Medication Safety: The Important Role of Pharmacy Technicians

CAPT - Alberta

Pharmacy Technician

Conference 2004

Sheraton Cavalier Hotel

Calgary, Alberta

September 11, 2004

David U

President & CEO, ISMP Canada

Agenda

- ISMP Canada's vision, mission and programs
- How safe is our healthcare system?
- Needs Cultural changes
- Pharmacy related errors/issues
- Pharmacy Technicians' role
- Human Factors Engineering and Environmental Factors
- Regulated Pharmacy Technician issues

ISMP Canada Vision

- Independent nonprofit organization
- Established for the collection & analysis of medication error reports and the development of recommendations for the enhancement of patient safety
- Intends to serve as a national resource for promoting safe medication practices throughout the healthcare community in Canada

Mission

- Committed to the safe use of medication through improvement in drug distribution, naming, packaging, labeling, computer program design and drug delivery system design.

- Collaborate with healthcare practitioners and institutions, schools, professional organizations, pharmaceutical industry and regulatory & government agencies to provide education about adverse drug events and their prevention

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Voluntary Practitioner Error Reporting System

- A voluntary, non-punitive reporting stimulates participation in reporting programs
- Front-line practitioners provide detailed, unrestricted information on incidents
- Errors, near-misses and hazardous situations
- Provides expert analysis, disseminates high-leverage safety strategies effectively

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ISMP Recent Projects

- CMIRPS partner
- Systems Analysis of Medication Errors (SAME)
- Ontario medication error database
- Safe Medication Support Service
  - Potassium Chloride
  - Opiate Narcotics
- Infusion Pump Survey

Programs

- Medication errors and near-misses reports
- Analysis and Recommendation for prevention strategies
- Publication and distribution of Medication Safety Alert Newsletters
- Application of the Analyze-Err program
- Application of the Medication Safety Self Assessment (A QA tool)

Canadian Collaboratives

- CMIRPS
- CCHSA
- CPSI
- Provincial
  - Ontario
  - Manitoba
  - Saskatchewan
  - Nova Scotia
  - British Columbia
  - Alberta

Medication Safety Alerts Newsletters

- Monthly newsletters on safe medication practices and special alerts
- Format similar to ISMP Medication Safety Alert! newsletters
- Distributed to healthcare institutions, community practice, practitioners and professional organizations
- By subscription

Medication Safety Self Assessment (Community version)

- Developed by ISMP
- Implemented by over 1300 hospitals in US
- Derived from years of experience from analysis of medication errors reported
- Adapted to Canadian version
- Ready to be launched in Canadian hospitals

How Safe Is Health Care?

- Harvard Medical Practice Study found adverse events occurred in 3.7% of hospitalizations;
- Australian study found 16.6% of hospital admissions were associated with an adverse event – 5% of these patients died
- IOM Report in US estimates 44,000 to 98,000 deaths yearly due to error

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Incidence From Other Chart Review Studies

Country	N Charts	Year	Incidence of AE	Preventable?
Australia	14,000	1995	16.6%	51%
USA (Utah & Colorado)	15,000	2000	2.9%	--
England	1014	2001	11.7%	50%
New Zealand	1326	2001	10.7%	71.8%
Denmark	1097	2001	9.0%	40.4%

Canadian Study

- CIHI and CIHR joint Study
- Retrospective chart review study on ADEs
- Applying the Australian study using predefined triggers
- Hospitals in 5 provinces
- Results published on May 25, 2004

The Canadian Study

Study Goals

- To identify the incidence of adverse events in a sample of Canadian hospitals
- To compare the incidence between medical and surgical patients and between different types of hospitals
- To compare the incidence to results from similar studies in England, Australia, New Zealand and elsewhere
- To compare results from chart based review obtained from administrative data and hospital incident reporting systems

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Canadian Adverse Events Study

- Based on methods used in the Harvard Medical Practice Study
- These methods have been further developed in studies in the Australia and UK
- Uses chart reviews of hospital records to identify adverse events and assess whether these events might be prevented

Canadian Study (results)

- 7.5% AE (1 in 13 hospitalizations)
- 37 % preventable
- App. 45% involved surgical events
- App. 25% involved drugs and fluids

Why Medication Safety?

- One of the leading causes of adverse events in many studies
- High visibility and high cost
- Many key technology and information management strategies are *already developed*

Research Highlights

Boston hospitals 1997 (Bates et al)

- additional length of stay for *preventable* ADE = 4.6 days
- increase in cost for preventable ADE = $5857
- cost for preventable ADE in 700-bed teaching hospital = $2.8 million

Annual Projections per Hospital (US data)

- 6,000,000 medication orders
- 300,000 medication errors
- 1900 ADEs
  - 530 preventable ADEs
  - 1370 non-preventable ADEs
- 1600 potential ADEs

Another Canadian Study

- Adverse events among medical patients after discharge from hospital
  by Alan Forster
- 328 patients: 76 experienced AE (23%)
- Most common AEs are ADEs (72%)

Incidence and Severity of Adverse Events after Discharge

- 400 medical inpatients
- Adverse event rate 19%
  - 6% preventable
    - 48% of ADEs resulting in at least non-permanent disability preventable
  - 6% ameliorable
- Of adverse events
  - 66% were ADEs
  - 17% procedure-related

Forster et al, Ann Intern Med, 2003

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Pre-hospitalized AE Study (Forster)

- 502 adult patients in Ottawa Hospital
- 64 adverse events (12.7%)
- One third deemed preventable
- Most events due to Drug Treatment
- 25 after admission; 39 pre-hospitalized
- Safety must be addressed in ambulatory care front

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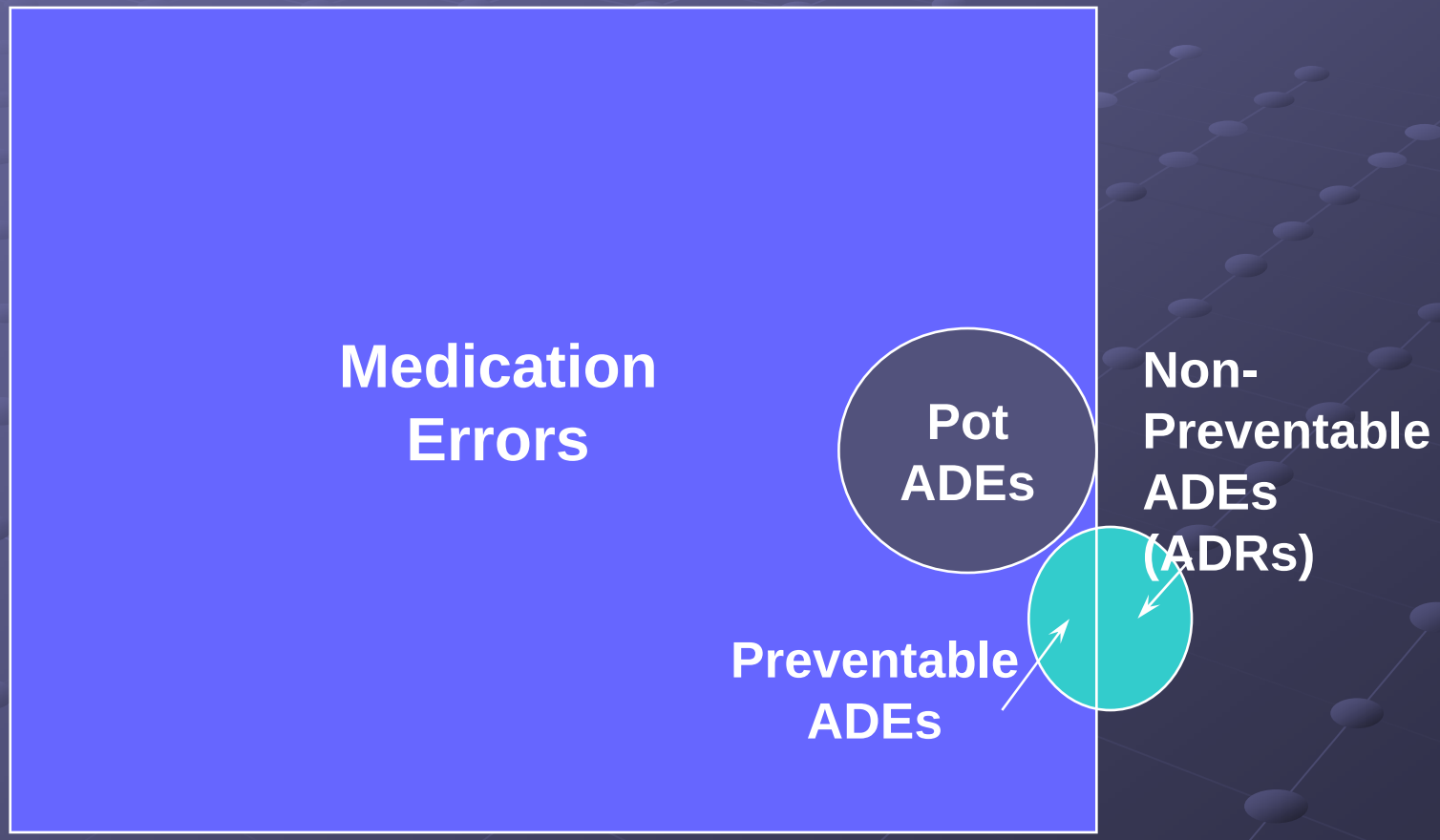
Ontario Medication Error Study

- Ontario MOHLTC funded study
- Prospective medication errors tracking
- Analyze-ERR software program
- Data on errors/near misses and root causes
- 14 hospitals in Ontario / 12 months data collection
- Over 4,600 records

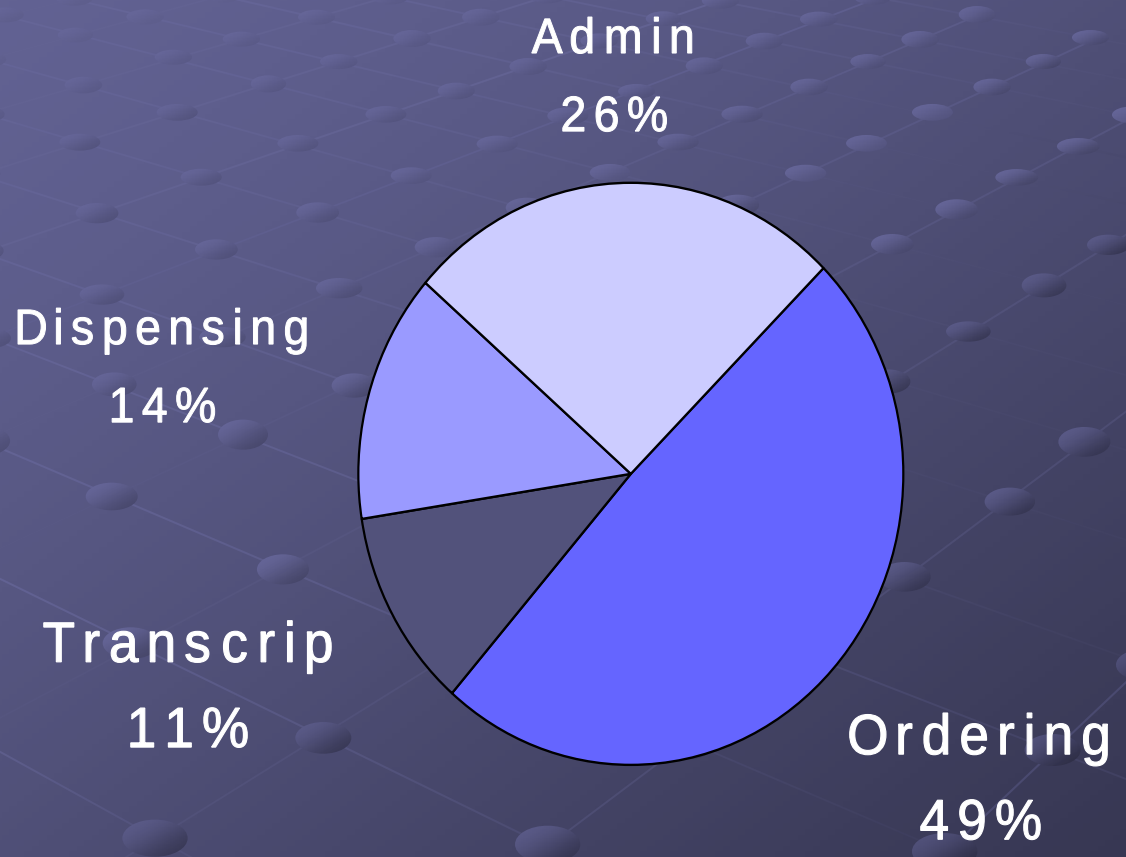
Ontario Medication Error Study (continued)

- Type of error
- Outcome description
- Severity Code
- Drug's therapeutic classification
- Stages when error occurs
- Time of the day of error
- Age and gender of patient
- Program/service where error occur

Relationships Between Med Errors, Potential ADEs and ADEs



Error Stage for Preventable ADEs and PADEs (n=264)



Sharp End, Blunt End

- Error investigations always concentrate on *sharp end* (front line staff) where patient/caregiver interaction occurs
- Contributing factors and latent errors often originate at the *blunt end* where organizational policies, procedures and resource allocation decisions are made

Latent (*Blunt End*) Failures

- Incomplete information about the patient
- Unclear communication of drug order
- Lack of unit dose system
- Lack of independent check before dispensing
- Lack of computer warning about excessive dose
- Ambiguous drug references
- Conflicting requirements for staff competency to prescribe
- Warning not placed prominently on syringe

Culture Change

- Provide leadership
- Job design: avoid reliance on memory, simplification and standardization (dispel the belief that healthcare workers are perfect)
- Promote effective team functioning
- Anticipate the unexpected; design for recovery
- Create a learning environment
- Dispel the fear of litigation and discovery

Shared Accountability – Sharp End

- Error detection and reporting
  - Seek out errors and voluntarily report them
  - Speak out about patient safety issues
  - Share personal knowledge of what went wrong
  - Recommend error reduction strategies
- Error reduction efforts
  - Facilitate implementation of system-based error reduction strategies

Shared Accountability – Sharp End

- Safe professional practice habits
  - Follow the safety literature
  - Seek out education to maintain competencies
  - Willingness to change practices
  - Ask for help when needed
  - Value teamwork
  - Support colleagues

Shared Accountability – Blunt End

- Position patient safety as job one
- Promote and reward error detection and reporting
- Communicate directly with staff
  - Safety enhancements
  - Discuss mission, vision, values, strategic goals
  - Learn about the barriers to safe practice

Shared Accountability – Blunt End

- Establish safe workloads
- Support system enhancements as recommended by front-line
- Lead proactive improvement efforts
- Require periodic self assessment of safety
- Engage the community in patient safety

Medication Errors –
A New Way of Thinking

FROM:

- Who did it?
- Punishment
- Errors are rare
- Physicians don't participate
- Add more layers
- Calculating error rates

TO:

- What allowed it?
- Thank you!
- Errors are everywhere
- Physicians, RNs, RPh, QA/ RM involved
- Simplify/standardize
- No thresholds

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Emphasis on Multi-factorial Nature of Errors

- Assume that slips, lapses and mistakes are inevitable
- Many factors, latent and active, must be present and in proper alignment for error to occur
- Emphasis on redesign of system to make it more difficult to err

Errors Involved in Dispensing Stage

- Wrong patient
- Wrong drug(s)
- Wrong dose
- Wrong route
- Wrong frequency
- Missing drug/dose
- Drugs given without an order
- Incorrect labeling

Opportunities for Mishaps

- Prepackaging
- Manual unit dose filling
- Point of Care dispensing cabinets
- Robot and ATC dispensing
- Floor stock
- I.V. Admixture/TPN
- Chemotherapy preparation

Rank Order of Error Reduction Strategies

- Forcing functions and constraints
- Automation and computerization
- Simplify and standardize
- Reminders, check lists and double check systems
- Rules and policies
- Education
- Information
- Punishment (no value)

Changes Needed to Improve Medication Use Process

- Computerization of medication use process
- Use of machine readable codes for most administered medications
- More consumer involvement in medication safety
- Improved access to drug information, error alerts in monographs, electronic reminders

Primary Principles in Error Reduction

- Reduce or Eliminate the Possibility of Errors
  - Failure mode analysis
  - Root cause analysis
  - System redesign
- Make Errors Visible
  - computer alerts
  - warnings/reminders
  - double check systems
  - triggers (markers)

Most Frequent Serious Error Types

- Insulin
- Free flow IV pumps
- PCA devices
- Parenteral narcotics
- Lidocaine
- Cancer chemotherapy
- Neuromuscular blockers
- Conscious sedation
- Concentrated electrolytes (potassium, magnesium, phosphate)

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High Alert Medications

- Adrenergic agonists
- Intravenous adrenergic antagonists
- Amiodarone & amrinone
- Benzodiazepines (primarily midazolam)
- Intravenous calcium
- Chemotherapeutic agents
- Chloral hydrate liquid in pediatrics
- Intravenous digoxin
- Dopamine & dobutamine
- Heparin (intravenous) and warfarin
- Insulin
- Lidocaine
- Intravenous magnesium sulfate
- Opiate narcotics
- Neuromuscular blocking agents
- Intravenous potassium phosphate & potassium choride
- Intravenous sodium chloride, high concentrations
- Theophylline

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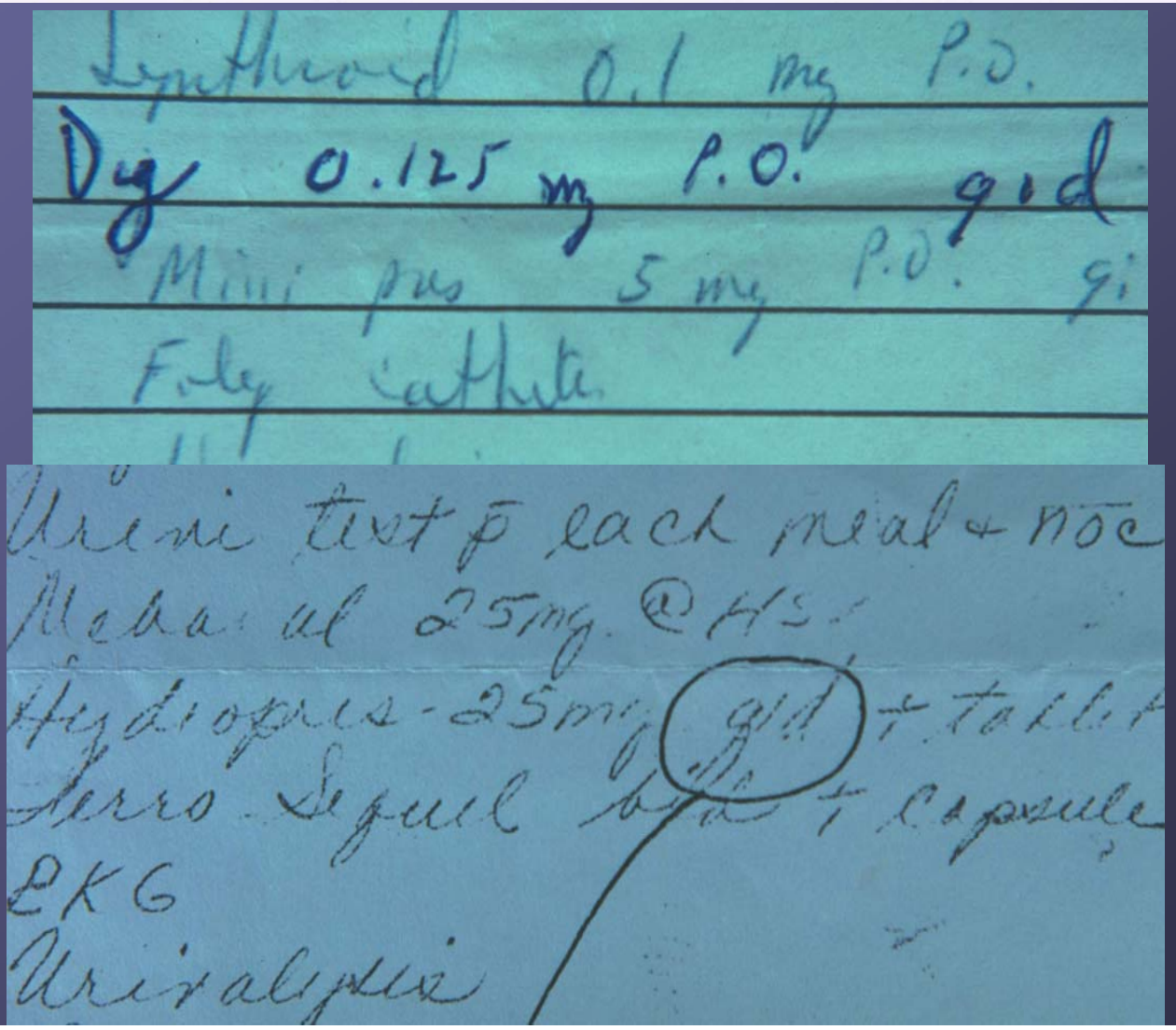
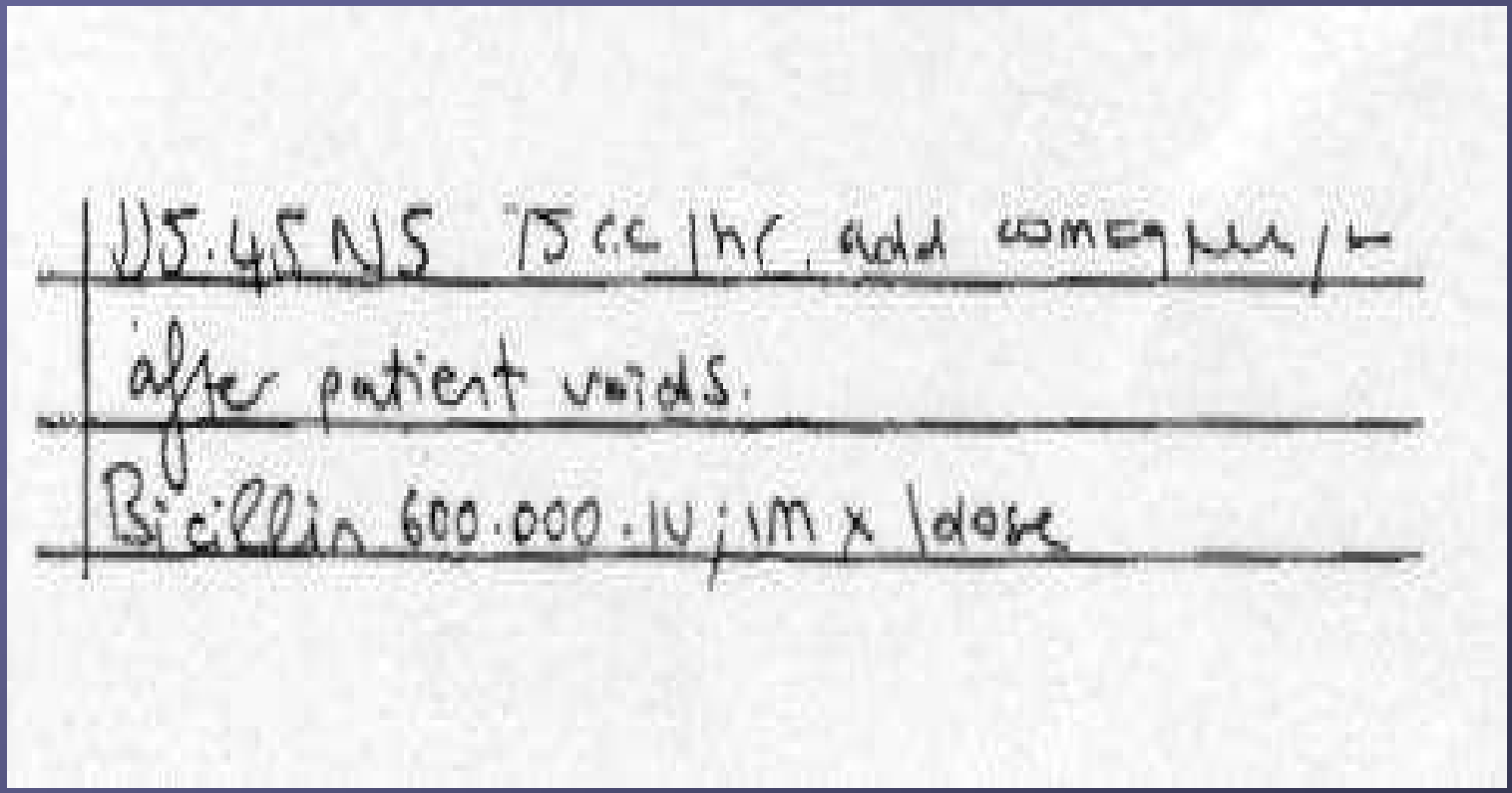
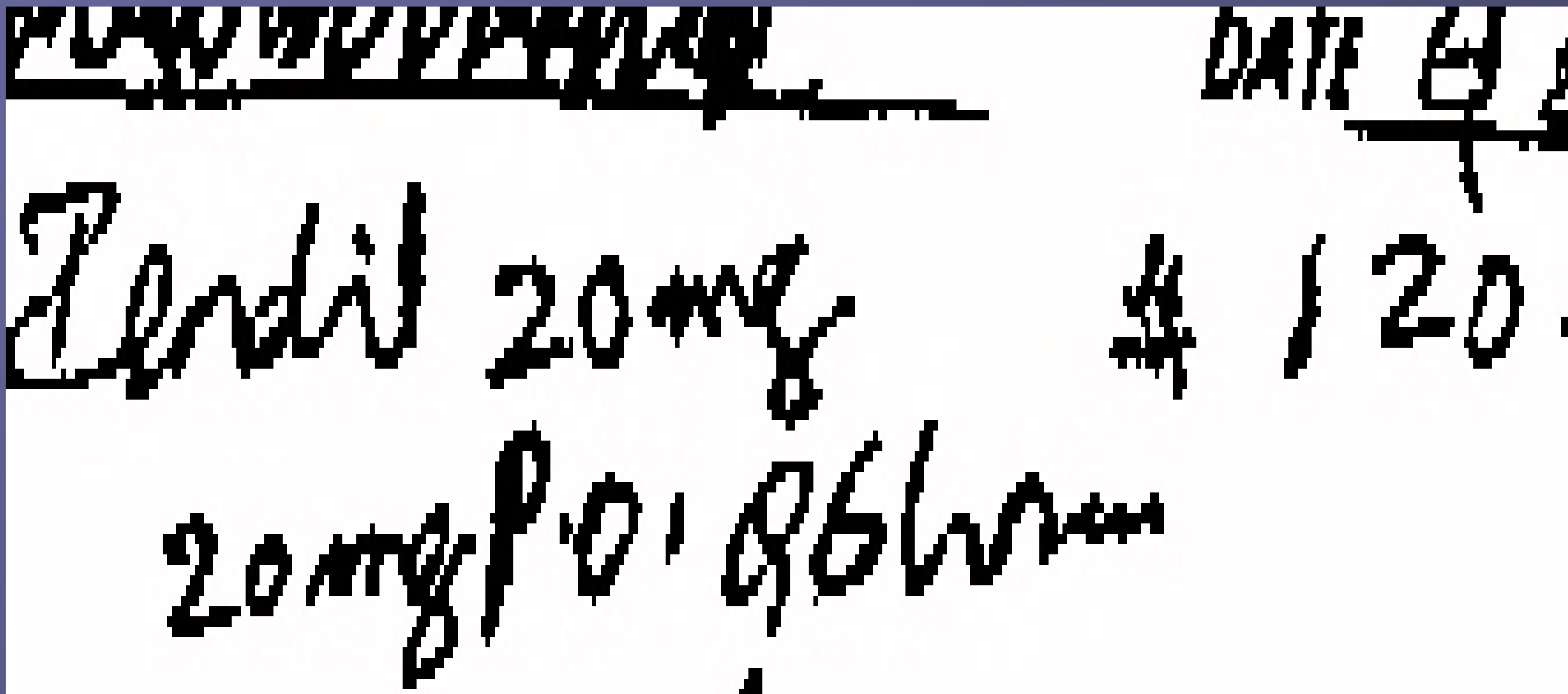
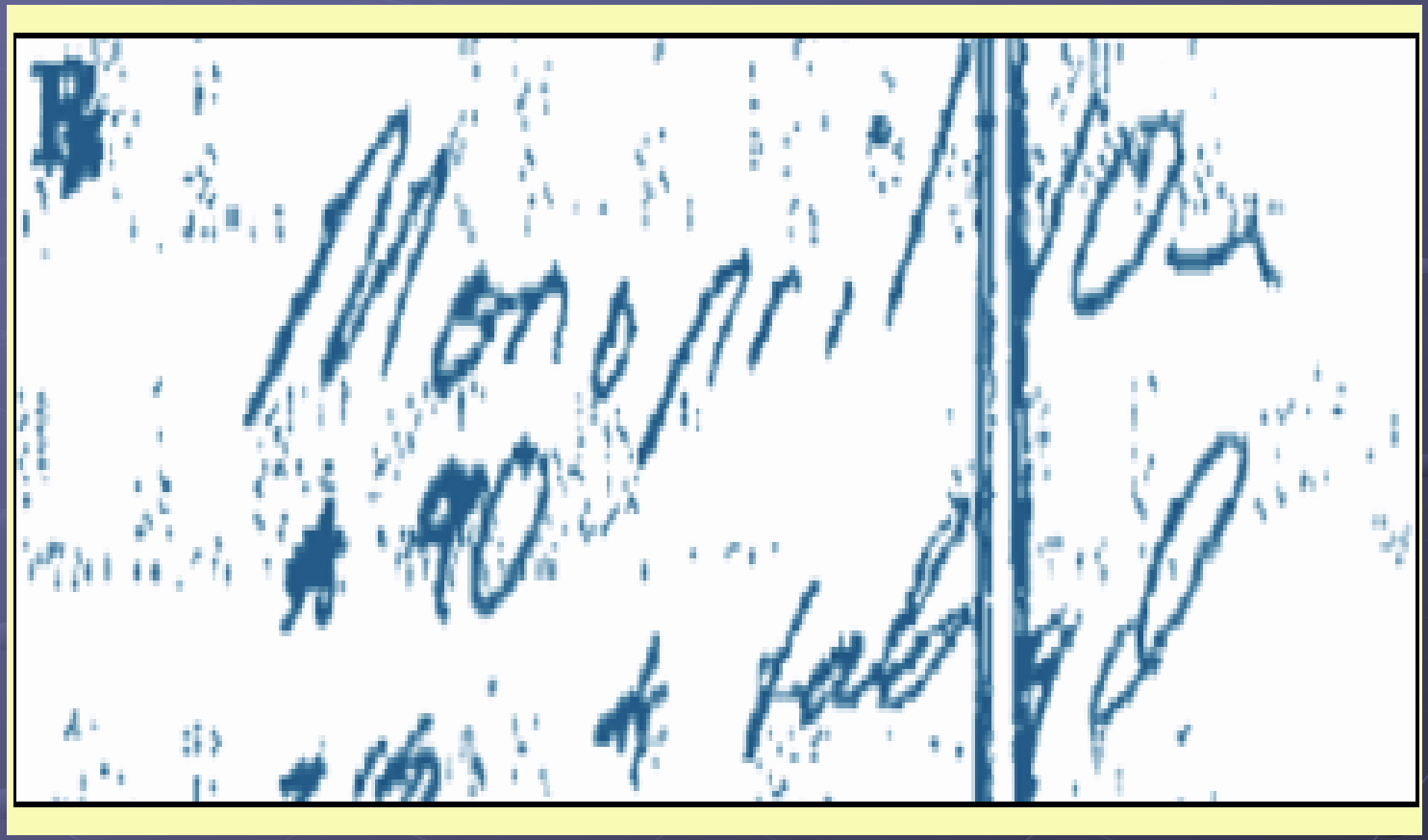
60 Regular Insulin Now




D5.45NS 75 cc/hr, add
after patient voids.
Bicillin 600,000 IU/1M x 1 dose


DATE
Zestril 20mg $ 120.
20mg po q6hrs



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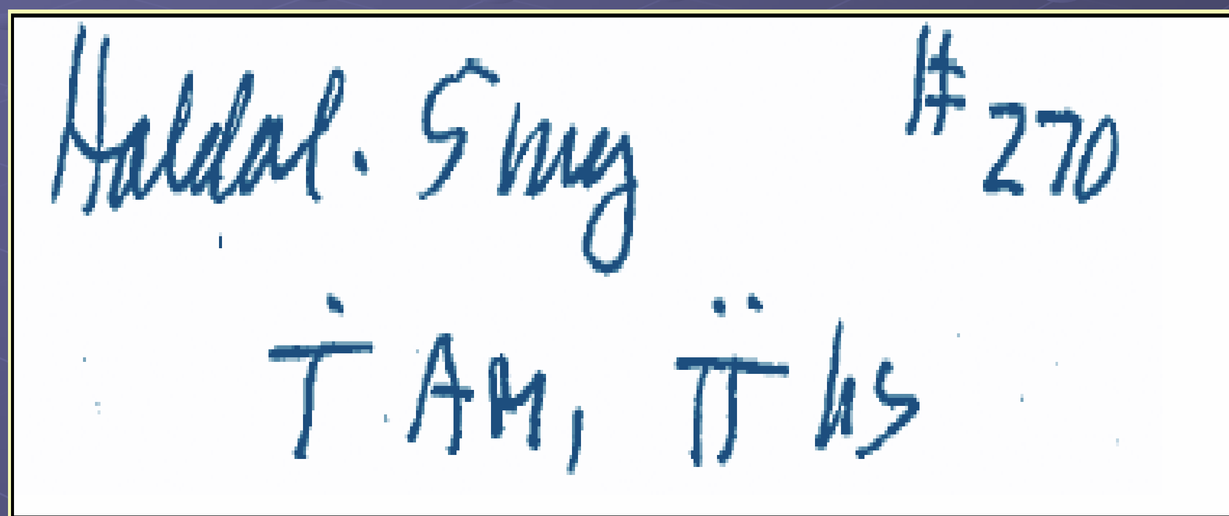
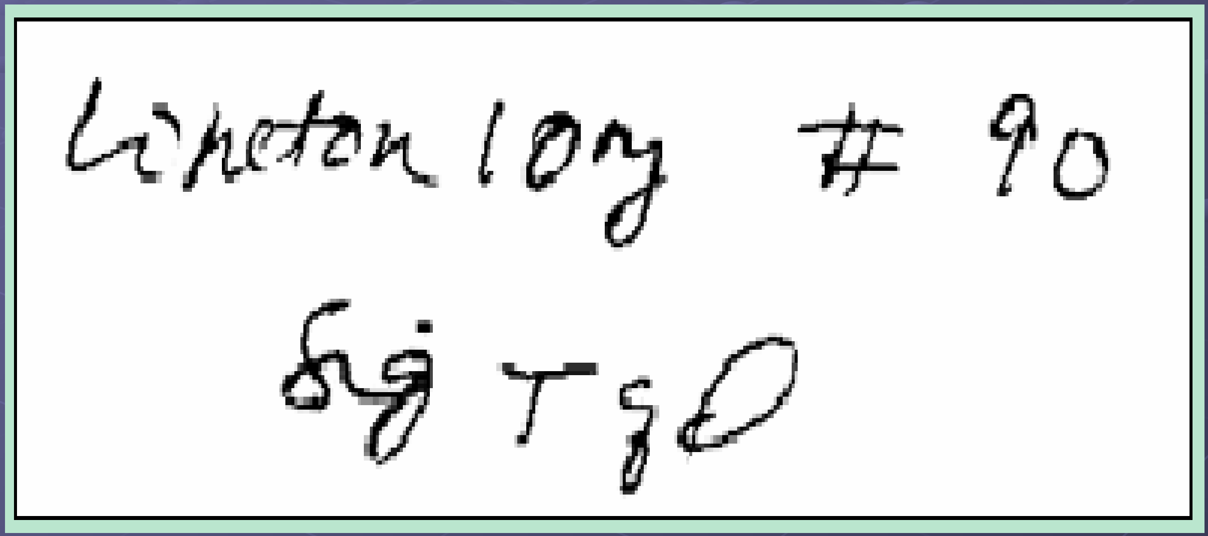


Haldol. 5 mg #270

i AM, ii hs



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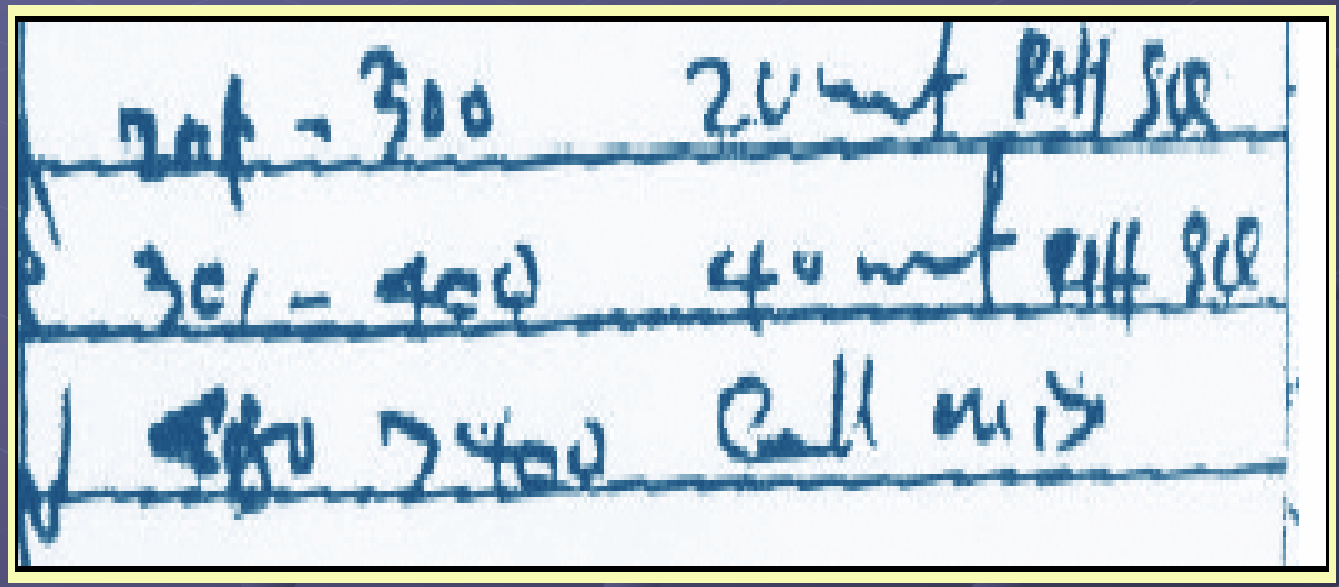

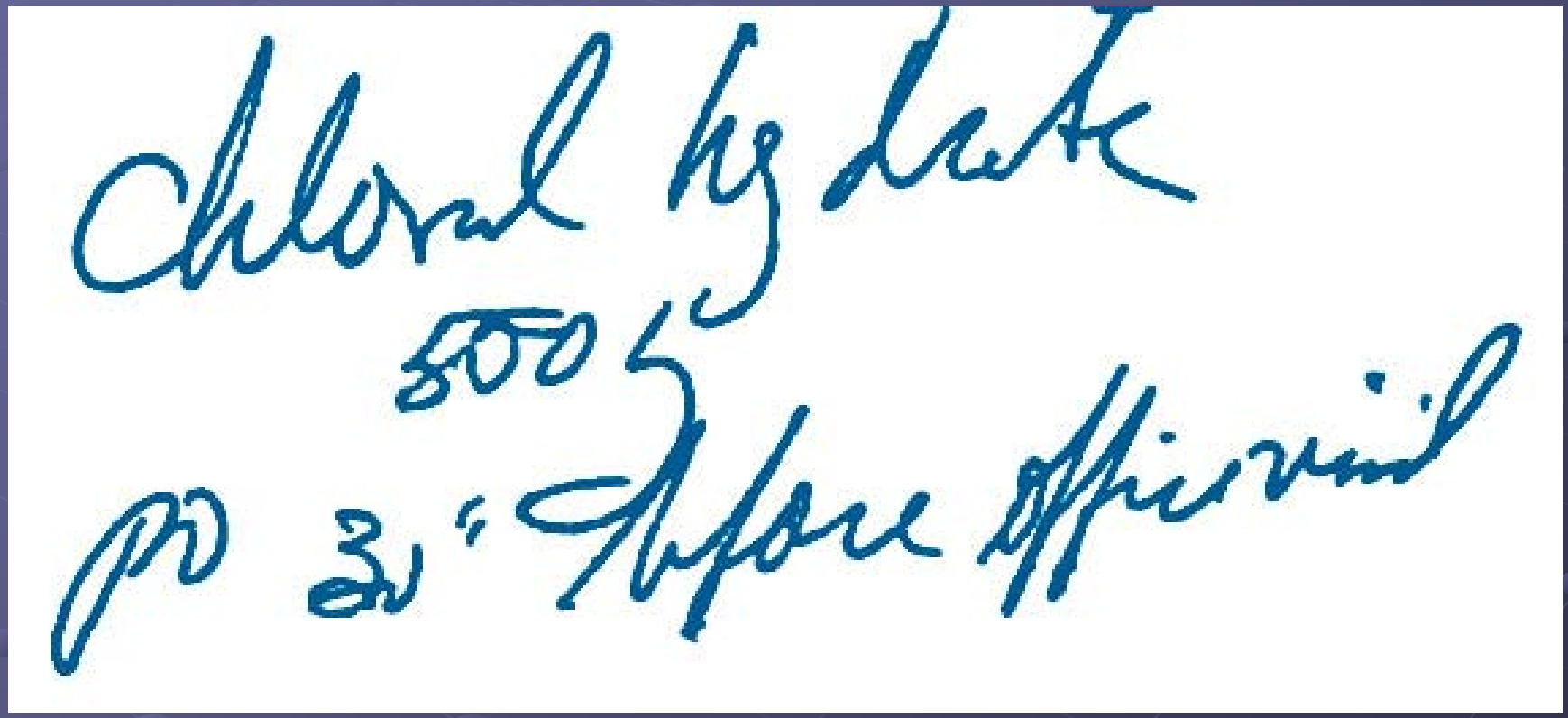

Safe Practice Recommendations for Automated Dispensing Units

- Minimize drug supply and stock drugs in unit dose, smallest dose/container size, single concentration
- Establish maximum dose range for “high alert” medications
- Educate staff to remove single selected dose only.
- Returns to pharmacy, not dispensing unit
- Adequate check system to assure accurate restocking
- Allergy reminders for specific drugs on appropriate storage pockets or drawers

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Drug Labeling, Packaging and Nomenclature

- Unclear manufacturer labeling and packaging
- Similar drug names, packaging or labeling
- Unlabeled syringes prepared by staff
- Computer-generated labels difficult to read

Drug Storage, Stock and Distribution

- Consistent brands/strengths
- Bins and stock organization
- Returned medication
- Expired medication
- Unit dose packaging and dispensing
- Traditional dispensing and wardstock
- Chemotherapy preparation
- I.V. admixture

Enalaprilat
Injection
1.25 mg/mL
Anhydrous Equivalent
FOR INTRAVENOUS

NDC 10019-281-02
Pancuronium
Bromide Injection
2 mg/mL Rx only
For IV Use
2 mL Vial Preserved


10 mL
DIN 00624721
Prod. No 351
EAU STÉRILE
POUR INJECTION USP
SANS AGENT DE
CONSERVATION
ASTRA
10 mL 9 mg/mL
DIN 00624748
Prod. No 356
SODIUM
CHLORIDE
INJECTION USP
WITHOUT
PRESERVATIVE
0.9%
Isotonic Vehicle
ASTRA
10 mL 149 mg/mL
DIN 00624756
Prod. No 352
POTASSIUM
CHLORIDE
FOR INJECTION CONCENTRATE USP
20
4.0 mEq/mL
ASTRA

Confirmation Bias

It leads one to “see” information that confirms our expectation rather than to see information that contradict our expectation.

The pweor of the hmuan mnid

Aoccdrnig to a rscheearch at Cmabrigde Uinervtisy, it deosn't mttaer in what oredr the ltteers in a wrod are. The olny iprmoetnt tihng is taht the frist and lsat ltteer be at the rghit pclae. The rset can be a total mses and you can sitll raed it wouthit porbelm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe.

Amzanig huh?

Pharmacy Technicians' Key Roles

- Participate in Safe Medication Practice Committee
- Open communication with colleagues
- Be vigilant on questionable orders
- Be alert on high risk drugs:
  - purchase
  - labeling
  - dispensing

Pharmacy Technicians' Key Roles

- Update on new technologies
  - bar-coding
  - point-of-care dispensing cabinet
  - wireless hand-held scanner
  - Robot/ATC
  - COPE and Pharmacy computer system

Emerging Issues

- New Treatments
- New Drugs
- New Technologies
- Privacy Issues
- Patient Safety
- Changing roles

Challenges and Barriers

- Political and economic factors
- Education to keep up
- Certification principle and practice
- Patient/clients centre care
- Increasing workload

Staff Competency & Education

- Competency validation
- Certification process
- Staff development
- New and unfamiliar drugs
- Orientation process
- Asking questions and challenging pharmacist

Environmental Factors

- Workload issue
- Staff morale issue
- Air circulation, lighting, noise and space
- Workflow
- Interruptions
- Employee safety

Quality Processes & Risk Management

- QA audit on unit dose bin fill
- QA audit on i.v. admixture
- Perform independent checks
- High risk drugs and high risk patient population

Independent Checking

- Keep prescription, label, and medication container together
- Verify prescriptions prepared by technicians
- Calculations
- Standard concentrations
- Automated compounding equipment

Davis NM. *American Pharmacy* 1994; NS 34: 22-23.
Cohen MR. *Medication Errors. Causes, Prevention, and Risk Management;* 9.1-11.19.

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Independent Checking: Does it work?

- Two practitioners going through the same calculation or reading the same labels not exactly “independent”
- System induced errors hard to check
- Need proper training
- Double check on high alert drugs
- Double check on high risk patients

Human Factors Engineering 101

HFE: a discipline concerned with design of systems, tools, processes, machines that take into account human capabilities, limitations, and characteristics

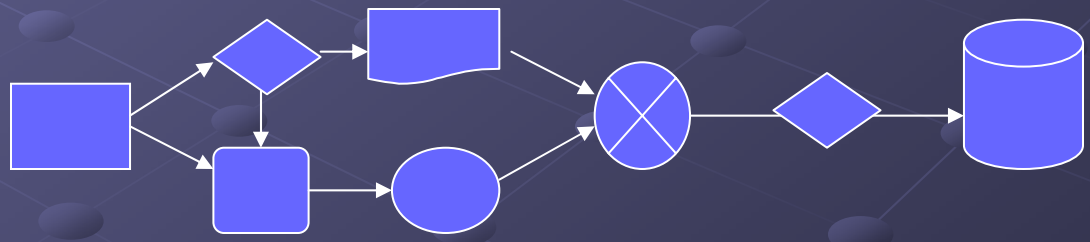
HFE = Ergonomics = usability engineering = user centered design

Human Factors - Guiding Principle

Fit the task or tool to the human, not the other way around

Goals of Process Design

- Minimize additional work/tasks
- Provide relevant info needed to get job done
- Provide suitable work area to get job done



Goals of Tool Design

- Simple, concise, natural language & familiar terms
- Logical layout of info
- Located close to where task is carried out
  (minimize working memory)
- Easily identifiable as reference (should not require reading)
- Provides enough info and detail for new user
- Provides “quick” shortcuts for familiar users

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Some Human Factors Themes…

- Working Memory / Workload / Task Demands
  - time pressure, cognitive demands, stress, information overload, multi-tasking
- Task Flow / Information flow
- Confirmation Bias or Cognitive Tunnel Vision
- Repetition, Fatigue, Sleep Deprivation
- Interface Design (order forms, drug packages & labels, etc.)
- High Noise-to-Signal Ratio (information overload)
- Work Area Design & Environmental Factors (lighting, noise, distractions)

Human Factors Engineering (HFE)

- Medical devices such as infusion pumps
- Computer software design
- Point of care dispensing cabinets
- Labeling and packaging of pharmaceuticals
- Distribution system
- Protocols/Policies and Procedures

Environmental Factors

- Work pace
- Illumination
- Noise,
- Interruptions
- Staffing

Organization Dynamics

- Cultural issues
- Supervisory practices
- Organization support

Personal Qualities

- Demeanor
- Patience
- Ability to manager stress
- Interpersonal relationship

What is Happening in Alberta

- Interests expressed in part of regulated health professional
- A need for
  - Defining standards of practice
  - Introducing code of Ethics
  - Ensuring competency

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