Patient Safety During Medication Administration: the influence of organisational and individual variables on unsafe work practices and medication errors

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Medication errors are a leading cause of unintended harm to patients both in Australia and internationally and there is now a concerted attempt to identify and correct individual and workplace factors that encourage medication errors. The current study used structural equation modelling to measure organisational climate and to test a model with hypothesised links between climate and unsafe medication administration behaviours. The study also examined the possible mediating role of stress and morale. Data were collected from 176 nurses working in rural areas in Australia. The model provided a reasonable fit to the data with organisational climate accounting for 39% of the variance in individual distress, which in turn explained 7% of the variance in self-reported violations. The only variable that made a direct contribution to errors was violations, which accounted for 24% of the variance in medication errors. These findings highlight the importance of monitoring the state of the whole health system. Deficiencies at the organisational level affect the psychological well-being of hospital employees, and distressed employees are more likely to engage in substandard work practices that ultimately endanger the patients under their care.

Keywords: Medication errors, Patient safety, Systems approach.

1. Introduction

Within the hospital environment, adverse events resulting from medication errors are recognised as a leading cause of unintended harm to patients. Here in Australia, Malpass *et al*. (1999) estimated that 20% of recorded hospital incidents involved an error in the use of medications. The Australian Quality of Health Care Study (Wilson *et al*. 1995) put the figure at 17%. These estimates are similar to those reported in the UK (Vincent *et al*. 2001) and the US (Leape *et al*. 1991, 1995) and confirm that errors in the administration of medications are a significant contributor to iatrogenic injury and illness (Bates 1999). The well-documented prevalence and seriousness of this problem in health systems across different countries demands the attention of researchers from a range of disciplines employing different methodologies, each of which can shed light on particular aspects of the problem.

The current study used structural equation modelling to assess the effects of organisational and individual level variables on medication administration behaviours reported by nurses working in hospital settings. These behaviours were divided into violations, which involve the deliberate deviation from rules that describe the safe or approved method of performing a particular task or job, and errors, which refer to unintended outcomes caused by slips, lapses and mistakes made by individuals (Reason 1990). We begin by defining the scope of the behaviours included in this study before reviewing the literature on the causes of medication errors and tracing the development of a model that describes the impact of organisational climate on individual stress and morale and the effects of both organisational and individual variables on safety behaviours (violations and errors).

1.1 Predictors of Medication Errors

Medication error has been defined as a failure in the drug treatment process resulting in inappropriate medication use (ACSQHC, 2001). Errors can occur at any time along the continuum of the medication system, from prescribing to administration. Leape et al. (1995) found that most errors occur in the doctor prescribing (39%) and nurse administration (38%) stages, with the remainder nearly equally divided between transcription and pharmacy dispensing. Our interest in this study was on the complex and demanding medication administration stage where the nurse must ensure that correct procedures are followed so that the right dose of the right drug is administered to the right patient at the right time and by the right route (Delaune & Ladner, 1998). Furthermore, nurses are responsible for preparing and checking medications, updating their own knowledge of medications, monitoring the effectiveness of treatment, reporting adverse reactions, and teaching patients about their drugs (Delaune & Ladner, 1998). Small wonder that many things can and do go wrong. In a review of studies of medication error, O'Shea (1999) summarised the causes of these errors as poor mathematical skills, lack of drug knowledge, excess workload, inadequate staffing levels, inexperience, failure to follow procedures, distractions and interruptions, and quality of prescriptions.

As is the case in other high risk industries, failure to follow procedures is a major contributor to medication errors. Helmreich (2000) reported that over half the "errors" observed in a line safety operations audit were due to violations and that those who violated procedures were 1.4 times more likely to commit other types of errors. In fact, procedural violation is such an influential factor in accident causation that many researchers (e.g., Reason 1990, Lawton & Parker 1998) suggested that it be treated as a safety outcome variable in its own right, rather than as just one of the predictors of error. Lawton and Parker further argued that the psychological pathways to violations and errors are different with the former being associated with social-psychological factors, such as attitudes and behaviours whilst the latter are more closely associated with deficiencies in skill or information processing. The distinction between errors and violations has other important implications. Because they are by definition unintentional, individuals are not always aware that they have made an error, especially if it takes the form of a memory lapse. In contrast, workers are usually aware that they are taking shortcuts or working outside the rules. These forms of behaviour are not only likely to be of higher frequency but also easier for the worker to recall and report. Violations therefore offer another window into the world of medication errors.

McKeon *et al*. (2003) chose violation of medication administration procedures as the outcome variable for their study of rural nurses in Queensland, Australia. Using a self-report questionnaire, they collected data from 506 nurses on perceptions of workload levels, drug knowledge, ease of access to reference materials, and expectations of doctors regarding nurses working outside regulations (violations). They then constructed a path model that linked all four input variables directly to violations. Workload was found to also have indirect link with violations via expectations of doctors. The model captured 21% of the variance in self-reported violations with all input variables except access to reference materials making a significant contribution. A higher level of drug knowledge was associated with lower levels of violations whilst higher workload and higher expectation by doctors that nurses would work outside regulations were associated with higher levels of violations.

The McKeon et al. study employed a quantitative methodology to demonstrate a link between organisational factors and workplace violations but used a restricted set of predictors which included just one individual factor, drug knowledge. However, the safety literature suggests that these individual factors are important and should be included in models that seek to explain safety behaviour. Oliver *et al*. (2002) collected data from a wide range of industrial sectors and employed structural equation modelling (SEM) to test models depicting the influence of organizational and individual variables on accidents. They found that individual level variables, including safe behaviour and general health, mediated the indirect effects of the organizational variables. Stress, in particular, was an important mediator of both organizational and environmental variables. Petersen (1996) reported that people working under stress experience four to five times as many injuries as those not in stressful situations. In a study of nurses in the

United States, stress levels of nurses were found to be associated with patient falls and medication errors (Dugan *et al.* 1996).

Further support for the impact of stress on errors and for the impact of organisational variables on violations can be found in other studies. Mearns *et al*. (2001) reported that pressure for production and work pressure explained 58% of the variance in violations. In a series of studies conducted within an aviation maintenance context, Fogarty (2003) consistently found that stress and morale were related to errors whereas characteristics of the organisation, such as policies and planning processes, were more likely to be related directly to violations and indirectly to errors via violations and individual factors such as stress and morale. These studies from outside the medical field provide the justification for a structural model of medication errors that includes both organisational and individual variables as predictors of medication violations and errors. The model is presented in the next section.

1.2 Building a Measurement and Structural Model

To fufill the measurement requirements for the study, we chose the Queensland Public Agency Staff Survey (QPASS, Hart *et al.* 1996). QPASS is a validated instrument and has been used extensively to assess organizational climate, individual stress and morale, and quality of working life for personnel working in the health industry in Queensland. The organisational climate scale covers eight positive and two negative dimensions of organisational behaviour and human resource management. The positive dimensions are workplace morale, supportive leadership, participative decision-making, role clarity, professional interaction, appraisal and recognition, professional growth, and goal congruence. The two negative dimensions are workplace distress and excessive work demands. QPASS also measures individual distress, individual morale, and quality of work life. In addition to its proven measurement qualities, the choice of QPASS was influenced by the fact that it has an underlying structural model that can be adapted to purposes such as the present investigation of medication violations and errors. The conceptual model is shown in Figure 1.

[Insert figure 1 about here]

The primary characteristics of the model are derived from the structure of QPASS itself and the studies described in the preceding paragraphs that suggest ways in which errors and violations are related to the QPASS variables. According to the QPASS model (Hart *et al.* 1996), Organisational Climate directly affects Individual Distress, Individual Morale, and Quality of Work Life. These influences are shown in Figure 1 by the arrows directly connecting Organisational Climate to these three variables. Quality of Work Life is also indirectly affected by Organisational Climate through Individual Distress and Individual Morale. The QPASS model has been validated by its authors but it will undergo further validation in this study and be treated as the base model.

Our extensions to the model consisted of the inclusion of Violations and Errors as additional outcome variables. The literature is not clear on the exact nature of the linkage between Organisational Climate and Violations with some studies suggesting

that the linkage is entirely direct (Fogarty 2003) and others suggesting that the effect of Organisational Climate is at least partially mediated by individual factors, notably stress (Lawton & Parker 1998, Cox et al. 2002). Figure 1 allows for both of these possibilities with a direct pathway between Organisational Climate and Violations and indirect pathways via Individual Distress and Individual Morale. An alternative model showed Organisational Climate directly affecting Violations with the pathways from Individual Distress and Individual Morale to Violations removed.

Regarding Errors, (Fogarty 2004) found that the effect of Organisational Climate is entirely mediated by individual variables, such as stress. In other words, as proposed by Reason in his seminal work on human error, individuals are the last system defence against error. They have the capacity to stop errors in poorly functioning organisations or to allow them to occur in otherwise safety conscious organisations. Accordingly, there is no direct pathway linking Organisational Climate with Errors in Figure 1.

2. Method

2.1 Participants

Participants included 176 nurses working in 11 public sector hospitals in two rural health service districts in Queensland, Australia. These hospitals ranged in size from 11 to 100 beds. Most respondents were registered nurses (n = 136; 77.3%), with 37 (21.0%) being enrolled nurses with medication endorsement, and 3 participants not indicating their registration category. There were 162 (92.0%) females, 12 (6.8%) males, and 2 unidentified. Most were employed on a permanent full-time (n = 64; 36.4%) or permanent part-time basis (n = 85; 48.3%). The majority of participants were over the age of 40 years (n = 102; 58.0%) with the largest group being between 41 and 50 years (n = 59; 33.5%). Most participants had more than 10 years experience with Queensland Health (n = 104; 59.1%), with a number (n = 38; 21.6%) having worked for the organisation for more than 20 years.

2.2 Materials

The instruments used in the current study were the Queensland Public Agency Staff Survey (Hart *et al*., 1996) and a Violation Behaviour scale and an Error index that were developed for this study. What follows is a description of the variables with the reliability coefficients reported by Hart *et al*. indicated in brackets. Unless otherwise indicated, scale scores were obtained by summing the responses to each item and dividing by the number of items in the scale. With the exception of the two negatively-valenced organisational climate scales (Excessive Work Demands and Workplace Distress) and the Individual Distress scale, high scores are desirable.

2.2.1 The Queensland Public Agency Staff Survey (QPASS: Hart *et al*., 1996).

The 6-item Quality of Work Life Scale was used to measure nurses' level of satisfaction with conditions at work. Respondents were asked to indicate their level of agreement on a 7-point Likert scale ranging from *strongly disagree* to *strongly agree* with higher scores indicating a higher perceived quality of work life. (α = .91).

The 14-item Occupational Positive and Negative Affect Scale was used to assess the positive (individual morale) and negative (individual distress) emotional responses that nurses have to their workplace. Because similar-sounding scales appear in the Organisational Climate section of QPASS, we point out that these positive and negative affect items are directed at employees' personal reactions to their workplace. The two other scales bearing similar names (Workplace Morale and Workplace Distress: see description below) assess employees' perceptions of morale and distress levels among the workforce generally. These self versus others estimates are usually moderately correlated (.60 for morale and .65 for distress in the present study), the large amount of unshared variance justifying their treatment as separate constructs in the QPASS model. For the 14 positive and negative affect items, respondents were asked to indicate how often over the past month they had experienced seven positive and seven negative emotions on a 7-point scale ranging from *not at all* to *all the time*. Higher scores indicated a higher level of that particular emotion. (α = .94 for Individual Morale and .90 for Individual Distress).

The Organisational Climate section of QPASS requires respondents to use a 5-point scale ranging from *strongly disagree* to *strongly agree* to indicate their level of agreement with each of 50 statements designed to cover 10 dimensions of organisational functioning. Higher scores indicate higher levels of each variable. Confirmatory factor analysis indicated that the ten dimensions can be aggregated at a second-order level to provide an overall index of organisational climate (Hart *et al*., 1996). Scores on the eight positively-valenced scales were therefore aggregated before subtracting the total of the two negatively-valenced scales to yield an overall index of Organisational Climate. The 10 subscales are described in Table 1.

[Insert Table 1 about here]

A more complete description of QPASS, its organisational applications, and its theoretical model can be found at http://www.psier.qld.gov.au/orgclim/docs/qpassguide.pdf.

2.2.2. Violations Scale. This scale was developed with the assistance of subject matter experts, that is, nurses with many years experience in medication administration, and with reference to the procedures required for safe medication administration (Delaune and Ladner 1998). The scale comprises 13 items asking respondents to indicate how often in the past 12 months they had to bend the rules when administering a medication. It was measured on a 5-point scale ranging from *never* to *most of the time*, with higher scores representing higher numbers of violations. (α = .80)

2.2.3 Error Index. Error measures can be constructed using items designed to tap into the slips, lapses, and mistakes that occur on the job or by listing behaviours that are considered to be errors, regardless of their actual underlying psychological causes. Fogarty (2003) found that different error measures were highly correlated and tapped a common underlying factor. In the present study, we chose five behavioural items that were based on the 'five rights', that is, the guidelines traditionally taught to all nurses regarding medication administration: 'the right patient, the right drug, the right dose, the

right route, and the right time' (Delaune and Ladner 1998). In recent literature, these 'five rights' have been referred to as the ritual that nurses should use to prevent medication errors in nursing (Cox 2000). Respondents were asked on a 4-point scale (*never, once or twice, three or four times, more often*), how often in the past 12 months they had made an error when administering a medication. Higher scores represented higher numbers of errors.

2.3 Procedure

Two health service districts in Queensland were invited to take part in this study. Both districts use QPASS as part of their process of continuous improvement and they welcomed the opportunity to extend the scope of the survey to include questions on violations and errors. Because this project involved a student researcher, ethics approval was also obtained from the University's Human Research Ethics Committee. Questionnaires were either delivered or mailed to the various hospitals by university researchers and data were collected over a one-week period. Staff were allocated work time to complete their questionnaires. Confidentiality and anonymity were guaranteed. Of the 280 questionnaires distributed to nurses, 176 were completed and returned, representing a response rate of approximately 63%.

3. Results

3.1 Descriptive Statistics

Two cases were deleted because they were considered to be multivariate outliers, leaving a dataset of 174 cases. All scales were normally distributed except for the Error index and Violation Behaviour scale, both of which are traditionally (and reassuringly) low base-rate events. To compensate for this non-normality, the Bollen-Stine adjusted *p*-value was used to evaluate model fit in structural equation modelling (SEM). Reliability analyses (Cronbach's alpha) indicated that all scales had satisfactory reliability (above .70) with the coefficients for most scales being higher than those reported by Hart *et al*. (1996). Descriptive statistics are presented in Table 2.

[Insert Table 2 about here]

The means shown in Table 2 help to paint a picture of how these employees see themselves in their particular work contexts. Quality of Work Life was rated just above the mid-point of the scale, as was Morale. The overall rating given to Organisational Climate was just below the midpoint of the scale. These ratings for the QPASS section of the questionnaire are similar to the QPASS benchmark figures given for nurses by Albion *et al*. (2005). Means for the Violations and Errors scales were low but, as indicated by their correlations with other measures, both scales exhibited sufficient variability to permit further analysis.

Turning to the correlations, within the QPASS model, Quality of Work Life and Individual Morale and Individual Distress were significantly correlated with each other and with the Organisational Climate scale. These correlations were in the expected directions and similar in magnitude to those reported by Hart *et al*. (1996). The Violations scale was significantly correlated with all other variables and most strongly

with Errors. As noted by Fogarty (2004), Organisational Climate was not significantly related to Errors.

3.2 Structural equation modelling

Maximum likelihood procedures from AMOS 4 (Arbuckle and Wothke 1999) were employed to test the fit of various models. To check that the base QPASS model (Hart *et al*., 1996) fitted the data, it was tested without the violation and error variables introduced for this study. Overall, the fit statistics for this model were unsatisfactory: χ^2 (1) = 13.66, Bollen-Stine *p* = .00; CMIN/DF = 11.25; TLI = .84; CFI = .97; RMSEA = .24. Modification indices suggested that a good fit would be obtained by adding a covariance pathway between Individual Distress and Individual Morale. Cotton and Hart (2003) also suggest such a connection in their description of the structure of occupational well-being (p. 120), so the modification was made. It was not possible to engage in further testing of this saturated model but we were satisfied with the basic structure of QPASS so the extended model shown in Figure 1 (plus the additional covariance pathway[1]) was then tested. Fit statistics were excellent: χ^2 (3) = 2.41, Bollen-Stine *p* = .49; CMIN/DF = .80; TLI = 1.00; CFI = 1.00; RMSEA = .00. Inspection of coefficients for individual pathways indicated that a number of paths were not significant, so these were deleted and the model retested. These changes had little impact with the statistics still indicating excellent fit: χ^2 (7) = 8.58, Bollen-Stine *p* = .28; CMIN/DF = 1.23; TLI = .99; CFI = 1.00; RMSEA = .04. The model, which accounted for 7% of the variance in Violations and 24% of the variance in Errors, is shown in Figure 2.

[Insert Figure 2 about here]

For readers unfamiliar with path analysis, the measured variables are shown in boxes. An arrow connecting one box to another indicates that the first variable influences the second (i.e., the second variable is a dependent variable). AMOS shows the residual variances, which are equivalent to R^2 values in multiple regression analysis, on the top right hand side of the box. The numbers shown along the pathways in the model indicate the strength of the relationship between each variable. The higher the absolute value of the number, the stronger the relationship and the greater the benefit there is to be gained by improving scores on the variable at the start of the causal chain. A negative value indicates an inverse influence on the outcome variable, that is, higher scores on one variable are associated with lower scores on the other. The model shown in Figure 2 contains the pathways with significant beta coefficients and indicates that the only variable that made a significant unique contribution to the prediction of Violations was Individual Distress, with higher levels of distress associated with more violations. A higher incidence of violations was, in turn, associated with a greater incidence of errors (R^2 = .24).

The alternative model showing Organisational Climate having a direct effect (and no indirect effects) on Violations was then tested. To achieve this, the pathway

[1] Note that the AMOS program requires the pathway to be fitted to the error (residual) terms, rather than to the variables themselves.

from Individual Distress to Violations in Figure 2 was replaced with a pathway from Organisational Climate to Violations. The fit statistics for this alternative model were almost identical to those obtained for the model shown in Figure 2: χ^2 (7) = 8.87, Bollen-Stine p = .26; CMIN/DF = 1.27; TLI = .99; CFI = 1.00; RMSEA = .04. The R-Square values were also practically identical, with the model accounting for 6% of the variance in Violations and 25% of the variance in Errors. The model is shown in Figure 3.

Other versions of indirect effect models, for example, one showing Quality of Work Life influencing Violations, also fitted these data. These additional models are not shown because they did not improve the fit or R-Square values and we have no theoretical grounds for promoting them.

4. Discussion

The aim of the present study was to examine groupings of organisational and individual variables that were considered likely to impact on medication administration performance, explore the relations among these variables, and develop a model for predicting self-reported violations and errors by nurses administering medications. The QPASS model proved to be a satisfactory framework for this investigation of medication violations and errors. With the exception of the extra pathway fitted between morale and distress (a modification that does not have major theoretical significance), the base model replicated earlier findings regarding structural relations among QPASS constructs, thereby giving us a greater degree of confidence when examining the relations of QPASS variables with Violations and Errors.

The first data that need to be discussed are the correlations. Table 2 shows that three of the four variables in Figure 1 - namely Quality of Working Life, Morale, and Organisational Climate - were negatively correlated with Violations whilst Distress showed the expected positive relationship. Whilst the correlations were not large, they still amounted to medium effect sizes (Cohen, 1988). These findings suggest that both organisational and individual factors contribute to violations, with errors more likely when the organisational climate is poor and when individuals are suffering from stress and/or low on morale. A similar pattern of correlations was observed with Errors except that, in this case, Organisational Climate did not correlate with Errors. Fogarty (2004) also reported a lack of relationship between organisational factors and errors. These correlational data suggest that problems at the organisational level do not convert automatically into errors whilst individual differences variables, such as stress and morale, do have a direct relationship. However, the question of pathways of influence is better addressed by considering the results of the tests of the models showing various direct and indirect pathways.

Contrary to previous research (e.g. Dugan *et al.* 1996, Fogarty, 2003, 2004), the results of the path analysis employed in the present study provided only weak support for the proposition that morale and stress are directly linked with errors. The correlations (Table 2) suggest that there are significant relationships between errors and both of these variables but they did not translate into significant pathways when the

influence of other variables was taken into consideration in a path model. One possibility is that the measure of violations, which was not present in Fogarty (2004), captured variance in the measure of medication errors that would otherwise have been captured by the individual variables. However, deleting Violations from the path model still did not result in significant links, so this explanation is unlikely to be valid. A more likely explanation is that the choice of question content for the Errors scale rendered it less sensitive to variations in stress levels. There were just five questions asking how often in the past 12 months nurses had mistakenly 1) given the wrong drug, 2) by the wrong route, 3) to the wrong patient, 4) at the wrong time, 5) at the wrong dose. Nurses are well-drilled on the five rights of drug administration and it may be that, despite the use of the word "mistakenly" in the question stem, a proportion of the sample answered these questions as though they were violations. Explanations aside, the path analyses did not support a direct link between individual variables and errors.

The remaining path analyses focused on violations and compared the indirect effects model (Figure 2) with a direct effects model (Figure 3). In the former, Organisational Climate has a strong effect on Individual Distress and Individual Morale. The distress variable, in particular, is linked with Violations, which in turn has an impact on Errors. Thus, when the climate is positive, nurses are less likely to feel stressed, less likely to violate procedures, and therefore less likely to make errors. The alternative model (Figure 3) showed Organisational Climate directly affecting Violations with the pathways from Individual Distress to Violations and from Individual Morale to Errors deleted. Thus, when the organisational climate is positive - for example, when nurses receive supportive leadership, are involved in decision making, are able to participate in professional development, and workloads are reasonable - nurses are less likely to participate in unsafe behaviour when administering medications.

Both models explained a non-trivial amount of variance in Violations (approx. 24%) and a substantial proportion of the variance in Errors (approx. 7%). The fit statistics and R-Square values for both models were almost identical. On the basis of this finding, it is impossible to say from these data whether the effect of Organisational Climate on Violations is direct or mediated by stress and morale. What we can say is that, whether the effect is direct or indirect, Organisational Climate is linked with safety behaviours.

4.1 Limitations and Directions for Future Research

The R-Square value for Violations in the present study, although still representing a medium-sized effect (Cohen, 1988), was not as robust as the 21% reported by McKeon *et al*. (2003). In the attempt to draw upon a wider range of organisational variables, some of the key variables in the earlier study were omitted (e.g., Expectations of Doctor). The earlier study drew the material for its questionnaire from interviews conducted with nurses on the topic of drug administration. It is likely that in order to obtain better prediction of violations and errors, the questions have to be set more firmly in a medication context. A further possibility is that although

organisational climate is clearly important to the well being of individual employees, the concept is too broad to account for a large proportion of the variance in safety behaviours. Schneider (1990) argued that measuring the climate of an organisation may require a strategic focus, that is, rather than investigating general organisational climate, it may be more appropriate to choose a focus of interest and measure the form of climate that is compatible with the outcomes being investigated. For example, if service is the criterion of interest, then measure the service climate; or if safety is of interest, measure the facets of the workplace related to a climate for safety. In support of this line of reasoning, Neal *et al.* (2000) found that a specific climate for safety was more strongly related to safety performance than the general climate of an organisation. When the effects of safety climate were controlled, general organisational climate did not contribute to safety performance. They suggested that this outcome encourages the use of specific forms of climate when specific outcomes are of interest. For the above reasons, future research may be able to explain more of the variance in unsafe behaviour if the climate of the organisation relative to safety is measured rather than the general climate of the organisation.

A further limitation is that this research was carried out in public sector hospitals in rural areas. Nurses working in these areas do not have access to all the resources that are available in large city hospitals. For example, there is a shortage of doctors in rural areas of Australia and nurses often have to make drug administration decisions that they would not be required to make in larger hospitals. Arguably, they are subject to more organisational pressure to work outside strict procedural guidelines than is normally the case with nurses. For these reasons, it is uncertain whether these findings can be generalised to other hospital environments. The cross-sectional nature of the present study is a further limitation; longitudinal data would certainly help to verify the causal mechanisms that are being promoted here. Finally, we must point out that this study has focussed on nurses' involvement in the violations and errors that occur during the medication administration process. However, drug administration is just one part of the medication error chain. Researchers can use a similar methodology to that adopted in the present study to determine the contributions of organisational and individual factors to errors in other parts of the medication process (e.g., prescription).

4.2 Conclusion

Drug administration is a difficult and complex task and nurses do not always enjoy the best of working conditions. In the various studies we have conducted in this industry, we have not found evidence that nurses are any less safety-conscious than workers in other high-risk industries. Violations are, by definition, deliberate actions but they are not intended to do harm. They happen largely because organisational conditions encourage, or even force, nurses to cut corners or work outside the regulations (Fogarty & McKeon, 2003). In our previous study, we showed that excessive workload and expectations of doctors can increase the frequency of medication violations. The present study demonstrates that such violations are also

more probable when the individual is distressed and morale is low and that these personal states are influenced by organisational climate. If we are to continue to improve health systems to promote patient safety, management needs to broaden its focus so that attention falls not just on patients but also on the employees and the organisations themselves. Regular monitoring of organisational climate, safety climate, and levels of individual distress and morale can help to achieve better health outcomes for everyone.

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Table 1
Description of Organisational Climate Subscales

Name	Subscale Description	Items	Alpha
Workplace Morale	Perceptions of how other staff are coping in the workplace, that is, whether others show enthusiasm, pride in their work, team spirit, and energy.	5	.88
Supportive Leadership	How respondents perceive their managers, that is, their communication style and whether they are approachable, dependable, and supportive.	5	.91
Participative Decision-Making	Assessing the decision-making processes in the organisation, that is, whether staff are asked to participate in decisions and given opportunities to express their views.	4	.85
Role Clarity	Whether expectations, work objectives, responsibilities, and lines of authority are clearly defined.	4	.73
Professional Interaction	Whether there is acceptance and support from others and good communication in the workplace.	7	.82
Appraisal and Recognition	Perceptions about the quality and quantity of feedback on work performance.	6	.87
Professional Growth	Whether respondents feel encouraged to attend further training and development.	5	.79
Goal Congruence	Whether personal goals are in line with workplace goals, and whether workplace goals are clearly stated and easily understood.	5	.81
Workplace Distress	Perceptions of how others in the workplace are coping, that is, whether others appear frustrated, stressed, tense, anxious, and depressed about their work.	5	.91
Excessive Work Demands	Perceptions of the workload in the organisation.	4	.82

Table 2
Correlation Matrix for Individual Variables, Organisational Climate, Violations, and Errors (N = 174)

	M	*SD*	Max#	1	2	3	4	5
1. Qual Wk Life	4.14	1.40	7.0	1.00				
2. Morale	4.38	1.30	7.0	.73**	1.00			
3. Distress	2.96	1.25	7.0	-.63**	-.55**	1.00		
4. Orgl Climate	19.01	16.47	41.0	.75**	.63**	-.62**	1.00	
5. Violations	1.37	.33	5.0	-.25**	-.19*	.26**	-.25**	1.00
6. Errors	1.18	.23	4.0	-.22**	-.21**	.17*	-.15	.49**

Max# indicates the highest possible score for that variable
* Correlation is significant at the 0.05 level (1 tailed).
** Correlation is significant at the 0.01 level (1 tailed).

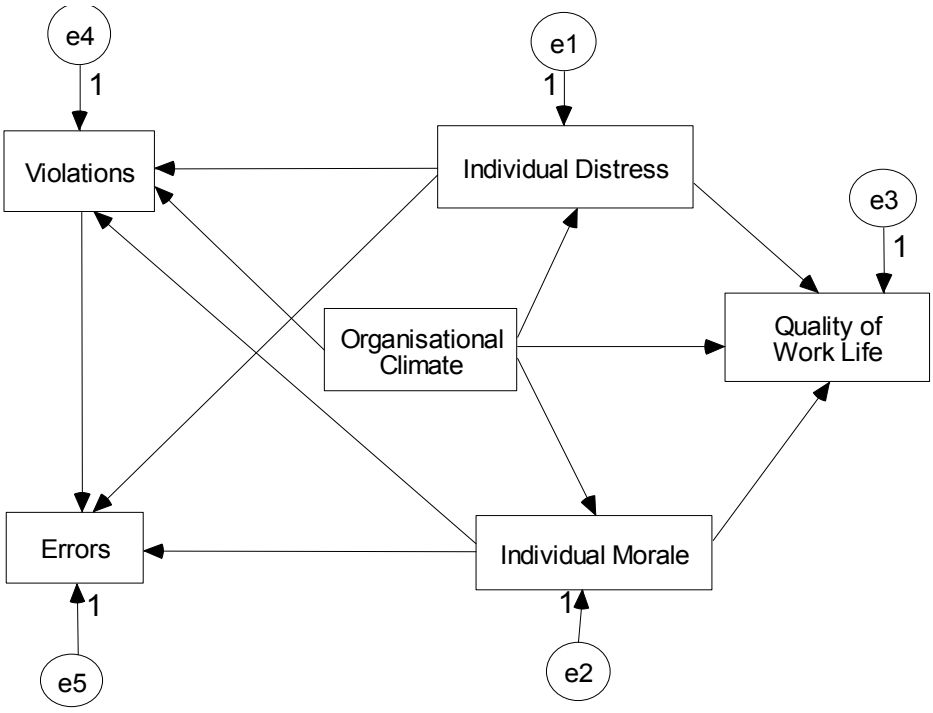

Figure 1. Conceptual Model of Relationships among Organisational Climate, Individual Factors, Violation Behaviour, and Errors

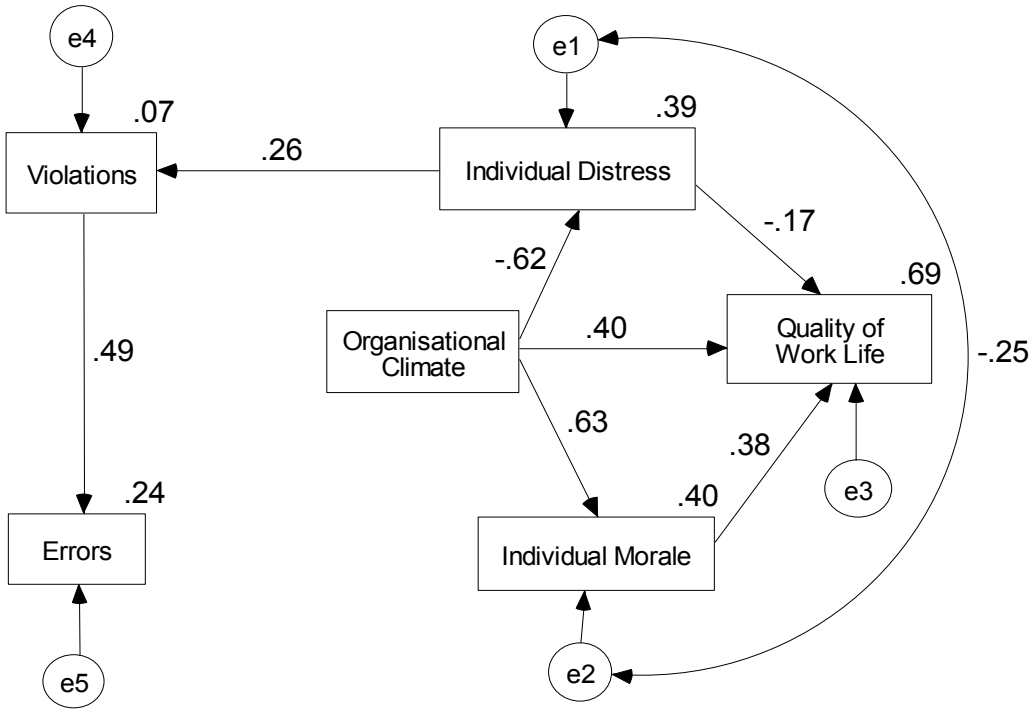

Figure 2. Structural Model Showing Individual Distress Mediating the Effects of Organisational Climate on Violations and Errors

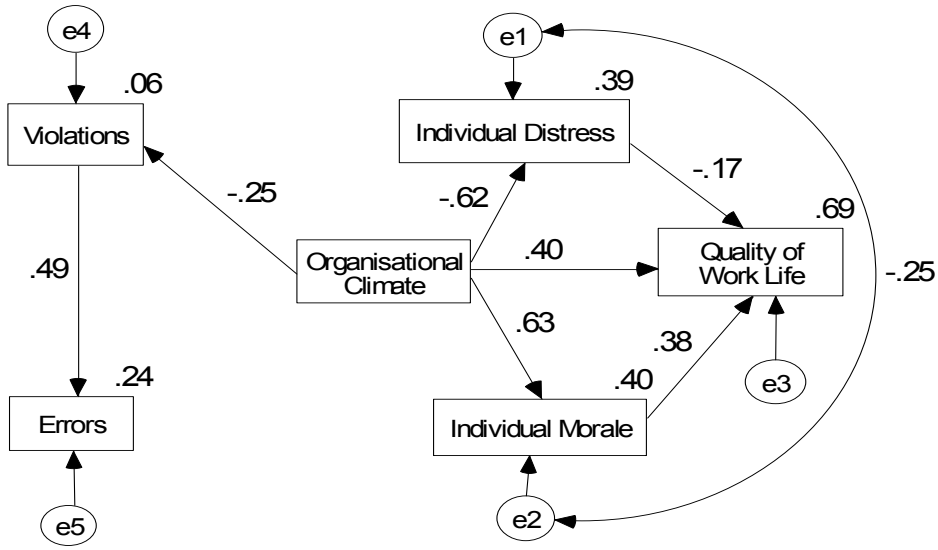

Figure 3. Structural Model Showing the Effect of Organisational Climate on Violations and Errors