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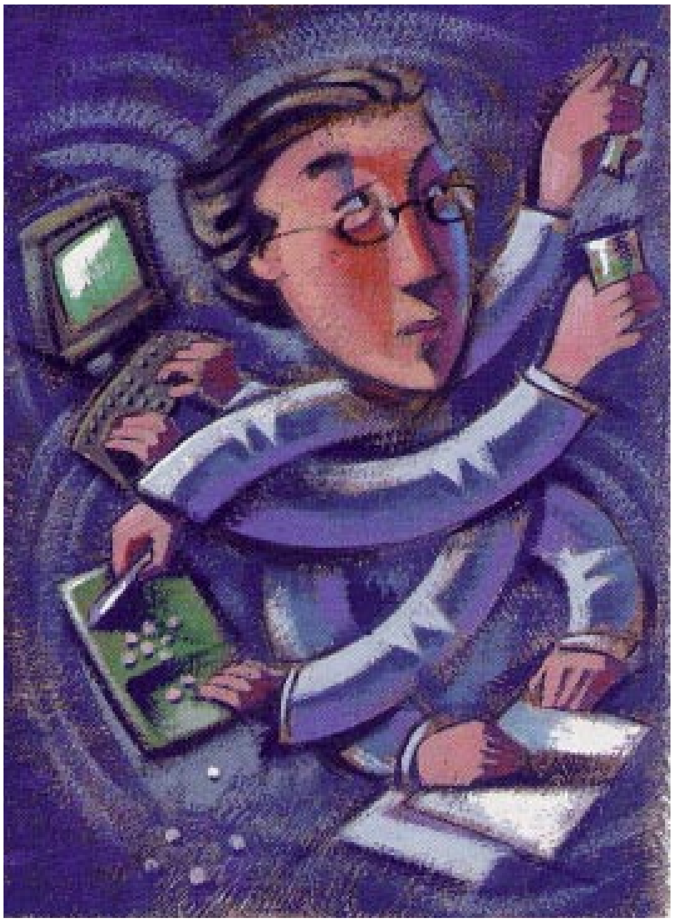


Pharmacy Workload

The causes and confusion behind dispensing errors

Anthony F. Grasha, Ph.D.
University of Cincinnati

Canadian Pharmacists Association
Association des pharmaciens du Canada

Misconceptions about Pharmacy Workload

Anthony F. Grasha. PhD
Professor of Psychology, University of Cincinnati, Cincinnati, Ohio

The relationship of workload to pharmacy dispensing errors is a controversial issue in Canada as well as the United States. There has been much debate on the number of hours people can work, the number of scripts that can be filled, and the impact of a pharmacist shortage on workload and public safety.

Unfortunately the issue has become polarized, which makes it difficult to objectively evaluate. At one pole is the argument that pharmacists are asked to do too much and that workload has become a major factor in dispensing errors. Recently, for example, I received a letter from an attorney, responding to comments I made as part of an interview in the *New York Times*. I had tried to place the problem of dispensing errors in a broader context, but he was involved in the union movement among pharmacists and was not looking for shades of gray. "As far as I can tell," he wrote, "workload is the only issue."

At the other pole is the belief that workload has been exaggerated as a factor that contributes to human error, and that pharmacists have to be careful regardless of how many prescriptions they fill. This view is not uncommon among those responsisible for managing pharmacies within corporations, and is not simply based on self-interest. To illustrate, consider what happened when I was commissioned to examine the pharmacy incident reports within a corporation in the United States.[1,2] As part of this project, pharmacists were encouraged to report errors through a direct computer link to the company's database. Reporting for the project occurred over a three-week period and involved several hundred *relatively low* (less than 900 scripts a week), *median* (900-1400 scripts a week), and *relatively high volume* (1400+ scripts a week) retail outlets. Surprisingly, when the *percentage of incidents* was examined (i.e., number of incidents reported divided by the median store prescription volume), more misfills were associated with the low volume stores. The observed percentages were: low volume stores **(.079%)** median volume stores **(.034%)** and high volume **(.022%).**

One might argue that pharmacists who were busy simply did not take the time to report errors, and that the lower percentage of misfills for the high volume stores reflects a reporting bias. Unfortunately, this explanation does not fit with the reports of pharmacists in interviews and focus groups.[3,4] It is not unusual to hear people report that many mistakes occurred when they were not very busy. And, as I will illustrate later, similar data appear using a variety of research strategies ,including direct observation of pharmacists at work and pharmacists' reports while self-monitoring.

Of course, none of this is justification to encourage long workdays or higher rates of dispensing medications. Like everyone else, pharmacists have different thresholds for workload and how much they can do safely and without burning out. *As this article will show, such thresholds are present at both low and high levels of workload.* So to understand the effect of workload on performance, a clear definition is needed. Also, the relationship between the "objective" and "subjective" nature of workload must be understood, and the variety of workplace and psychosocial factors associated with workload must be considered.

To accomplish this, we will have to set aside some popular misconceptions about workload. Controversial issues often force people to take sides and to seek social support for their beliefs. In the process, facts get distorted, details are omitted, and contrary evidence is suppressed, leading to further misunderstanding. Debates about workload are no exception.

Several studies on workload issues might clarify a few points and perhaps stimulate new ways of thinking. In this article, I will share my research into pharmacist performance conducted over the past eight years, largely through my work in retail pharmacy settings. In particular, I will emphasize findings from my most recent investigation of 36 chain drugstore operations in the United States.[5,6] That work was based on a model of human error that emphasizes the role of human cognitive system malfunctions due to stress and tension created by a variety of psychosocial factors.[7] These include: individual perceptions of workload, the physical environment, personal qualities, relationship stress on and off of the job, organizational dynamics of a pharmacy, and the influence of outside organizations such as pharmacy boards and third-party insurance requirements.

A brief description of the research protocol is provided in Table 1. Note that this recently completed project (June, 2000) also involved comprehensive surveys of pharmacists working outside of the immediate field-sites, the use of a pharmacy laboratory simulation to isolate and control factors affecting dispensing, and a review of the psychological and pharmacy literature. The goal was to have a broad base of support for conclusions and at least two independent sources of information to back up major conclusions.

Table 1: Summary of the Research Protocol

Participants

Eighty-four volunteer pharmacists working in 36 chain pharmacy field-sites nationally. Pharmacists were paid for training and given a small incentive to participate.

Participants were typical in terms of age, sex, and years of experience to other pharmacists working within each chain.

Field-Sites

The field-sites were equally divided among six corporations and included 12 low volume (<1000 scripts a week), 12 medium volume (1000-1800 scripts a week) and 12 high volume (>1800 scripts a week) pharmacies. Sites were located in six states and represented a cross-section of traditional chain drug stores, those in grocery outlets and mass merchandising locations. Each was staffed appropriately with pharmacists and technicians for the volume of scripts processed.

Measures

A variety of psychosocial questions assessed personal levels of stress, personality characteristics, job satisfaction, attitudes and beliefs about organizational, interpersonal, environment, and task-related issues. All participants answered the same 241 questions which were combined into a variety of subscale scores for further analysis.

Procedures

All pharmacists participated in four- to five-hour training sessions that included the questionnaire on psychosocial measures and a discussion of the study, as well as instructions on the research protocol. Participants worked on various aspects of this project for four to five weeks. Anonymous and confidential field-site information was recorded in small booklets that were returned to the principle investigator by mail.

Tasks included recording mistakes made and corrected while filling scripts, counseling patients, and discussions with physicians by telephone. Participants recorded these process errors for a total of 18 hours, and recording was divided among early, middle, and late parts of their shift. They also responded to questions designed to measure their moods and their perceptions of workload. Also, pharmacists performed random checks of 74 Will-Call items and looked for discrepancies in 200 randomly selected original scripts and attached computer labels. Participants received anonymous feedback on error tendencies, and some products were targeted for special attention using lists strategically placed in the pharmacies. Exaggerated product labels also were used to increase discrimination among difficult to read labels. High-intensity task light and magnification devices aided the initial reading and verification of difficult to read scripts. Factors studied in the field-sites were examined under controlled conditions in the laboratory simulation. Finally, a 241 item comprehensive survey of 234 pharmacists provided other checks on the psychosocial characteristics of field-site pharmacists and allowed additional perceptions on the causes of misfills to be included.

Outcomes from this project have been organized around several misconceptions identified in my research.

Misconception
Workload is Best Defined Objectively

For many people, workload is defined as the number of hours and days worked, the number of scripts filled, the pace of their work, how many breaks and how much help they receive. The focus on the objective side of workload, unfortunately, has led to the search for the "magic number"—how many scripts pharmacists should fill before accuracy suffers. Indeed, after presenting my findings to an industry group, the first question I was asked was, "What is a safe number of prescriptions to fill?" The belief that there must be a breaking point for pharmacists in terms of scripts filled or hours worked ignores individual differences and several facets of workload.

Workload is a process and not an event

Dispensing has a number of interrelated components that to varying degrees take up a pharmacist's time. A recent study of U.S. retail stores showed that pharmacists' activities during dispensing were diverse, as was the time involved in each part of the process.[8] Activities include: present script (7.4%); process script (32.1%); prepare order (23.4%); deliver/dispense order (8.9%); pharmacy administration (5.8%); management of inventory (9.1%); disease management (2.0%); miscellaneous activities (11.3%). In effect, pharmacists have diverse "workloads" and attempts to control just one aspect may overlook something that is potentially important.

For example, as pharmacists spend 68% of their time processing orders and prescriptions, there is a significant opportunity to free-up time for technicians to check that work. Pharmacists might spend more time counseling patients or performing additional checks of completed work. A survey of participants suggested that at least 30% of misfills could be detected at the point of counseling. Also, for every additional independent check of work completed, at least 95% of mistakes that got past normal verification processes during dispensing can be caught. These interventions would likely reduce dispensing errors more successfully than any arbitrary limit on prescription numbers.

Workload has both “objective" and "subjective" components.

There is a subjective side to workload. This is experienced as "task tension" or stress and is influenced by a number of factors, including specific task demands, broader job stress, and tension from a variety of psychosocial variables. In the study of 36 pharmacy field-sites, one of our measures involved the NASA Task Load Index.[9,10] The index consists of six sub-scales that evaluate perceptions of physical demand, mental demand, time demand, concerns for performing well, and task-related frustration and effort. A composite index of overall task tension that ranges from 0-100 points can be calculated, as well as scores on the individual dimensions. The overall job signature on subjective workload for pharmacists and technicians participating in the project is shown in Table 2.

Pharmacists monitored and recorded their perceptions of workload or subjective task tension during the early, middle, and late parts of their shifts. Records were kept as part of the self-monitoring protocol described in Table 1. The overall scores shown in Table 2 illustrate that the dispensing task is particularly stressful for the mental demands it places on people, the effort required, and the need to perform at a high level. Relative to technicians, pharmacists found dispensing more physically demanding; they expended less effort but reported feeling more frustrated. Overall, the dispensing task is moderately stressful, relative to a low stress benchmark task such as sorting playing cards into suits, which carries an overall workload score of 20.[5]

Misconception
Adverse Effects of Workload are Similar Throughout the Dispensing Process

People tend to want their views of reality to be as simple as possible.[4] When this logic is carried into the pharmacy, some may expect that any adverse effects of workload should be the same at various points in the dispensing process. Our research, however, suggests that such expectations cannot be applied to the effects of workload, as the following examples illustrate.

Table 1: Perceptions of Subjective Workload

	Overall Tension	Mental Tension	Physical Demand	Time Demand	Performance Concern	Effort	Frustration
Pharmacists	58.5	69.2	45.5	45.3	86.1	68.7	38.4
Technicians	55.3	69.8	36.4	42.4	89.7	76.3	62.4

* Unweighted NASA-TLX Scores
Maximum Scores = 100

Contrary to expectations, objective measures of workload do not affect the components of the dispensing task in the same way.

For example, using a pharmacy simulation task where the components of dispensing can be controlled and isolated, participants working at a relatively slow pace produced more mistakes during data-entry. Those working at a fast pace, however, made more product selection mistakes.[11,12] On the other hand, during final verification, more label errors were missed as workload increased.[13] The point is that we cannot generalize about how detrimental a given factor will be in the dispensing process. The dispensing process is multifaceted and subject to influences that may not work across the board in ways that conventional wisdom suggests they should.

Misconception
An Increase in the Amount of Objective Workload is a Good Predictor of Error

When we do something wrong, there is a bias in Western cultures to look for explanations outside of ourselves.[14] People focus on factors in the environment, the actions of others, or they feel victimized by "fate." This is a variant of the "fundamental attribution bias" and is one of the reasons workload increases are blamed for misfills.

Often, a serious problem is brought to a pharmacist's attention several hours or days after the event occurred. This affects our interpretations for several reasons. Our memories are normally not instant replays of what happened, but reconstructions of what occurred. And when negative emotions such as anxiety are present, such constructions are seldom accurate.[15] Instead, the attribution bias kicks in and attention focuses on things like workload, interruptions, noise or other factors that seemed to be prominent in the pharmacy environment.

Upon closer examination, however, the role that workload plays in producing misfills is far more complicated. To understand it, we cannot focus on individual experiences but need to look at workload effects among a group of pharmacists. That is, we want to know how it generally functions in affecting accurate and inaccurate performance, recognizing that there may be individual cases where it indeed was a factor. But even then, we have to consider the combined role of workload with other variables.

The relationship of increasing workload to misfills is not well established.

Research is sparse on the issue of how workload and error are related in a pharmacy. And a review of the findings from studies conducted largely in outpatient pharmacy field sites as part of the current project yielded large discrepancies in the purported negative effects of prescription workload. In some cases, moderate to strong linear associations have been reported between prescription volume and error (correlation coefficients range from .40 to .78)[16-18] In stark contrast, published data from other sources[11,12,19] yield relatively weak linear associations.

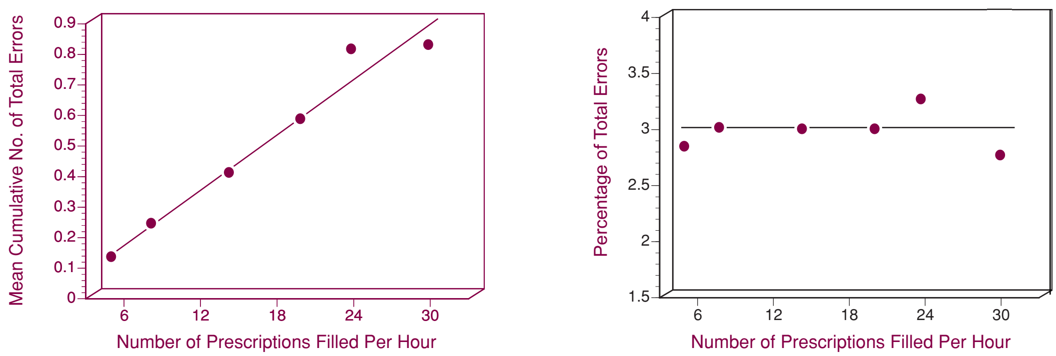
One of the problems is that in studies where relationships were found, dispensing errors were commonly summed across pharmacists and periods of time on task. To provide an index of how many mistakes were entering the system over time, a cumulative count of errors committed on shift was assessed. Thus the errors made during the first time period are added to the second time period and so on. Figure 1 shows the nature of this relationship and is based upon a composite of data from the literature and our pharmacy simulation where this pattern is easily observed.

Reporting errors in this manner paradoxically makes it difficult to evaluate the role that workload plays.

The problem is that there will always be a larger total number of errors late in a shift when mistakes are summed in this way. In fact, one could just as easily start with the number of mistakes made only during the last time interval and sum backwards from late in the shift to the beginning. The data shown in the left-hand side of Figure 1 would basically become reversed leading to the conclusion that the total number of errors entering the system was higher during the first hour on shift than during the last hour.

To adequately assess the role of objective workload, we must examine how likely a misfill is during any period of time on shift. We need to know the percentage of errors (i.e. ratio of misfills divided by number of scripts filled) early in a shift and to see if that percentage differs from those observed later on. If workload alone was responsible for errors, the percentage of mistakes later in a shift should be higher than those observed earlier. The right-hand side of Figure 1 shows what happens when the data from the left-hand side of the figure are converted to percentages for each point on the chart. No linear increase in misfills over time as a function of workload is observed. Because the per-

Figure 1: Relationship of error to workload *



On the left side is shown the relationship between cumulative counts of the number of total errors as the number of prescriptions filled per hour increases. On the right side is shown the percentage of total errors to scripts filled at each point in the chart on the left side of Figure 1.

* Composite from Grasha and Schell,[11] Schell and Grasha[12] and Allan.[13] Separate analyses for each data set were essentially identical; combining them increased the ability to generalize the findings across situations.

centage of errors entering a system at any given point in time are not dramatically different, we cannot conclude that increases in the number of prescriptions dispensed over time (i.e. an objective measure of workload) is the major factor producing the mistakes.

Such findings do not close the door on workload and its possible role in human error in the pharmacy. There may be other ways in which it is problematic, including the fact that it may work in conjunction with other factors. To solve the mystery, we must do two things.

1. The percentage of misfills associated with each person in the sample must be examined under high and low conditions of workload. To do this, three independent sources of data were used. One was the percentage of overall dispensing errors pharmacists made in an outpatient pharmacy in a well designed study of factors affecting such mistakes.[18] The second source of data was our pharmacy simulation studies,[11] and the third was an analysis of the percentage of total errors in dispensing among the 84 field-site participants in the current project.[5,20] This information is shown in Figure 2.

In each case, when workload was high, a larger number of people made a relatively smaller number of mistakes. Similarly, when workload was low, there were more participants making relatively more mistakes. This data is remarkable as the settings in which the data were gathered were not equivalent and the measures of error were different. For example, in the outpatient pharmacy study, observers checked the

Figure 2: Relationship between total error and workload for three independent samples

TOTAL ERROR

Outpatient Pharmacists

WORKLOAD	High (Above Md)	Low (Below Md)
High	2	5
Low	6	1

Pharmacy Simulation

WORKLOAD	High (Above Md)	Low (Below Md)
High	10	25
Low	22	19

Pharmacists in Field-Sites

WORKLOAD	High (Top 3rd)	Low (Bottom 3rd)
High	7	15
Low	12	9

To generate each matrix, each sample was initially split into high and low error participants. This was done by determining the percentage of total mistakes each made [i.e., ratio of all errors/ scripts filled and whether each person was above or below the median of the percentage of errors]. Next whether or not participants were above or below the median [outpatient pharmacy and simulation participants] or in the top 3rd or bottom 3rd of the workload distribution [chain pharmacy field-site participants] was determined. Then, whether they worked on a relatively high or low number of scripts was calculated [i.e., above or below the median on workload or in the upper or lower 3rd of the distribution of scripts filled]. The 2 x 2 matrix for each sample that resulted from this procedure is shown in this figure. In each case the outcomes were statistically significant [Outpatient pharmacists [x^2 =4.7; p <.05]; Pharmacy simulation participants [x^2 =4.9; p <.05]; Field-Site Pharmacists [x^2 =2.8; p <.lO] work of pharmacists after a prescription passed final verification. Total errors identified by the observers constituted the measure of misfills. In the pharmacy simulation, total errors measured were those made entering data into the computer, during product selection and counting and pouring. Mistakes in the participants' work were identified by monitors. Finally, in the field-sites, the total number of mistakes monitored and reported by pharmacists while working on scripts was the measure of error reported here.

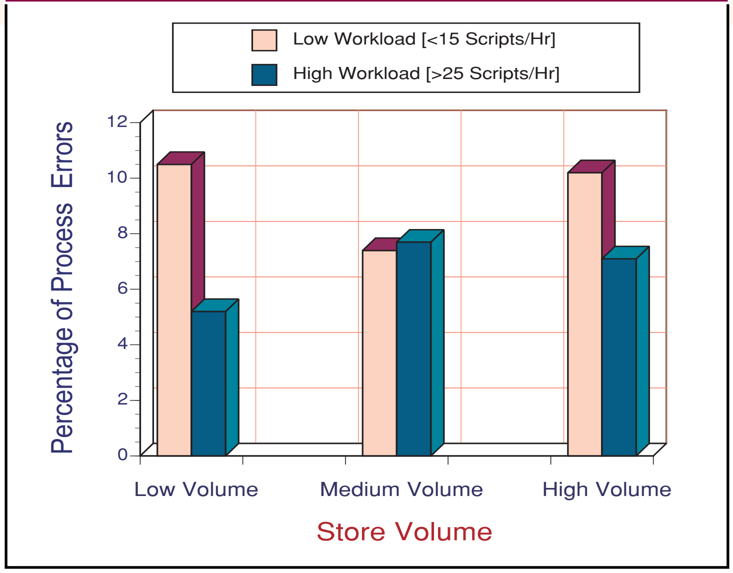
2. The relationship of error to changes in workload within low, medium, and high volume pharmacies was also examined. In the current project, this relationship was identified using the percentage of total errors pharmacists caught and reported in the process of filling scripts. This was calculated during times when they worked on less than 15 scripts per hour (relatively low workload) or more than 25 scripts per hour (relatively high workload). The percentages obtained revealed what happened when a shift in workload occurred in the low, medium, and high volume stores.

Figure 3 illustrates how the incidence of process errors changed. In the low and high volume stores, more mistakes were reported when working on 15 or fewer scripts per hour. Fewer mistakes were observed when prescription volume was high. Pharmacists in medium volume outlets were not affected as much by shifts in their workload. Shifts from high to low workload conditions were more detrimental for pharmacists working in high volume stores. They made more process errors when workload dropped than they did while maintaining a faster pace.

Such changes in work rhythms from high to low workload in stores where someone normally expects to work harder may disrupt cognitive processes used to verify one's work. When workload increased in the low volume stores, however, pharmacists made fewer errors. Working at a relatively faster pace seemed to increase task engagement and concentration that resulted in fewer mistakes. With less work to do, however, boredom may occur and it becomes easier to focus on non-task issues that interfere with performance.

Pharmacists in focus groups routinely mentioned that "some of my worst times were when I did not have enough to do." Taking extra care during lulls in work appears crucial, while finding ways to better distribute work to avoid dramatic shifts in workload would seem advisable. Similar increases in error when shifts from high to low workload occur have been observed in non-pharmacy tasks as well.[21,22]

Figure 3: Changes in process errors within low [<1000 scripts/week], medium [1000-1800 scripts/week], and high volume [>1800 scripts/week] pharmacies



Misconception

Psychosocial Factors are not Important in Understanding how Workload Affects Pharmacists

The "inner pharmacist" is a big part of understanding human error and a "missing link" in understanding the role that workload plays in accurate and inaccurate performance. It has, however, received relatively little attention in the literature. Popular interventions for understanding and controlling errors take a systems perspective and de-emphasize the role that people play. In effect human beings are seen as victims of system defects that introduce errors. Thus, interventions for identifying and controlling error that emphasize technology, facility design, standardized procedures and professional practice standards are preferred. In theory, such things modify systems to make them less vulnerable to error, and there is no doubt they have been effective.

What gets lost in the shuffle is that whenever a mistake occurs, a human being is normally present. And, if we understood more about that person, we might help them better manage medication errors. The findings from the current project are relevant here. Not only do they suggest that psychosocial factors must be examined, they show these factors are important predictors of errors and the ability of pharmacists to detect them.

We can begin exploring the role of psychosocial factors in error by examining how subjective impressions of workload are associated with human error. The data from the project showed that perceptions of task tension (i.e. subjective workload as assessed by the NASA Task Load Index) also changed with increments in objective levels of work. Remember from the earlier discussion that workload has both an objective and subjective component. Subjective workload in the current project generally increased when the number of scripts dispensed was higher. When workload was relatively low and process errors were high (i.e. low volume store and working on <15 scripts per hour), participants rated their overall perceptions of task tension as 40.2. When working under conditions of relatively high workload and low error (high volume store and working on >25 scripts per hour), their average overall task tension was rated as 60.5. In both cases, pharmacists were equally motivated to do well. Those working under low and high workload conditions reported identical scores on the NASA Task Load Index concern-for-performing-well sub-scale (low volume store average = 88.3; high volume store average = 87.5).

So concern about doing well is not enough to maintain error-free performance. The data suggest that pharmacists also required an increase in task tension. Of course there may be limits to the increments in task tension that would produce desirable results. Too much stress and tension can become a problem. Unfortunately, we just don't know what that limit is. What we do know is that pharmacists in the field-sites who worked on at least 25 scripts per hour were not adversely affected. In addition, while working under conditions of high workload and low error, pharmacists rated themselves as possessing significantly more task tension due to mental demand (74.1 versus 47.5) physical demand (47.2 versus 27.1), effort expended (71.2 versus 46.1), frustration with the task (44.5 versus 12.3), and time demand (47.8 versus 23.4). Corresponding increases in perceptions of task tension in each of the areas above also were noted in the low volume stores when a shift in workload from relatively fewer scripts (<15 per hour) to relatively more (>25 per hour) occurred. In the latter case, they also made fewer errors, so again it appears that increases in particular types of task tension help reduce errors. In effect this data measures the components of what pharmacists mean when they say, "I'm usually more attentive and engaged with the task when I'm working harder."

Overall, low levels of objective workload and subjective task tension during the process of dispensing scripts were associated with more errors. These workload factors, when combined with four other psychosocial factors, accounted for 34% of the process errors identified during self-monitoring. The four remaining psychosocial factors that emerged from this analysis were:

- √ Pharmacists who made fewer errors had a supervisor who they perceived as helpful in setting task goals and who allowed them appropriate autonomy.
- √ Pharmacists who perceived pharmacy equipment and lighting as inadequate made more mistakes.
- √ Pharmacists who believed the number of breaks they had were adequate to meet their needs made fewer process errors.
- √ Pharmacists who had a cognitive style of attending to details and who could focus their attention made fewer errors. About 12% of the pharmacists in the field-sites had difficulty doing such things and they accounted for 33% of the mistakes observed.

Misconception
Pharmacists Respond in Similar Ways to Factors that Produce Misfills

The emphasis by the industry to develop better policies and procedures to reduce errors assumes that everyone responds in the same way to such things. This bias also appears when psychosocial influences and differences among people are ignored in all of the popular and voluntary error-reporting procedures used in the United States.

Qualities of people and other psychosocial factors are often placed in the background when they should become a part of the foreground.

This is evident when the different thresholds pharmacists have for making errors are examined. Mistakes are not just due to how much work someone does. To illustrate, task and psychosocial variables associated with pharmacists who were in the lower third and upper third of the distribution of process errors were analyzed and are shown in Table 3 [23]

Again it reveals the trend for a low number of process errors to be associated with high workload as well showing the role that psychosocial variables play. Pharmacists who did not make as many process errors worked on 7.5 more scripts per hour. The fact that they made fewer process errors and thus corrected themselves less assisted their productivity. Both groups wanted to do well, so motivation is not a factor. But the presence of statistically significant

Table 3: Characteristics of pharmacists who made a relatively large and small number of process errors

	PERCENTAGE OF PROCESS ERRORS	
	Lower 33% [<4.8%] [n = 28]	Upper 33%[> 11.6%] [n =30]
• Scripts/Hour	29.2*	21.7
• Job Dissatisfaction [Max Score = 95]	46.1*	51.5
• Concern for Quality	88.2	84.8
• Adequacy of Breaks [Max Rating = 3]	1.7*	1.2
• Sleep in Hours	6.7*	6.2
• Impulsive Personality [Max Score =15]	7.2*	8.6
• Supervisor Ratings		
-Overall Skill [Max Score =35]	28.2	24.8
-Encourages Excellence [Max Score = 10]	6.7*	5.7
-Encourages Independence [Max Score = 15]	12.2*	10.7

* The differences in scores shown above were statistically significant at the $p < .05$ level.

differences on a variety of psychosocial measures indicates that there is more to the story. However, it appears that increased stress from overall job stress (as measured by the job dissatisfaction sub-scale of the Holistic Stress Test) and tension in roles with supervisors played a role. Such stress in combination with the other factors increases cognitive tension that leads to distracting thoughts, making errors more likely.

It is worth noting that the variations between the factors associated with errors were not particularly large. Relatively small changes in variables within a pharmacy appear to produce relatively large differences in performance. This is not uncommon in systems where turbulence appears or when a sudden shift from one mode of responding (accurate to inaccurate) happens. Such changes are often seen in systems described by Chaos Theory.[24] Among other things, the theory suggests that combinations of several factors within systems lead to turbulence and sudden shifts in performance including factors involved in cognitive functioning.[25]

Perceptions of workload, personal qualities, relationships with supervisors, and other psychosocial factors are unlikely to remain stable over time. Nor will they just serve as a relatively neutral backdrop to human engineering or policy and procedure interventions. In Chaos Theory terms, the effects of psychosocial factors may be small initially but one can expect them to increase in magnitude in a nonlinear way over periods of time.

Conclusions

It should be clear that workload is a much more complicated variable than we normally expect. There is no strong or simple relationship between increases in workload and human error in the pharmacy. If anything, pharmacists need to be more alert when their workload is light, or when shifting from relatively high to low levels of workload. Such conditions appear to lead to less task engagement and symptoms such as becoming less attentive and an increase in mental distractions.

One should not conclude from this article that pharmacists can handle any amount of workload over extended periods and not experience adverse effects. Rather, there are limits to which people can be pushed, but one can expect variations in those limits. Workload thresholds or points in a workday or week where performance deteriorates would apply to both high and low workload conditions. People are often in touch with their limits and those impressions should be respected.

Perceptions of workload or the nature of subjective workload on the job also must be considered. It has several components, and pharmacists tend to have relatively higher levels of perceptions of the mental demands of their jobs, the efforts expended, and their concerns for performing well. Analyses of errors that occurred when pharmacists were working under high workload conditions and when the characteristics of pharmacists in the top and lower third of the distributions of errors revealed something critical about such perceptions of workload. In each case, the pharmacists were very concerned about doing well. *The errors were not due to a lack of motivation*. Instead, they appeared to be related to the presence of other psychosocial variables, such as poor relationships with supervisors, overall job dissatisfaction, the perception that breaks were inadequate to meet their needs, impulsivity and field-dependence (i.e. less able to focus and attend to details), personality characteristics, not getting enough sleep, and perceptions that pharmacy lighting and equipment were inadequate. Combinations of such factors increase over time to create mental tension and distractions that lead to a breakdown in cognitive functioning.

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