

## The Role of Human Factors in Pharmacy Errors:

-Twelve Practical Applications-

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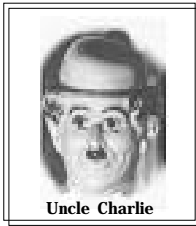
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## Paradigms for Performance

- Approach to any problem occurs within some schema model, or broader paradigm that organizes the issue
- Creates a lens for what we see and how we respond



What do You See? ←

What do You Think? →

From Los Angeles California, what direction would you fly an airplane to get to Reno, Nevada?

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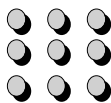
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## Changing Paradigms

Solve the following problem in 60 seconds  
Connect all of the nine dots below with three straight lines



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## PARADIGMS for Managing Medication Errors

- Three perspectives on explaining and managing medication errors
- Each one alone is not enough



**System Influences**



**Individual Interface With System**



**System Influences Within Individuals**

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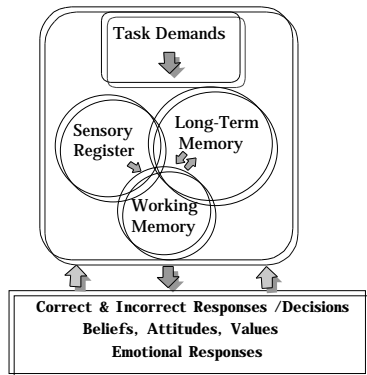
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## Cognitive Systems Model




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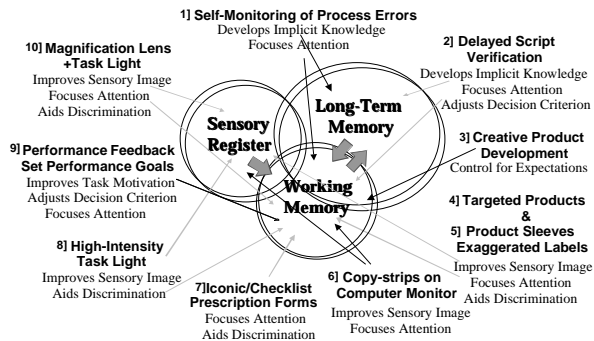
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## Prototypes in This Study & Their Functions




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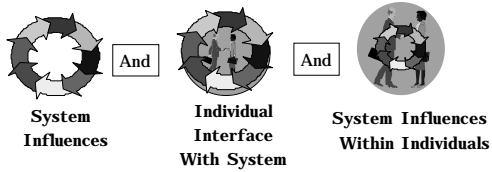
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### Connecting PARADIGMS

- To understand pharmacy errors and threats to patient safety we must understand the interconnections among three factors




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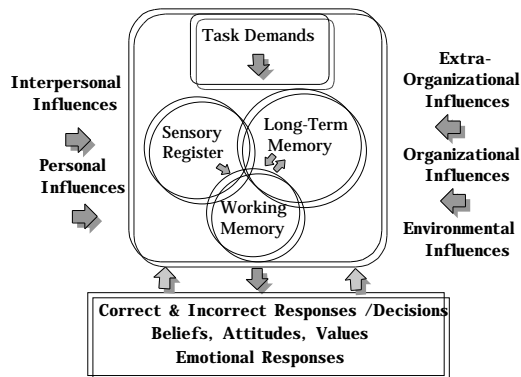
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### Cognitive Systems Model




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### Cognitive Systems Model

- Links Objective & Subjective Reality to Performance

<p><b>Task</b> Objective Workload [ e.g., Scripts/Hour] Perceptions of Workload [Task Tension]</p> <p><b>Environment</b> Physical Features [e.g., Light &amp; Equipment] Perceptions of Adequacy of Above</p> <p><b>Intrapersonal</b> Physical components/capabilities Psychological components/capabilities</p>	<p><b>Interpersonal</b> Number of People Conflict &amp; Tension with People</p> <p><b>Organizational</b> Formal Rules, Structures Informal Norms, Structures Perceptions of Org. Dynamics</p> <p><b>Extra-Organizational</b> Outside Influences on Behavior Tension Created by Influences</p>
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### Tension & Stress: Effects on People at Work

**Speeds up the rate at which information is processed**  
-- mind takes shortcuts to meet demands

**People ruminate on the things that are on their mind**  
-- mental distractions interfere with concentration and performance on the job

**Old and somewhat ineffective and inefficient habits begin to dominate rather than the new things we learned**  
--we may do the right and wrong things in the right as well as the wrong ways

**Saps time and energy from job related tasks**  
-- motivation, work attitudes, & satisfaction suffer

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### Overview of NACDS Education Foundation Project

*Components of the 18-Month Research Protocol*

- **36 Pharmacy Field-Sites in the United States**
  - Eighty-four Pharmacists/ Six Corporations
  - 12 Sites each of Low, Medium, and High Volume Pharmacies
  - Confidential and Anonymous Reporting
- **Comprehensive 241 Item Survey of 700 Pharmacists and 300 Technicians on Psychosocial Factors in the Workplace**
- **Pharmacy Simulation Studies Involving 230 People**
- **Interviews and focus groups with 100 pharmacists**
- **Review of Pharmacy and Psychology Literature on Human Performance in the Workplace**

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### Monitoring of Process Errors

**Self-Monitoring Process Error Form Prototype**

Day \_\_\_: Part of Shift [ Early ] [ Middle ] [ Late ]  
 Time of day you began \_\_\_ ended \_\_\_  
 Scripts you helped to fill during this time frame \_\_\_\_\_

Correcting information to patient on telephone  
 \_\_\_\_\_

Correcting script information when copying from a telephone call or FAX transmission  
 \_\_\_\_\_

Date-entry changes  
 \_\_\_\_\_

Product selection corrections  
 \_\_\_\_\_

Count & pour changes  
 \_\_\_\_\_

Corrections during normal checkpoints  
 \_\_\_\_\_

Counseling patient or answering patient questions  
 \_\_\_\_\_

Correcting script after it was placed in "will-call"  
 \_\_\_\_\_

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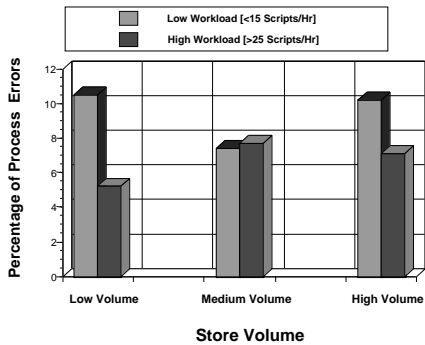
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**Individual Performance Outcomes  
Process Errors Store Volume & Workload**




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**Twelve Things to Do**

- 3] Drops in mental tension lead to error.  
Readjust mental tension before filling prescriptions at the beginning of a shift, after a break, or when workload is low.

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**Perceived Task Tension**

NASA Task Load Index (Unweighted Scores)

Overall	Mental	Physical	Time	Performance	Effort	Frustr
Tension	Demand	Demand	Demand	Concern		

Think about your last day at work for a few moments.

- How many hours did you work?
- Approximately many scripts did you "work on either alone or as part of a team?"

Follow the instructions of the presenter for rating the subjective tension and stress associated with aspects of your workload using a 1 - 100 scale where 1= a very low score and 100 a very high score.

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## Perceived Task Tension & Performance

NASA Task Load Index (Unweighted Scores)

	Overall Tension	Mental Demand	Physical Demand	Time Demand	Performance Concern	Effort	Frustr
[ High Vol Store ] [ High Volume >25 Scripts/Hour ]	<b>60.5</b>	<b>74.1</b>	<b>47.2</b>	<b>47.8</b>	<b>84.9</b>	<b>71.2</b>	<b>44.5</b>
[ Low Vol Store ] [ Low Volume <15 Scripts/Hour ]	<b>40.1</b>	<b>46.7</b>	<b>29.6</b>	<b>23.8</b>	<b>89.8</b>	<b>41.7</b>	<b>12.6</b>

\* Maximum Score = 100

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## Twelve Things to Do

- 4] Periodically monitor process errors [ i.e. near misses] and take special precautions when you notice they are increasing and approaching 6 per hour.

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## Performance & Process Errors

Detection and Correction of Process Errors

- Over 4 weeks, **21,672 scripts** monitored
- **9.03% rate of process errors** to scripts filled per pharmacist
- Total of **1,950 process errors**
- For every 6 process errors, 1 mistake got past final verification and into "Will-Call" bins or into a patient's hands

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## Twelve Things to Do

- 5] Use feedback from the monitoring of process errors to identify problems and to set goals to improve performance

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## Feedback/Goal Setting

- Provided after baseline period of two weeks
- Average rates of process and delayed verification task errors for all other pharmacists used as norms for feedback
- Person evaluated themselves in terms of being in the middle, top 25% or lower 25% of each distribution
- Goal to maintain or to improve was set for the final two weeks of the project

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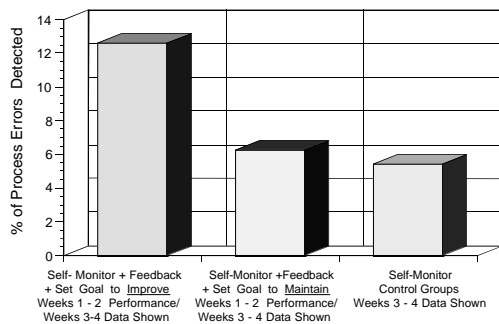
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## Feedback & Process Errors



Overall Detection and Correction of Process Errors During Weeks 3-4

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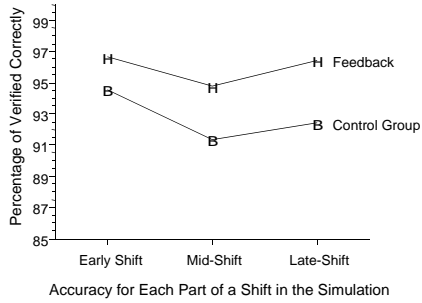
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### Feedback and Verification Accuracy




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### Twelve Things to Do

- 6] Randomly check work completed that has passed final verification.

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### Delayed Verification

**Prototype Form:**  
Checking "Will-Call" / "Return to Stock" Scripts

Day of week check was made: \_\_\_\_\_  
Time of day check was made: \_\_\_\_\_

Approximately how many hours have you worked before making this check? Circle the number of hours below.

[ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 ]

	Targeted Scripts	Other Scripts
Wrong script in bag	<input type="text"/>	<input type="text"/>
Incorrect directions	<input type="text"/>	<input type="text"/>
Incorrect count/amount	<input type="text"/>	<input type="text"/>
Wrong strength	<input type="text"/>	<input type="text"/>
Wrong drug	<input type="text"/>	<input type="text"/>

\*If wrong strength or drug, note here or on back of page  
\*Note other mistakes you observed on the form provided

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**Identification of Undetected Errors During Random checks of "Will-Call," "Return to Stock" Scripts and "Script Forms & Attached Labels."**

- One of each type of check made once per week.
- 25 "will-calls," "12 return to stock" & "100 scripts & labels"
- Total of 21,372 randomly selected scripts checked in study
- Checks made over 4-week period

<i>Will-Call / RTS [ n=5,772 ]</i>	<i>Scripts / Labels [ n=15,600 ]</i>
<ul style="list-style-type: none"> <li>• Wrong script in bag</li> <li>• Incorrect directions</li> <li>• Incorrect amount</li> <li>• Wrong strength</li> <li>• Wrong drug</li> <li>• [Misc.] Other</li> </ul>	<ul style="list-style-type: none"> <li>• Incorrect patient name</li> <li>• Incorrect directions</li> <li>• Incorrect count</li> <li>• Wrong strength</li> <li>• Wrong drug</li> <li>• [Misc.] Other</li> </ul>

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**Identification of Undetected Dispensing Errors**

**% Detected Inside of the Pharmacy**

- **Will-Call /Return to Stock**
  - 3-5% of scripts filled
  - historical average dispensing error rate for in-patient, out-patient, independent and chain pharmacy settings
- **Scripts & Labels**
  - 2-3% of original scripts and attached computer labels checked

Majority of errors in both cases were not potentially clinically significant. Label mistakes dominate

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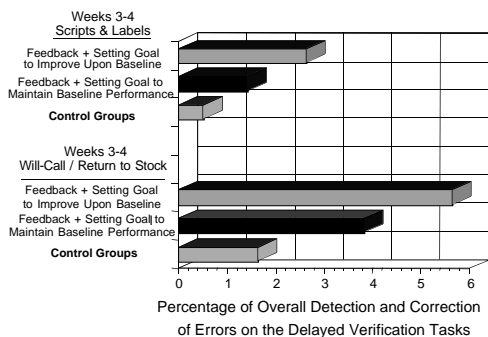
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**Feedback & Delayed Verification Error Detection**




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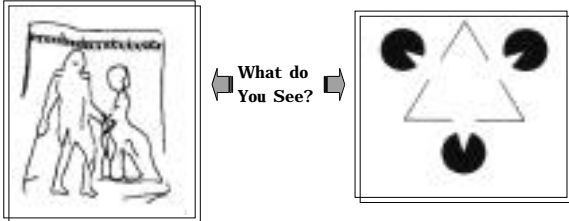
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### Paradigms for Performance

- Approach to any problem occurs within some schema model, or broader paradigm that organizes the issue
- Creates a lens for what we see and how we respond



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### Twelve Things to Do

- 7] Conduct independent checks of work completed to reduce any remaining errors on average by 95%.
  - Dispensing error rate (4% of scripts filled)
  - Checking error rate (5%) of scripts checked
    - i.e., 95% of any remaining errors are caught for each independent check made
  - True Error Rate = Dispensing rate x Checking rate
  - Example  $(.04 \times .05) = .002$  or .02% errors remain

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### Twelve Things to Do

- 8] Improve sensory discriminations and the focus on details by placing prescriptions at eye-level during data-entry.
- 9] Improve sensory discriminations and the focus on details by using supplemental task lighting and magnification "as needed."

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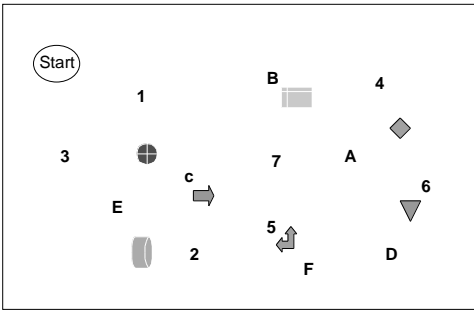
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### Cognitive Style & Performance



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### Cognitive Style: Field- Independence/Dependence

- More detail oriented and less distracted pharmacists & technicians were, the fewer errors they made. [Field-Independent]
- Pharmacy personnel who had a "big picture" orientation made more mistakes. [Field-Dependent]

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### CopyStrips



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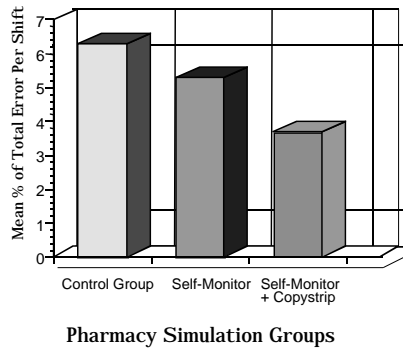
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### CopyStrips and Error



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### Effects of Illumination on Error

#### Objective Levels of Illumination and Error

- Total Dispensing Errors
- 45 foot-candles of illumination [3.8% errors]
  - 146 foot-candles [2.6% errors]
- 32% Improvement [ Buchanan et. al., 1991]

#### Perceptions of Illumination and Error

- Total Process Errors During Dispensing [1-5 rating scale]
- Illumination inadequate [ratings <2.5] [8.5% detected]
  - Illumination adequate [ratings >2.5 ] [11.8% detected]
- 38.8% Improvement [ Grasha et. al., 2000]

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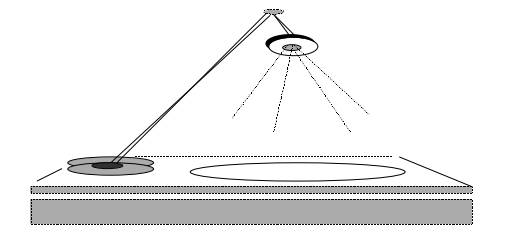
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### High- Intensity Task Light



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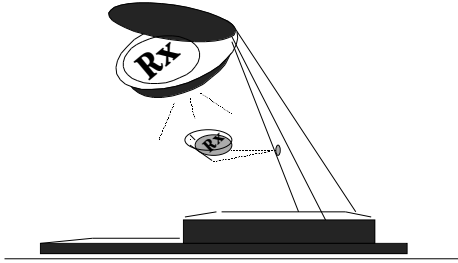
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### Magnification/Task Light



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### Twelve Things to Do

- 10] Use principles for enhancing attention to target products for special attention and use product sleeves, exaggerated labels and other devices to aid product selection and verification.

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### Exaggerated Labels

Loestrin**FE**

Fosamax **5** mg      Seroquel **100** mg  
0310-0271-10

ortho **TRI** *Cyclen* Vanceril **DS**      Prinivil **10** mg  
0085-1112-01      0006-0106-82

Zestril **10** mg

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## Prototype Product Sleeves



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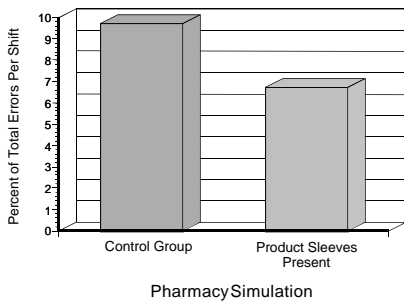
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## Overall Effect of Product Sleeves on Total Errors



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## Twelve Things to Do

- 11] If supervising others, learn as much as you can about how to “work with” people and to supervise in as positive a manner as possible.

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### Supervisor Perceptions & Performance

**Supervisor Dimensions [Supervisory Rating Scale]**

- Overall Supervisor Skill
- Specific Dimensions of Skills  
Associated with Inaccurate Performance

- \_\_\_ Told people what to do and how to do it.
- \_\_\_ Did not establish a climate for excellence and professionalism
- \_\_\_ Overbearing when discussing expectations
- \_\_\_ Did not delegate appropriately
- \_\_\_ Did not encourage autonomy
- \_\_\_ Tended to not give reasons for why something should be done.
- \_\_\_ Set high standards for performing tasks but style created tension

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### Twelve Things to Do

- \* 12] Take steps to manage stress inside and outside of the workplace in order to reduce dysfunctional task tension and mental distractions.

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### Perceptions of Job Stressors

Mean Job Stress Scores  
[Holistic Stress Test] [95 Maximum Score]

Pharmacists / Field-Sites	48.7
Pharmacists / Surveys	49.8
Pharmacy Technicians	48.1
College Students / Part-Time Jobs	54.8
College Faculty	53.3
R&D Middle Managers	50.9
Military Reservists	49.0
Medical Residents	60.6

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### Job Stressors

Top Five Ranked Causes of Job Stress  
[Holistic Stress Test]

Pharmacists

- Supervisor demands high job standards
- Lack of promotions & poor pay raises
- Inadequate feedback on performance
- Extra effort expected-- no extra reward
- Too many tasks to complete

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### Job Stressors

Top Five Ranked Causes of Job Stress  
[Holistic Stress Test]

Pharmacy Technicians

- Supervisor demands high job standards
- Changes in policy & procedures
- Lack of promotion & poor pay raises
- Inadequate feedback on performance
- Too many tasks to complete

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### Pharmacists who Managed Stress Well

- Possessed Mental Hardiness
  - Able to Commit, Challenge, Control
  - Had a Problem Solving Orientation
  - Used a "Small-Win" Attitude
  - Knew When to Cut their Losses
  - Challenged absolute and extreme beliefs
  - Checked ideas for coping with other people

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A New Non-Commercial Resource for More Information

**www.Pharmsafety.net**

**Free Self-Instructional  
Modules for CE Credit**

**Integrates Pharmacy  
Practice & Psychosocial Issues**

**Developed from McKesson  
Foundation Grant for Pharmacists  
In the USA & Worldwide**

**Modules Include Information On**

Enhancing Supervision, Risk Management, Organizing Safety Meetings,  
Stress Management, Learning from Mistakes,  
Developing a Culture of Safety, Managing the Aftereffects of Misfills

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## Summary

**An understanding of cognitive and other psychosocial factors are important to understanding accuracy, job effectiveness, and satisfaction in a pharmacy**

- pharmacists would benefit from a better understanding of how the mind works and how they are affected by psychosocial processes that affect on the job performance
- courses, workshops, continuing education distribution requirements to obtain such training would be helpful
- training in stress management, conflict management, and communication skills, and supervision would be useful

**The causes of misfills and job dissatisfaction are not located in any single factor**

- multiple factors are involved and a focus on any one factor is unlikely to prove effective

**The cognitive and psychosocial factors identified are important to working effectively and accurately in CURRENT AS WELL AS IN FUTURE ROLES & TASKS OF PHARMACISTS**

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