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Pharmacists' attitudes towards dispensing errors: their causes and prevention

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SUMMARY

***Objective*: To assess the attitudes of pharmacists towards the issue of dispensing errors.**

***Method*: A postal survey was undertaken among all Tasmanian-registered pharmacists residing in Australia. The anonymous questionnaire sought opinions on whether the risk of dispensing errors and the actual numbers of errors are increasing, the major factors contributing to the occurrence of dispensing errors, factors that can best minimize the risk of dispensing errors, the number of prescription items that one pharmacist can safely dispense in a day and whether Australia should have a regulatory maximum dispensing load, and an estimation of the number of recent errors at the pharmacist's workplace.**

***Results*: Completed questionnaires were received from 209 pharmacists (50% response rate). Most pharmacists (82%) believed that the risk of dispensing errors is increasing. The principal contributing factors nominated were: high prescription volumes, pharmacist fatigue, pharmacist overwork, interruptions to dispensing, and similar or confusing drug names. The main factors identified as being important in reducing the risk of dispensing errors were: having mechanisms for checking dispensing procedures, having a systematic dispensing workflow, checking the original prescription (duplicate) when dispensing repeats, improving the packaging and labelling of drug products, having drug names that are distinctive, counselling patients at the time of supply, keeping one's knowledge of drugs up-to-date, avoiding interruptions, reducing workloads on pharmacists, improving doctors' handwriting, and privacy when counselling patients. Most pharmacists (72%) stated that they were aware of dispensing errors that had left the pharmacy undetected, in their place of practice during the past 6 months. The median number of such dispensing errors that they were aware of was three. A median of 150 was nominated as the maximum number of prescription items that can be safely dispensed per 9-h day (i.e. 17 items per hour) by or in the presence of one pharmacist. Most pharmacists (58%) stated that there should be a regulatory guideline for the safe dispensing load in Australia.**

***Conclusion*: Dispensing errors are occurring in numbers well above reports to regulatory authorities or professional indemnity insurance companies, and seem to be accepted as part of practice. High prescription volumes, pharmacist fatigue and overwork appear to be important factors. The profession needs to be proactive and standards must be set appropriately high (i.e. zero error tolerance).**

INTRODUCTION

The dispensing process is an integral part of the quality use of medicines and together with patient counselling form the core professional activities of a pharmacist. These activities allow the safe and efficient provision to the general public of what would normally be dangerous or restricted drugs. The process of dispensing and counselling is composed of a sequence of steps, which if interrupted or completed incorrectly, could result in poor quality outcomes for the patient and less than desirable consequences for the pharmacist. The sequelae to serious dispensing errors may be far-reaching, including patient morbidity and mortality, increased health expenditure due to hospitalization and treatment, and loss of credibility and professional standing for the pharmacist, along with the risk of litigation and financial loss.

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With the increasing focus on high quality outcome-based service delivery in health care, it is timely for the pharmacy profession to critically self-examine all processes to ensure that their services are of the highest quality from both consumer and professional standards perspectives. This study is concerned with the dispensing process, including factors that increase the likelihood of errors and measures that can be implemented to improve the process.

Dispensing errors generally refer to errors in the dispensing process (e.g. wrong drug or dose strength, incorrectly labelled directions or drug dispensed to wrong patient) that are not detected and corrected prior to the patient leaving the pharmacy, and which may lead to sub-optimal outcomes of treatment for the patient. Little information on the current rate of dispensing errors can be found in the literature. In Australia, reliable figures are difficult to obtain and, as Lloyd suggested (1), Pharmaceutical Defence Limited, the professional indemnity insurance company for pharmacists, may not be told of the real rate of errors, as pharmacists tend not to report errors unless the consequences have been particularly serious and/or a professional indemnity claim is likely to be made against the pharmacist.

According to Lloyd (1), statistics kept by the Pharmacy Board of Victoria since May 1985 revealed 78 errors reported over 156 weeks. This is equivalent to a report every two weeks, or only one error reported every 1·7 million prescriptions dispensed – an unbelievably low rate.

It has been suggested that 5% of filled prescriptions in the U.S.A. contain some type of dispensing error (2). A study by Kistner *et al*. examined the accuracy of dispensing in a hospital outpatient setting (3). A manual audit of 9846 prescriptions revealed 1229 (12·5%) with errors, of which 155 (1·6%) were considered potentially serious. Allan *et al*. used a disguised-patient technique to study the nature and frequency of dispensing errors and the quality of patient medication counselling in 100 randomly selected community pharmacies in the U.S.A. (4). It was concluded that problems with the quality of medication counselling and dispensing accuracy in community pharmacy require immediate attention. There are a number of reports of patients who developed hypoglycaemia due to inadvertent dispensing of sulphonylurea drugs (5–8), and it has been suggested that hypoglycaemia due to drug-dispensing errors may be more common than is generally recognized (5).

The objective of this study was to survey pharmacists' opinions on the issue of dispensing errors in pharmacy practice. Specifically, it was intended to:

(i) identify factors, particularly those that are modifiable, that pharmacists perceive (from their own experience) as contributing to the occurrence of dispensing errors and to place a weighting on each of these factors;
(ii) determine interventions which could be implemented to minimize dispensing errors;
(iii) provide an estimate of the dispensing error rate in community pharmacy practice, given that many of the dispensing errors that are occurring at present are likely to go unreported unless patients bring incidents to the attention of the Pharmacy Board or the professional pharmacy organizations;
(iv) determine what pharmacists believe is a safe dispensing load for an average working day for a pharmacist, and canvass the issue of a regulatory maximum for dispensing load.

METHOD

A list of pharmacists registered in Tasmania and not residing overseas was compiled via the records of the Pharmacy Board of Tasmania. The list yielded 419 individuals, each of whom was sent a personalized letter containing a letter of explanation and the survey form (see Appendix). Replies were returned via an enclosed postage paid envelope.

The first section of the survey form (questions 1–6) dealt with the demographics of the pharmacist sample (e.g. age, gender, practice, working hours). The second section dealt with the pharmacists' opinions on errors in dispensing, and could be subdivided into five subsections:

(i) opinions on whether the risk and actual number of dispensing errors are increasing (questions 7 and 8);
(ii) perceptions of the major factors contributing to the incidence of dispensing errors (question 9);
(iii) perceptions of measures to best minimize the risk of dispensing errors (question 10);
(iv) views on the number of prescription items that one pharmacist can safely dispense in a day and

whether Australia should have a regulatory maximum dispensing load (question 11);

(v) awareness of any errors at the pharmacist's workplace and any causative factors (questions 12 and 13).

The survey responses were treated anonymously and confidentially, and data from all the respondents were pooled. Upon receipt of completed survey forms, the data were entered, stored and statistically analysed (STATVIEW IV®; Abacus Concepts, Palo Alto, Ca, U.S.A.) on a Macintosh® computer, with measurement with a ruler to the nearest integer (in millimeters) for responses to questions with a visual analogue scale (questions 5, 9 and 10).

Relationships between variables were investigated using the appropriate non-parametric statistical procedures (Spearman rank correlation, Mann–Whitney *U*-test, Kruskal–Wallis analysis of variance or chi-square test), with a *p*-value below 0·05 considered statistically significant. Eight options were available in describing the regular practice of surveyed pharmacists, but in the statistical analysis this was combined to give two groups with reasonable numbers: pharmacy owners and non-owners.

Approval to conduct the survey had been obtained from the Pharmacy Guild of Australia.

RESULTS

Of the 419 survey forms sent out, 209 completed returns were received (response rate of 49·9%). Of the respondents, 106 (51·2%) were males and 101 (48·8%) were females. The median age was 40·5 years (range: 22–76 years) and the median length of registration was 19 years (range: 1–49 years). With regard to the respondents' practice, 42·6% of the completed returns were from pharmacy owners and 57·4% from non-owners (including: full-time and locum community pharmacists, 37·4% and hospital pharmacists, 12·9%).

Table 1 reveals basic information for the owner and non-owner groups of respondents. There was a significantly higher proportion of males in the owner group (chi-square = 38·1, d.f. = 1, $P < 0{\cdot}0001$). The 'years registered' variable refers to how long the pharmacist had been registered in the state of Tasmania. 'Hours dispensing' refers to how long the pharmacist spends per week dispensing prescriptions. 'Continuous hours' refers to how many hours, on average, that the pharmacist spends dispensing each working day.

Table 1. Some characteristics of the survey respondents. The numerical variables are shown as medians and ranges.

Variable	Owners	Non-owners
Age (years)	44 (22–76)	38 (22–72)
Gender		
Female	21	80
Male	67	39
Years registered	20.5 (2–42)	16 (1–49)
Hours dispensing per week	40 (6–80)	26 (0–60)
Continuous hours per day	9 (0–13)	5 (0–13)

Opinions were sought on whether the risk of dispensing errors is increasing. There was a combined response of 171 (82·2%) answering 'yes', 36 (17·3%) 'no' and 1 (0·5%) 'unsure', with no significant difference between owners and non-owners. Similarly, opinions were sought on whether actual errors in dispensing are becoming more common. There was a combined response of 96 (47·1%) answering 'yes', 97 (47·5%) 'no' and 11 (5·4%) 'unsure', with no significant difference between owners and non-owners.

Table 2 presents the median values for the total sample and for the owner and non-owner groups, with respect to factors that increase the risk of dispensing errors, as measured from the visual analogue scale provided in the survey form (question 9). Also provided are the probability values from the Mann–Whitney tests, comparing the responses of the two groups. The major factors identified were high dispensing volume, pharmacist overwork and fatigue, interruptions to dispensing, and confusing or similar drug names.

Table 3 shows the Spearman–Rank rho and *p*-values when comparing the years registered as a pharmacist against proposed factors in contributing to dispensing errors. There were several statistically significant, albeit weak, correlations. Increasing period of registration was associated with a decline in concern about the possible contributions to errors of packaging and labelling of products, doctors' handwriting, access to adequate technical resources and sufficient time to counsel patients.

Table 4 depicts the median values for the total sample and for the owner and non-owner groups, with respect to measures that can best minimize the

Table 2. Responses on factors that contribute to dispensing errors. The numbers represent median responses on a 100-mm visual analogue scale. The *p*-values are for Mann–Whitney tests.

Variable	Combined	Owners	Non-owners	*P* value
High prescription volume	84	83	85	
Overwork	80	75	83	<0.01
Fatigue	80	75	84	<0.01
Interruptions	76	70	80	<0.05
Drug names	75	75	71	
Package/label	72	75	70	
Insufficient time for counselling	65	58	70	<0.001
Handwriting	65	56	68	
Sole pharmacist	60	53	70	<0.001
Lack of privacy	55	54	55	
Assistants	50	40.5	51	<0.05
Non-professional activities	50	45	51.5	<0.05
Original-repeat	50	50	55	
Noise	50	45	50	
PBS requirements	50	56	50	
Design of dispensary	50	50	50	
Job dissatisfaction	46	45	46	
Generics	46	46.5	46	
Software	40	33	40	
Technical resources	30	20	39	<0.001

risk of dispensing errors, as measured from the scale provided in the survey form (question 10). A number of factors were considered important in reducing the possibility of dispensing errors.

Table 5 shows the Spearman–Rank rho and *p*-values when comparing the years registered as a pharmacist against proposed measures to minimize the risk of dispensing errors. There were only two statistically significant, but weak, correlations. Increasing period of registration was associated with a decline in the perceived importance of patient counselling and improving the packaging and labelling of drug products.

The survey asked pharmacists to nominate an overall figure for what they perceive to be a safe number of prescription items that can be dispensed by or in the presence of one pharmacist working a 0900 to 1800 hour day. The median response was 150 prescription items (range: 10–300) or about 17 items per hour. Pharmacy owners tended to nominate a slightly higher figure than non-owners (medians of 150 and 145 prescription items, respectively; Mann–Whitney $U = 3860$, $z = 1{\cdot}8$, $P = 0{\cdot}07$).

The surveyed pharmacists were then asked if Australia should have a regulatory guideline for a maximum safe dispensing load. It was found that of the 201 respondents who answered the question, 117 (58·2%) answered 'yes', with 83 (41·3%) 'no' and 1 (0·5%) 'unsure'. Table 6 shows the breakdown of the responses between the pharmacy owners and non-owners.

The survey asked pharmacists if they were aware of any dispensing errors that had left the pharmacy undetected in the last six months. Of the 189 respondents who answered this question, 134 (70·9%) answered 'yes', and 55 (29·1%) answered 'no'. For the respondents who answered 'yes', the median value of errors in the past six months was 3 (range 1–50), while the total number of errors from all the responding pharmacists for the past six months was 498.

DISCUSSION

There is evidence that the risk of medication-related errors and adverse drug events is rising (9), and this

Table 3. Correlation between years registered as a pharmacist and views on factors contributing to errors.

Variable	Spearman rho	*P* value
Package/label	−0.300	<0.01
Handwriting	−0.200	<0.05
Technical resources	−0.200	<0.05
Insufficient time for counselling	−0.200	<0.05
Original-repeat	−0.100	
Overwork	−0.100	
Sole pharmacist	−0.100	
Interruptions	−0.100	
Software	−0.100	
Job dissatisfaction	−0.035	
Fatigue	−0.032	
PBS requirements	−0.030	
High prescription volume	−0.010	
Assistants	0.016	
Noise	0.027	
Generics	0.033	
Drug names	0.037	
Design of dispensary	0.100	
Lack of privacy	0.100	
Non-professional activities	0.100	

has been attributed to increases in the intensity of medical care and use of drug therapy, with new errors encountered as new drug therapies are introduced. Health care practitioners and health care systems must therefore incorporate adequate error reduction, prevention, and detection mechanisms into the routine provision of care (9). Lloyd suggested that pharmacists should adopt a 'zero error tolerance' approach to the dispensing process (1). Kistner *et al*. stated that error avoidance should focus on continuous quality assurance mechanisms (3). These include double-checking of all prescriptions, evaluation of the dispensing procedure and the reduction of distractions whilst dispensing.

The response rate for the survey of ≈50% was considered acceptable for this form of research. Males and females, and owners and non-owners of pharmacies were represented in almost equal numbers. Not surprisingly, there was a statistically significant greater proportion of males in the owner group. Owners tended to be older, with a median age of 44 years compared with the non-owners at 38 years. A large difference could be seen in the hours spent dispensing between the two groups. Owners spent a median of 40 h per week dispensing, whilst the corresponding figure for non-owners was 26 h. Owners were also dispensing continuously longer, at a median length of 9 h, compared to 5 h for the non-owners.

Most respondents (82%) thought that the risk of dispensing errors is increasing, with no difference between owners and non-owners. Fewer respondents (47%), however, believed that actual errors in dispensing are becoming more common. A number of factors were perceived by the respondents as potentially affecting dispensing error rates. Factors with a median response of at least 75 mm on the 100 mm visual analogue scales, in decreasing order of importance, were: high prescription volume (dispensing workload), pharmacist fatigue of any cause, pharmacist overwork, interruptions when dispensing (e.g. telephone or customers) and similar or confusing drug names. The first three factors are clearly interrelated to some extent, and suggest that pharmacists must carefully manage their work schedules to minimize fatigue (e.g. via regular rest breaks) and to ensure that overly high numbers of prescriptions are not processed by one pharmacist.

Abood suggested that pharmacists rank work overload as the most significant factor contributing to errors (2). Errors have been reported by pharmacists who regularly work 12 h or more every day, who do not have a meal or other break during the day, or who go without holidays and recreation for months or years on end (1). These workplace policies and procedures represent a potential occupational health and safety risk. Self-imposed speed of dispensing does not allow enough time for checking, whilst also increasing fatigue. Patients should be educated that it is for their safety and well-being that dispensing is allowed a reasonable amount of time.

Perceptions of what was a safe dispensing load for pharmacists were very similar between the pharmacy owner and non-owner groups – around 150 prescription items per day for one pharmacist (or 17 prescription items per hour). These figures mean that for an average working day from 0900 to 1800 hours, a minimum of 3·6 min is required for processing and checking each prescription item, and counselling the patient. The maximum dispensing load nominated by the pharmacists was similar to that suggested elsewhere. For instance, Greenberg suggested that a reasonable maximum workload was 125 prescriptions per pharmacist per 8 h shift (16 prescription items per

Table 4. Responses on factors that may reduce the risk of dispensing errors. The numbers represent median responses on a 100-mm visual analogue scale. The *p*-values are for Mann–Whitney tests.

Variable	Combined	Owners	Non-owners	P value
Mechanisms for checking	94	93	94	
Systematic workflow	91	90	93	0.07
Checking the original	90	82	90	<0.05
Improve labels etc	85.5	85	86	
Distinctive names	85	85	86	
Counselling	83	80	82	0.08
Updating knowledge	80	75	84	<0.01
Avoid interruptions	90	77	81	
Reduce work	77	76	80	0.08
Privacy when counselling	76	70	80	<0.01
Improve handwriting	76	75	76	
More than one pharmacist	65	58	70	<0.01
Assistants dispensing	52.5	55.5	51.5	

Table 5. Correlation between years registered as a pharmacist and views on factors that may reduce the risk of dispensing errors.

Variable	Spearman rho	P value
Improve labels etc	−0.20	<0.05
Counselling	−0.20	<0.05
Improve handwriting	−0.10	
Reduce work	−0.10	
More than one pharmacist	−0.10	
Assistants dispensing	−0.10	
Updating knowledge	−0.10	
Checking the original	−0.10	
Systematic workflow	−0.10	
Mechanisms for checking	−0.10	
Privacy when counselling	−0.03	
Avoid interruptions	−0.02	
Distinctive names	0.00	

Table 6. Responses to whether Australia should have a regulatory guideline for maximum dispensing load (chi-square = 10·7, d.f. = 2, $P < 0{\cdot}01$).

Response	Owners	Non-owners
Yes	40 (46%)	77 (68%)
No	47 (54%)	36(32%)
Unsure	0 (0%)	1 (1%)

hour), including the pharmacist handing out medication and counselling the patient (10). The Pharmacy Board of New South Wales has expressed concern about the workloads to which some pharmacists subject themselves, and indicated that an average of ≈12–15 prescription items per hour per pharmacist may be a reasonable guideline (11). In one case, the Iowa Board of Pharmacy set a quota of 14·2 prescriptions per hour, per pharmacist (12).

Guernsey *et al*. conducted a peer-review audit in the outpatient pharmacy of a large teaching hospital (13). During a 12-day period, 9394 prescription forms and their corresponding pharmaceutical products were examined manually before being delivered to the patient. A total of 1165 (12·4%) dispensing errors were detected, with 141 (1·5%) of these considered potentially serious. A linear relationship ($r^2 = 0{\cdot}78$; $P < 0{\cdot}001$) existed between the number of potentially serious errors and the total number of prescriptions filled. It was concluded that pharmacies with high volumes should set a limit to the number of prescriptions filled by their

pharmacists, and should experiment with quality assurance systems to reduce dispensing errors and subsequent legal liabilities.

Buchanan *et al*. in a high-volume army outpatient pharmacy, also found that there was a linear relationship between pharmacists' error rates and their corresponding daily prescription workloads (14). The journal *Drug Topics* conducted a nationwide U.S.A. survey of community pharmacies in an attempt to address the causes and extent of drug dispensing errors that occur (15). They found that the volume of prescriptions that were dispensed by a given pharmacy had a considerable impact on the rate of dispensing errors. Forty-seven percent of pharmacists who worked at a pharmacy that handled 100 or fewer daily prescriptions reported making errors. In contrast, 60% of pharmacists who worked at pharmacies that handled more than 100 daily prescriptions reported making an error.

It has been suggested that doctors and pharmacists alike have a huge responsibility to protect patients from drug prescribing and dispensing errors (16). They must take their time and evaluate and serve each patient individually. These professionals must remember that haste only makes waste (16). Like pharmacy, there is considerable concern within the medical profession about the issues of overwork and fatigue, and their contribution to errors (17, 18).

A majority of the respondents indicated approval with having a regulatory guideline for the maximum safe dispensing load in Australia. However, a significant difference in opinion between the owners and non-owners was observed. Non-owners favoured setting a regulatory maximum (68% of non-owners answered 'yes') whilst the owners tended to oppose it (54% of owners answered 'no'). The arguments put forward in creating this limit were based on ensuring that adequate time was given to dispensing a prescription, to minimize the likelihood of errors and to maximize patient counselling by the pharmacist. Opponents of such a maximum, however, argued that the economic viability of some pharmacies would be threatened and pointed out the potential difficulty in formulating and policing such a maximum.

Interruptions to the pharmacist should be reduced, as they break up the attention on the prescription at hand. Distraction by non-professional activities is potentially dangerous, and thus should not occur. Abood suggested a number of stress reducers that could reduce the number of interruptions to the pharmacist (2). Provision of comfortable waiting areas and opportunities to shop while waiting may reduce distractions by the patient. Pharmacy support personnel (e.g. technicians or assistants) should be properly utilized in the dispensing process. Use of faxes and answering machines should be encouraged to reduce distractions from answering telephone calls.

Errors can occur due to incorrect selection from drug storage systems. Drugs of the same brand should be stored separately due to similar appearances. As pointed out by Marty & Crothers (19), an increasing number of pharmaceutical companies are opting for packaging that reflects a 'corporate look' and this has resulted in errors due to incorrect drug selection. Dispensing by colour and corporate look is part of the automatic response inherent in 'assembly line' dispensing that can pervade a supply-driven dispensing process. This type of dispensing is output- rather than outcome-focused and is unlikely to incorporate the type of continuous quality assurance mechanisms described by Kristner *et al*. (3), such as checking of prescriptions, evaluation of dispensing procedures and reduction of distractions.

Perpetuating an error by not checking the duplicate prescription when provided with a repeat form has also been documented as a dispensing procedure factor contributing to dispensing errors (1). Poor dispensing procedures can also result in medicines for different patients being confused. This can be avoided in various ways, e.g. always verifying the name and address of the patient, and the use of numbered tickets or clear plastic bags. The seemingly increasing numbers of similarly named drugs also pose some problems to pharmacists (e.g. Lamictal and Lamisil) (20). Look-alike and sound-alike medication names have previously been associated with dispensing errors (19, 21–24).

The design and layout of the dispensary may also contribute to the occurrence of dispensing errors. According to Lloyd (1) and Dwyer (25), 'open' or 'fish-bowl' type designs do not provide the pharmacist sufficient privacy to consult references, counsel patients or concentrate for difficult preparations. Another variable that has been associated with dispensing error rates is poor lighting (14). On the other hand, ambient sound does not seem to influence dispensing accuracy (26).

An interesting finding was the statistically significant difference between owners and non-owners

with respect to their perception of the importance of a number of these factors. Non-owner pharmacists gave significantly higher ratings to the following variables: the unavailability of technical resources (e.g. equipment, reference books), sole pharmacist dispensing (compared with two or more pharmacists present at the one time), overwork, fatigue, insufficient time to talk with the patient, participation in dispensing by pharmacy assistants, interruptions, and non-professional activities occurring in the vicinity of dispensary.

Owners tend to work longer hours, as demonstrated by the demographic results, and would naturally be more concerned about their business. This may lead to them overlooking the effects of overwork and fatigue on the accuracy of prescription dispensing. Similarly, owners may be more likely to consider interruptions as part and parcel of the running of a pharmacy, and hence they may discount it as a major factor in the occurrence of dispensing errors. Owners may also consider non-professional activities around the dispensary as integral and unavoidable in the running of a pharmacy and hence may tolerate them, whilst non-owners generally view them with greater trepidation. The associated costs of employing more pharmacists (compared with a sole pharmacist or employing pharmacy assistants) and having good technical resources could explain the tendency by owners to rate these variables as less important than non-owners. It is disturbing, however, that non-owners appear to be more concerned about a range of these key professional issues than pharmacy owners.

The difficulty that community pharmacy has in separating its commercial and patient care interests is cited as a major reason for its incomplete professionalization (27). The dilemma here is that (i) one-quarter of Australian community pharmacies have difficulty in achieving a full proprietor's notional salary, let alone a return on funds employed (28), (ii) the number of prescriptions dispensed daily by the average community pharmacy continues to rise, plus there is an increasing reliance on the Pharmaceutical Benefits Scheme (PBS) for the turnover of a community pharmacy (28), and (iii) the mark-up on PBS drugs is very modest.

The responding pharmacists mentioned a number of factors that may reduce the risk of dispensing errors. Those variables with an overall median response of at least 75 mm on the 100 mm visual analogue scales, in decreasing order of importance, were: having mechanisms for checking dispensing procedures, having a systematic dispensing workflow, checking the original prescription (duplicate) when dispensing repeats, improving the packaging and labelling of drug products, having drug names that are distinctive, counselling patients at the time of supply, keeping one's knowledge of drugs up-to-date, avoiding interruptions, reducing workloads on pharmacists, improving doctors' handwriting, and privacy when counselling patients.

The above list suggests that a range of quality assurance procedures is important in avoiding dispensing errors. In order to reduce the occurrence of errors, methods must be devised to identify the sources of errors and to implement strategies to correct them. According to Greenberg (10), quality assurance and quality systems should be an integral part of pharmacy dispensing practice. A quality assurance programme should be developed to recognize where errors can and do occur in the dispensing chain. This should involve the filing of incident reports for every pharmacy error by whoever discovers the error. These reports should be handled non-punitively to encourage continued generation, and backed up with twice-yearly evaluations of personnel who handle medications.

As suggested by Dwyer (25), Australia and many other countries would benefit from the establishment of a central database of errors or potential dispensing errors to gain a better understanding of errors and their prevention. Such a system exists in the U.S.A., whereby incidents can be reported via a 24-h toll-free telephone service, and are published anonymously (29). One of the preventive measures for pharmacists to implement against dispensing errors is to be aware of the common types and causes of pharmacy errors, and to be alert to avoid them (2). Obviously, this approach is only possible if there is a non-punitive process that facilitates the routine reporting and publication of dispensing errors. Accepting a systems approach as the cause of errors means that system failures must be identified and corrected by asking the question, what caused the error to occur, not who (2). Such an approach, termed failure-mode and effects analysis, has been applied to hospital drug distribution systems (30).

Standards in the dispensing process must be set appropriately high. As noted by Kotler, a 98% accuracy standard may sound good but it would result in 400 000 misfilled prescriptions daily in the U.S.A. (31).

There should be zero error tolerance within the profession (1). Indeed, consumers have a zero error rate expectation (32).

Maintenance of contemporary pharmaceutical knowledge by the pharmacist is to be expected by the public and is a reasonable demand on the profession as a whole. Lloyd has contended that lack of up-to-date knowledge is a factor contributing to dispensing errors and that it is unacceptable for pharmacists to be unaware of new strengths and dosage forms (1). Lack of up-to-date knowledge may also be a factor in misinterpreting the prescriber's intent with poorly written prescriptions.

It is clear that patient counselling can help avoid and detect dispensing errors (2, 33). Counselling can reduce the number of errors, as it allows the pharmacist to formally identify the products and ensure the correct drugs are dispensed to the right person. The patient is the last line of defence in medication error prevention, especially if the patient has been made aware of the name of his/her medication, what it is for, and how to take it. The patient who has this information is in a much better position to ask questions during counselling by the pharmacist and to help ensure that the correct drug is given to them (1).

Again, several factors that may reduce the risk of dispensing errors showed a statistically significant difference between owners and non-owners. These were keeping one's knowledge of drugs up-to-date, privacy when counselling patients, having more than one pharmacist on duty, and checking the original prescription (duplicate) when dispensing repeats. Continuing professional education was one of the major factors mentioned in reducing dispensing errors. However, owners tended to lower the weighting of this factor compared to non-owners. Privacy when counselling was also considered less important by the owners, as was the practice of having more than one pharmacist on duty. When dispensing repeats, it is a statutory requirement that the duplicate of the original prescription is checked against the repeat to ensure uniformity. This is, of course, complied with by most pharmacists, but non-owners believed this is one of the best actions that can be undertaken to reduce the incidence of dispensing errors.

The survey revealed a large proportion of pharmacists (71%) acknowledging the recent occurrence of dispensing errors which had left their pharmacy undetected, with a median value of 3 and a sample total of $\approx$500 errors over the past 6 months being cited. One could only speculate on the number of errors of which the pharmacists were not aware.

In conclusion, the pharmacists indicated overwhelmingly that they thought that the risk of dispensing errors was increasing and most were aware of dispensing errors that had left their pharmacy undetected during the past 6 months. The major contributing factors identified were high prescription volumes, pharmacist fatigue and overwork, interruptions to dispensing, and similar or confusing drug names. The pharmacists believed that having good systems in place could minimize the likelihood of errors occurring, and the majority of respondents believed that there should be a regulatory guideline for the maximum safe dispensing load of around 17 prescription items per hour for one pharmacist.

Pharmacy systems should be designed to eliminate the causes of errors, especially unreasonable pharmacist workloads, and provide for numerous checks in the dispensing process (1–3, 29, 32). There is an urgent need for the professional organizations and Pharmacy Boards to be proactive on this issue, before legislators and bureaucrats decide to determine standards for the profession (10).

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Appendix: Survey of pharmacists examining the issue of dispensing errors

We appreciate your honest opinions. The responses will be treated anonymously and confidentially, and data from all respondents will be pooled.

The first set of questions relates to demographic information.

1 What is your age? _____

2 Gender? ☐ Female ☐ Male

3 In which year did you first register as a pharmacist? 19 _____

4 Which of the following best describes your regular practice?

☐	Community (owner)	☐	Academia
☐	Community (manager)	☐	Industry
☐	Community (pharmacist)	☐	Hospital pharmacy
☐	Community (locum)	☐	Other _____

5 On average, how many **hours each week** do you participate in **dispensing prescriptions**?

6 On average, how many **continuous hours** on each of your working days do you participate in **dispensing prescriptions**? _____

The remaining questions relate to pharmacists' opinions on errors in dispensing.
Note that in this survey dispensing errors refer to errors (eg wrong drug or dose strength, incorrectly labelled directions or drug dispensed to wrong patient) that leave the pharmacy undetected.

7 Do you believe that the risk of errors in dispensing is increasing in pharmacy practice?
☐ Yes ☐ No

8 Do you believe that actual errors in dispensing are becoming more common?
☐ Yes ☐ No

9 We are interested in identifying variables that pharmacists perceive as being associated with dispensing errors. Do you believe that each of the following factors is associated with the occurrence of errors in dispensing? Answer each by placing a cross anywhere on the scale provided.

(a) Poor handwriting by doctors

(b) Similar or confusing drug names

(c) The existence of generic brands

(d) Distractions due to PBS administration/clerical requirements etc.

No association at all *Very high association*

(e) The packaging and labelling of products

No association at all *Very high association*

(f) Potential discrepancy between details on original prescription and repeat form

No association at all *Very high association*

(g) Pharmacist overwork

No association at all *Very high association*

(h) Pharmacist fatigue of any cause

No association at all *Very high association*

(i) Job dissatisfaction

No association at all *Very high association*

(j) High prescription volume (dispensing workload)

No association at all *Very high association*

(k) Sole pharmacist (compared with two or more pharmacists present at one time)

No association at all *Very high association*

(l) Participation in dispensing by pharmacy assistants

No association at all *Very high association*

(m) Noise

No association at all *Very high association*

(n) Interruptions (eg telephone, customers)

No association at all *Very high association*

(o) Design of dispensary and layout of shelves

No association at all *Very high association*

(p) Design of computer dispensing software

No association at all *Very high association*

(q) Insufficient technical resources (eg equipment, drug reference books)

No association at all *Very high association*

(r) Lack of privacy when dispensing

No association at all *Very high association*

(s) Non-professional activities occurring in the vicinity of dispensary

No association at all *Very high association*

(t) Insufficient time to talk with the patient or his/her agent

No association at all *Very high association*

Are there other factors that you can suggest? Please list these below:

10 Which of the following factors would you nominate as being important in minimising the risk of dispensing errors ? Please rate the importance of each by placing a cross anywhere on the scale provided.

(a) Improving doctors' handwriting

Not important *Very important*

(b) Reducing workloads on pharmacists

Not important *Very important*

(c) Having more than one pharmacist on duty

Not important *Very important*

(d) Performance of physical dispensing by pharmacy assistants

Not important *Very important*

(e) Keeping one's knowledge of drugs up-to-date

Not important *Very important*

(f) Avoiding interruptions

Not important *Very important*

(g) Having drug names that are distinctive

Not important *Very important*

(h) Improving the packaging and labelling of drug products

Not important *Very important*

(i) Checking the original prescription (duplicate) when dispensing repeats

Not important *Very important*

(j) Having a systematic dispensing workflow

Not important *Very important*

(k) Having mechanisms for checking dispensing procedures

Not important *Very important*

(l) Counselling patients at the time of supply

Not important *Very important*

(m) Privacy when counselling patients

Not important *Very important*

Are there other factors that you can suggest? Please list these below:

_____

_____

_____

_____

11 Approximately how many prescription items do you believe can be safely dispensed per day (9am - 6pm) by/in the presence of one pharmacist? _____

Some Pharmacy Boards overseas (eg Iowa, USA) have imposed maximum safe dispensing limits for pharmacists. Do you think that there should be a regulatory guideline for the maximum safe dispensing load in Australia?

☐ Yes ☐ No

12 Are you aware of any dispensing errors in your place of practice during the past 6 months? Note that this refers to dispensing errors (eg wrong drug or dose strength, incorrectly labelled directions or drug dispensed to wrong patient) that left the pharmacy undetected (ie does not include dispensing errors that were discovered and corrected prior to the medication leaving the pharmacy).

☐ Yes ☐ No

If yes:

approximately how many dispensing errors in your place of practice during the past 6 months are you aware of ?

_____

was there a common causative factor that you could identify ? If yes, please list:

_____

_____

_____

_____

13 Do you have any further comments or suggestions on the issue of dispensing errors ?

_____

_____

_____

_____