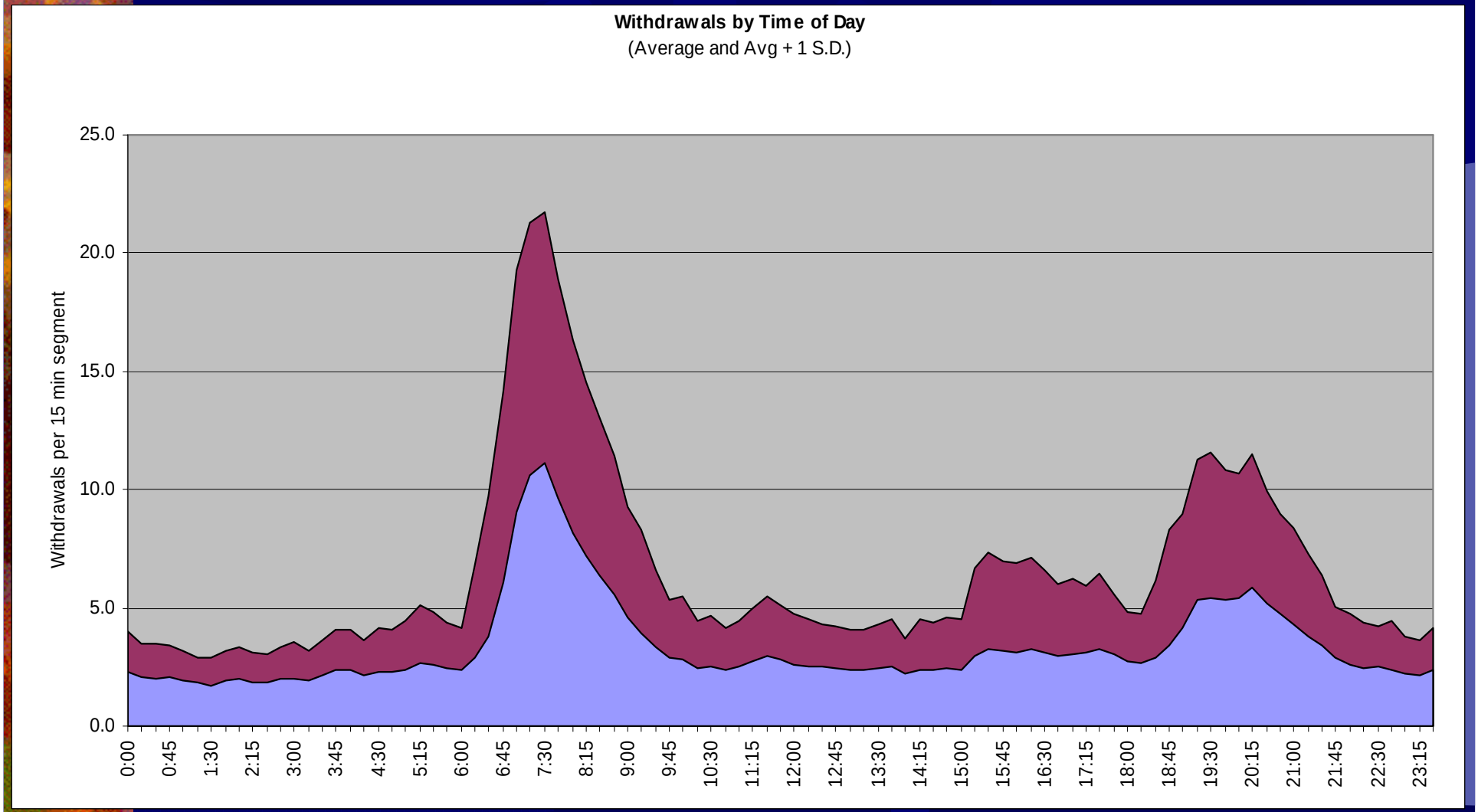
Omnicell

Pyxis

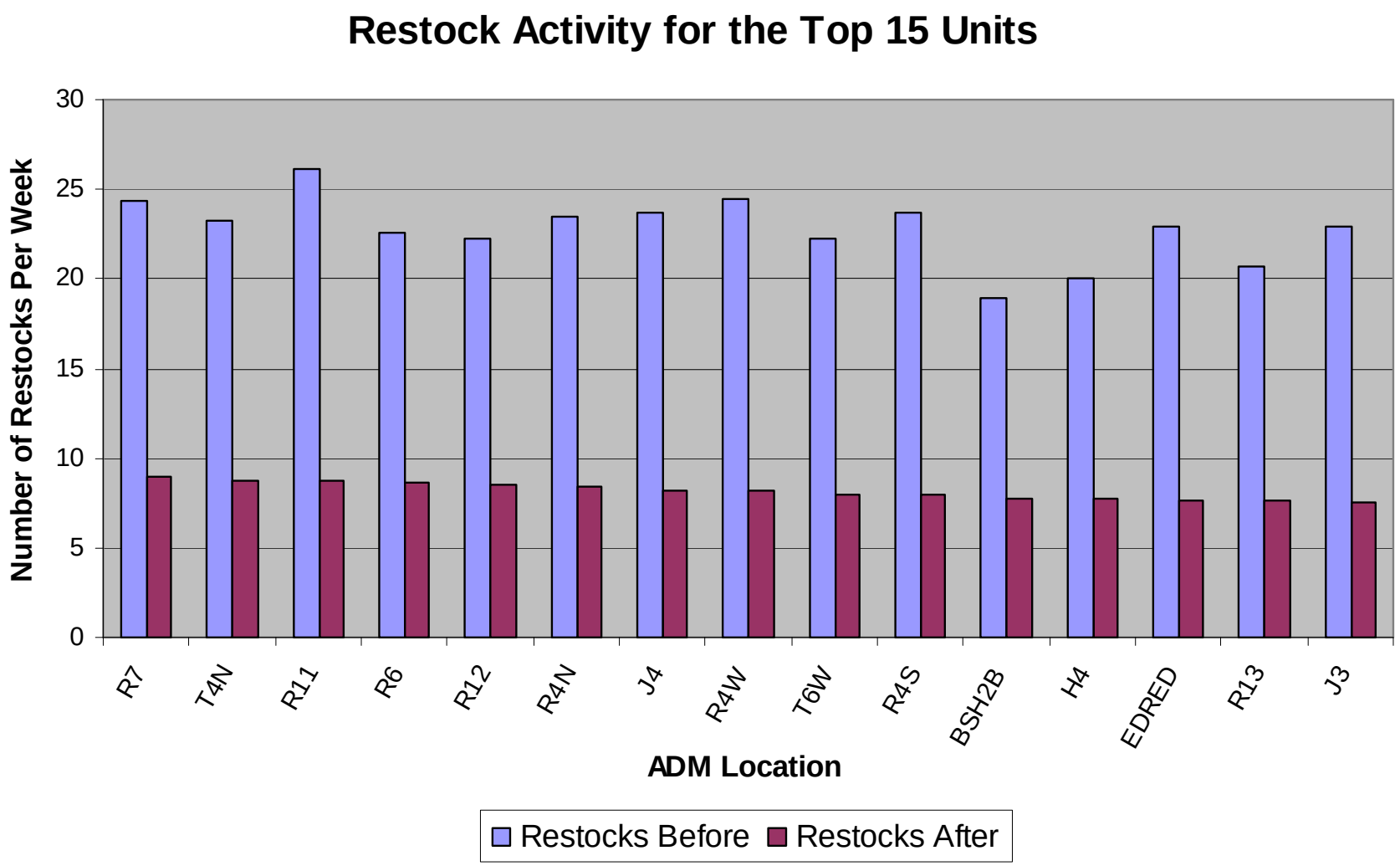
AcuDose

Nursing Battles

(Trying to fill cabinets while nurses are vending meds)



Maximize Restock Activities



Centralized Systems

- Inline Packagers
  - Multiple vendors of JVMedi
- Carousels
  - Multiple vendors
  - Software is key
- Robots
  - Swisslog
  - McKesson

Inline Packagers

- Essentially an oral solid packager
  - Similar concept to the original ATC-212
- Both canister and on demand
- Utilizes bar-codes
- Can include 100-500 line items
- Can fill patient-specific strips
- Allows for bulk drug utilization
- Canister calibration, returns, and incompatibilities

Carousels

- Great for inventory control
  - 2000-3000 line items
- Easily integrated to fill ADMs
- Can be used for first doses
- Integrated barcode capabilities
- Minimal training required
  - Lighted prompts are very helpful
- Handles virtually unlimited package sizes
- Returns and restocking a challenge

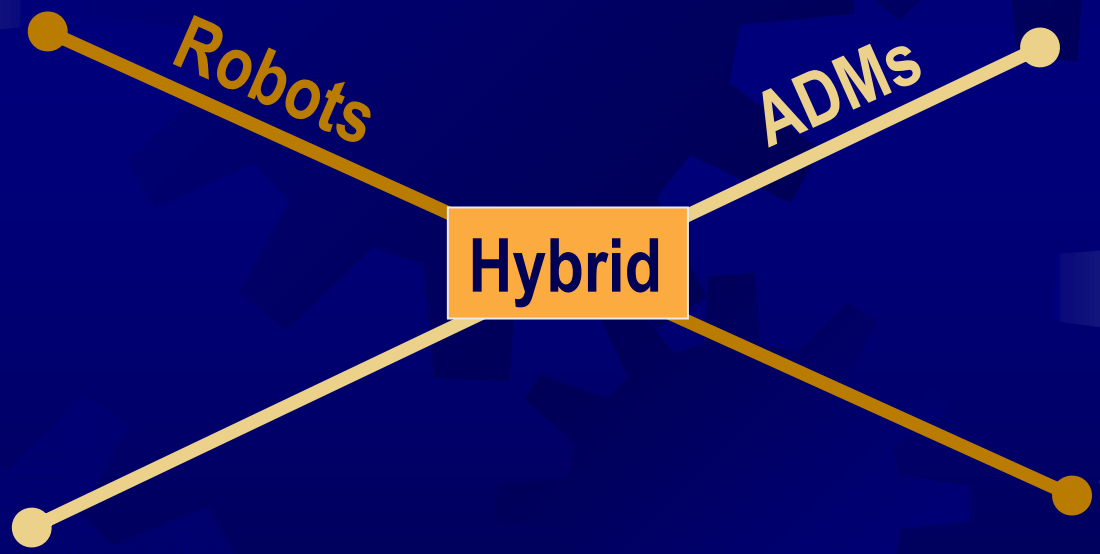
Centralized Dispensing Robotics

- Picks patient-specific meds to envelope, ring, or bin
- Bar-coded individual doses
- Very good inventory control
- Generally error free
- Simple crediting and restock process
- Limited pharmacist check
- Will likely reduce technician labor
- Space considerations and packaging

The Trade Off

Pharmacy Convenience

Nursing Convenience



The Hybrid Option

PROS

- Can take advantage of different technologies
- Synergies do exist
- Especially effective for larger hospitals (>200beds) and IDN's
- Flexibility of dispensing methodology, based on the drug
- Can maximize the benefits of each type of automation

CONS

- More equipment to justify
- More equipment to manage
- Interfaces
- Integration can initially be time consuming

Patient Safety Concerns

- Decentralized Automation
  - Misfills
  - LASA
  - Stockout delays
  - Matrix drawers
  - Overrides (errors have been reported as high as 11.7%, with 1.7% resulting in actual patient errors[¥])
- Centralized Automation
  - LASA
  - Bar-coding errors
  - Return/Discontinue accuracy
  - Bin restocking with Carousels

[¥] Kester Ket al. *Hosp Pharm.* 2006;41:535-537.

Anesthesia Workstations

- Automated medication documentation
  - Some incorporate bar-code scanning
- Can improve documentation and charge capture
- Mixed provider feedback, but generally positive
- Can be configured with most stereo systems and iPods

Additional Considerations

- Automation integration with
  - CPOE
  - “Smart” Infusion Devices
  - BCMA
- Bedside scanning and ADMs may not be the best mix
  - Nurse servers are somewhat attractive again
- Inventory space requirements (due to barcoded meds) may increase
- Company’s have experienced consolidation, and this will likely continue
  - Multiple solutions from one vendor
  - Still opportunities for price negotiation

IV Admixture Robotics for Acute Care Hospitals

Robotic Systems

- Historically limited to TPN compounders
- Intellifill was first to market with syringe filling robotics
- Cytocare available in the US in November for chemotherapy compounding
  - Currently functioning in Italy and the UK
- Riva is soon to be available for standard admixtures or chemotherapy

Major Players for IV Robotics

IntelliFill

Cytocare

Riva

Pharmacy Automation

Robotic Admixture Systems

PROS

- Can automate very complex tasks and manipulations
- Precision is significantly greater than human capabilities
- Very high throughput
- Employee exposure reduction
- Reduced opportunities for contamination
- Enhanced 797 compliance

CONS

- IntelliFill requires adoption of syringe program
- Can be costly, although ROIs are generally good
- Space considerations and potential construction
- More equipment to manage (downtime, interfaces, etc.)
- Riva and Cytocare are not tested in the U.S.

Additional Automation Considerations

Single Vendor Advantage?

- Many vendors are leveraging their multiple technologies to improve integration
  - Omnilink to Omnicell ADM Example
  - McKesson Robot, Carousel, and Cabinet Example
- Some have argued that best of breed is a better solution
- Advantages and Disadvantages

Vendor Selection Considerations

- Functionality
  - Is an ADM an ADM?
- Total Product Offering
- Ongoing Product Development
- Service and Support
- Market Penetration and Growth
- Facility and System Considerations
- Cost <u>and</u> Value

Return on Investment

- Vendors can assist with calculations, but they should always be validated internally
- Business plans are helpful
- Many installations will have a reasonable ROI
  - Personnel
  - Tangible
  - Intangible
- Mixed results in the literature
  - Depends on implementation effectiveness

Pharmacy Automation

- Continued automation of manual tasks performed by pharmacists and/or technicians.
- Refinement of existing technologies
- Automation outsourcing
  - Packaging facilities, compounding facilities, etc.
  - Health-system initiatives and co-ops

Conclusion

- Important to understand advantages and disadvantages of each type of automation
- Health-systems should develop an overall automation plan based on current and future automation needs
- Optimization is critical to the success of the department and improvement of the medication use process.
- A positive experience is dependent upon lots of work and lots of data analysis (and lots of time)

Discussion