



Avoiding and fixing medical errors in general practice: prevention strategies reported in the Linnaeus Collaboration's Primary Care International Study of Medical Errors

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Abstract

Aim To report tactics for avoiding and remedying medical errors observed by general practitioners in New Zealand and five other countries.

Methods The Primary Care International Study of Medical Errors collected 66 reports of medical errors in New Zealand and 363 reports from general practitioners in Australia, Canada, England, the Netherlands, and the United States. Strategies for avoiding and overcoming errors were grouped by themes, for New Zealand and the five other countries combined.

Results In all New Zealand reports and 336 (92.6%) reports from other countries, doctors offered at least one error prevention idea. The largest category of suggestions was 'more diligence' (New Zealand: 69.7% of reports, other countries: 55.3%). Other strategies were: 'provide care differently' (New Zealand 22.7%, other countries 36.4%); 'improve communication' (19.7% and 17.8% of reports); 'education' (7.8% and 11.0% of reports); and 'more resources' (12.1% and 14.0% of reports).

Conclusions In general practitioners' medical errors reports, a culture of individual blame is more evident than recognised need for systems design. A minority of reports contained specific, pragmatic suggestions for changing healthcare systems to protect patients' safety. Error reporting systems may be a practical way to generate innovative solutions to potentially harmful problems facing general practice patients.

Although healthcare quality has always been an important issue for healthcare providers and patients, it is only recently that the pool of international research demonstrating grave and systematic dangers to patients arising from medical errors has prompted widespread political and lay concern. Major reports in the United States (US)¹ and the United Kingdom (UK)² in 1999 and 2000 recognised the problem and signified the start of systematic improvement efforts.

Both these reports relied on patient safety research that has tended to focus on hospital care and research in New Zealand has been similarly targeted.³ To date, primary care providers have been excused almost entirely from engaging in patient safety inquiries and considering improvement strategies.

Medical errors research has led to the conclusion of recent policy statements,^{2,4} that the negative consequences of a medical culture that 'names, blames, and shames' individual healthcare providers precipitates defensive responses from individuals while failing to address underlying causes of errors.⁵ Instead of blaming doctors and nurses, leading patient safety proposals call for the design and implementation of

error prevention strategies that target systems of care.⁶ This approach moves the focus from the individuals participating in the system to the design of the system itself. It requires detailed knowledge of 'the system' so that system components that allow or even promote errors can be identified and changed. Medical errors research in hospitals has improved the safety of anaesthetics,⁷ medication use,^{8,9} and peri- and intra-operative care¹⁰ but many of these safety lessons cannot readily be translated into primary care.

During the last decade, only three projects—in Australia,¹¹ the US,¹² and the UK¹³—have suggested that routine primary care may hold substantial threats to patient safety. Bhasale¹¹ and Fischer¹² both examined incidents that had 'harmed' patients or had 'potential for harm'. Britten¹³ analysed patient-physician misunderstandings that adversely affected patients' decisions about taking medicines. A further study has recently been completed.¹⁴

The Primary Care International Study of Medical Errors (PCISME) was a project of the Linnaeus Collaboration, an international research group focusing on quality issues in primary healthcare. PCISME collected medical error reports from general practitioners and family physicians in Australia, Canada, England, the Netherlands, New Zealand, and the US. The reporting format took advantage of the reporters' insider knowledge of the health system they were providing care in and requested their views on ways to avoid the reported error. We analysed these data to assess general practitioners' insights not only on the medical errors they encountered, but also on ways they thought these errors could be avoided.

Methods

Participants—The general methods of the PCISME study have been reported elsewhere.¹⁴ In summary, Linnaeus Collaboration members invited known general practitioner or family physician contacts from Australia, Canada, England, the Netherlands, New Zealand, and the US to participate in the study. We aimed to enrol 20 general practitioners from each country. Each participant was asked to make at least 10 reports of medical errors they noticed during their daily practice of medicine between 1 May 2001 and 31 December 2001. To be eligible, doctors had to provide direct patient care for at least 20 hours per week, be computer literate, and have access to an Internet-connected personal computer with a CD-ROM drive (for uploading the reporting software).

Study data and processes—A standard study protocol was devised in a face-to-face 2-day meeting of investigators from all six countries in Washington DC in 2000 and used in all countries. To manage the heterogeneity of participating countries' cultures (despite their common use of English) we debated and agreed on language in the data collection form that would capture equivalent data from each country. This process produced some broadly phrased data fields (such as whether patients affected by errors had 'complex' or 'chronic' health problems) that investigators agreed would be interpreted in the same way by primary care doctors in the six countries.

Study data were observations of medical errors general practitioners made during their daily clinical practice of medicine in a variety of settings. We used a definition of 'error' that was pilot tested and shown to be understandable in a US pilot study.¹⁵ Errors were anything that 'should not have happened', including both administrative and clinical mistakes—anything participants identified as something to be avoided in the future. This definition was displayed on the first screen of each electronic report so that general practitioners were reminded of it every time they entered the system. Reported events did not have to actually or potentially harm patients. A free text description of the error was made with prompts to record what happened, known consequences, and the reporter's view on what could have avoided or redeemed the error. Check boxes recorded where the error occurred. If the error related to a particular patient, reports included the patient's age, sex, ethnicity, familiarity to the doctor, and whether they were affected by chronic or complex health problems.

Reports were made using an electronic web-based data collection tool based on a design implemented for a previous study by a British medical software company, the World Health Network. Electronic

data were routed, encrypted, from doctors' practices in the six countries through a secure server in London, before being accessed by each country's principal investigators (MT and KH in New Zealand) and the international study coordinator (SD). The data collection process produced a set of anonymous reports that could be associated with a unique participating physician. Participants attached an identifier known only to them to each report to anonymise the data. Ethics approval was obtained for each country separately.¹⁶ In New Zealand, the Otago Ethics Committee approved the study.

Analysis—Reports were categorised according to the type of error reported, using the preliminary error taxonomy developed from the earlier study.^{14,15} Data for this analysis of preventive strategies mainly derived from free text responses to the question: *What could have prevented it? Please think about what should be changed to prevent this from happening again.* We also scanned free text responses to the questions *What happened?*, *What was the result?*, and *What may have contributed to this error?* and if preventive strategies were suggested in these responses they were also included in the analysis. A qualitative analytic approach based on 'immersion' in the data and 'crystallisation'¹⁷ of themes and categories was the primary analytic method. Although aware of discussions regarding the influence of medical culture on medical errors, we deliberately 'bracketed' this knowledge in an effort to derive the themes and categories directly from the data.

As context for the above analysis, we calculated descriptive statistics for the variables: primary error type;¹⁴ reported site of occurrence; patient age, sex, and ethnicity; and familiarity of the reporting physician with the affected patient. The proportion of reports attributed to each error type and prevention theme and category was calculated for each country. The study was not designed to allow statistical comparisons of countries' data nor to provide epidemiologically generalisable findings.

Results

A total of 437 reports were made. No error could be defined in 6 reports (1 from New Zealand), thus leaving 431 medical errors reports—132 from Australia, 81 from Canada, 63 from England, 14 from the Netherlands, 66 from New Zealand, and 75 from the US. In New Zealand, 20 South Island general practitioners were invited to participate and 11 different identifiers were used. A total of 84 general practitioners were enrolled in the study from the other five countries and 68 identifiers were used.

Context

The primary types of error reported (one per report) and characteristics of affected patients were broadly similar for all countries (Table 1). Table 2 shows that most errors reported by New Zealand doctors (63.6%) were considered to have originated outside the general practice, whereas in other countries doctors mainly reported errors originating inside their practices (69.3% happened 'in my office'). Balancing this result, more New Zealand doctors' reports involved errors they considered originating in hospitals, pharmacies, laboratories, emergency departments, patients' homes, and in telephone contacts.

Prevention strategies

A total of 166 qualitatively different prevention strategies were suggested 680 times. In all New Zealand reports and 336 (92.6%) reports from other countries, doctors offered at least one idea on error prevention. Figure 1 shows the percentage of reports (containing the main prevention themes) from New Zealand and all other countries combined.

More diligence—From all countries, the largest category of suggestions (N=313) was interpreted as expressing the 'name, blame, shame' culture. It included statements such as that doctors (or frequently practice staff, nurses, and other providers) should

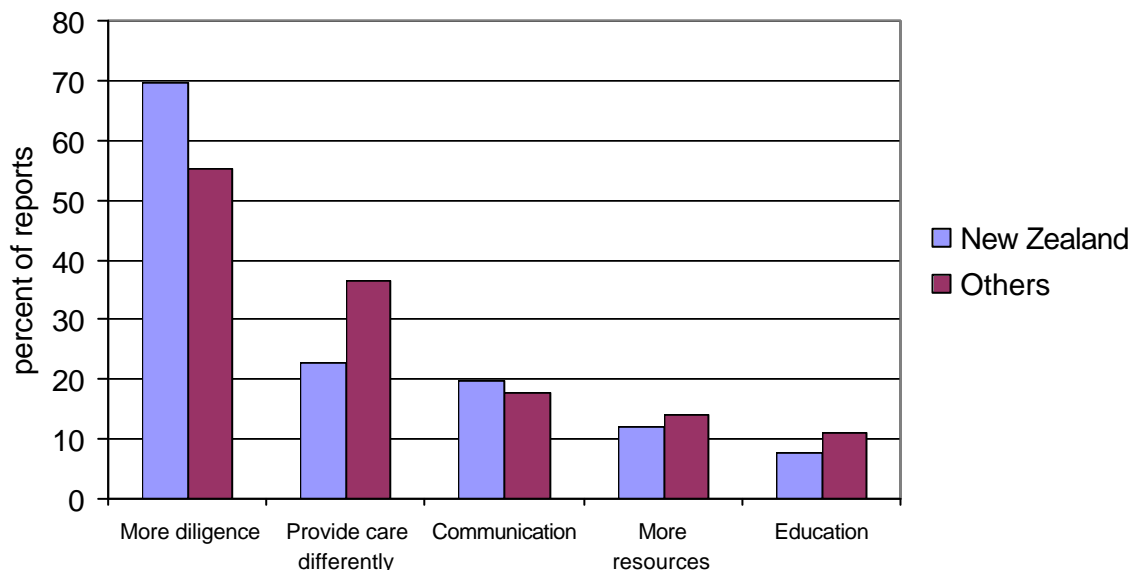
not make the reported error, should be more careful, should follow pre-existing protocols, or provide care to accepted standards.

We defined this theme as ‘more diligence’. Prevention strategies of this type were proposed in 69.7% of New Zealand reports and 55.3% of other countries’ reports. Every country made at least seven reports calling for more diligence by doctors and all countries except the Netherlands referred to a need for more diligence by administrative staff. New Zealand and Canada were the only countries not to list nurses as needing to apply more diligence. England was the only country proposing more diligence of hospital consultants to reduce errors.

Further strategies in this category related to doing the same thing better (all countries), investigating and referring earlier (Australia and Canada), and following-up more quickly (New Zealand and the US). All countries also contributed some reports proposing the development of personal attributes such as greater assertiveness or awareness. Workforce management was the only error category not attracting ‘greater diligence’ as a prevention strategy in New Zealand, Australia, and Canada.

Conversely diligence was the suggested strategy in all US reports of medical errors related to workforce management and payment. In New Zealand 81.0% of errors attributable to knowledge and skills gaps attracted “more diligence” as a prevention strategy, whereas ‘more diligence’ was suggested in 64.4% of errors attributable to healthcare systems and processes. In other countries ‘more diligence’ was suggested for 67.6% of knowledge and skills errors and 52.5% of process errors.

Figure 1. Prevention strategy themes for New Zealand and the other five countries combined



Provide care differently—Sixteen practical suggestions of ways to provide care differently were made in 15 (22.7%) reports from New Zealand, and 159 suggestions

were made in 133 (36.4%) reports from other countries. All countries except the US suggested some errors could be avoided by patients having only one provider for certain healthcare services: general practice care overall, drug dispensing, and screening procedures.

All countries also offered some suggestions to address specific problems by organising care differently—for instance, having walking frames beside the beds of frail elderly patients in hospitals and nursing homes would help avert falls, having clinicians involved in the design of information management systems would help them to better meet doctors' needs, and having less paperwork would allow doctors to better focus on their clinical responsibilities. Computer system design problems included having multiple patient records opened on the computer at one time leading to mixed-up records and computerised prescribing using 'pick lists'. In New Zealand, inadvertent prescribing of 'quinine' instead of 'quinidine' was a recurring error.

New Zealand doctors suggested that if topical steroids came in smaller tubes errors involving their overuse would decrease, if drugs that were dangerous in combination were stored in different places they would be less likely to be used simultaneously, and if pharmacists referred patients instead of proposing diagnoses the reported diagnostic error and inappropriate treatment would not have happened. Reports from New Zealand, Australia, the Netherlands, and the US suggested that repeating back instructions made orally might prevent some errors.

From New Zealand, Australia, Canada, and the US came the suggestion that abnormal laboratory or diagnostic imaging results reported urgently by telephone or fax would have averted some errors. Other countries offered suggestions to organise the practice differently (for example, allocating responsibility for answering telephones to specific staff and using only window envelopes), comments on reorganising nursing homes, suggestions on changing diagnostic investigation procedures, and suggestions that shifted greater responsibility for care to patients (such as *making the patient responsible for follow-up* and *getting care from a medical doctor*)—but no suggestions were made in these subgroups by New Zealand general practitioners.

Some doctors reported having already made changes to avoid repeating the reported error. In New Zealand, these included changing computer templates to ensure antenatal screening tests were completed at the right time and instituting double-checking processes to ensure the doctor was adequately prepared for consultations at peripheral clinics.

Improve communication—Fourteen ways to improve communication were suggested in 13 (19.7%) reports from New Zealand, and 67 suggestions were made in 65 (17.8%) reports from other countries. All countries' reports included at least three ways that improved communication could have averted the reported error. Often (16/81 communication suggestions) this was by better explanations to patients.

Doctors in New Zealand, Australia, Canada, and England (but not the US or the Netherlands) reported errors in communication between providers. Solutions included making formal arrangements for the transfer of responsibility for patient care between providers and improving the clarity of investigation reports by avoiding using codes and standardising the phrasing of reports.

More education—All countries except the Netherlands made at least five suggestions regarding the need for more education of healthcare providers (5 suggestions made 40 times) or better patient education (4 suggestions made 5 times). From New Zealand these suggestions were broadly framed as *more experience* and *more staff training*—although one specific suggestion was that a delay in diagnosis and treatment of a sports injury could have been averted if sports players and coaches better understood the potentially damaging consequences of such delay.

More resources—All countries except the Netherlands highlighted a need for more resources of time (34), physical resources (30), money (3), and research (2). Fewer calls for more resources came from New Zealand reports (8 [12.1%] reports, 10 resource needs) than from all other countries combined (51 [14.0%] reports, 59 resource needs).

Errors in ordering medications generated more resource strategies than any other error type—in these cases the resource that was usually needed was a computer capable of providing the decision support needed by doctors when prescribing. Reports from Australia and Canada identified a need for more money in the health system generally. From England came the suggestion that dealing with complex health problems should attract differential payments but no calls for more money came from New Zealand, the US, or the Netherlands. A need for more time typified English reports in particular (15/34 ‘more time’ suggestions).

Table 1. Medical error types and affected patients in six countries (percent of error reports)

Variable	Australia N=132	Canada N=81	England N=63	Netherlands N=14	New Zealand N=66	United States N=75	Total N=431
Error type	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Treatment Process error	28.0	29.6	15.9	14.3	24.2	27.4	25.4
Office administration error	19.7	17.3	22.2	21.4	9.1	24.7	18.9
Investigation Process error	13.6	21.0	17.5	14.3	13.6	21.9	17.0
Communication error	15.2	11.1	19.0	7.1	8.2	11.0	14.5
Wrong diagnosis	13.6	8.6	12.7	42.9	19.7	2.7	12.6
Other	9.9	12.4	12.8	-	15.1	12.4	11.7
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Patient characteristics							
aged 20-79 years	88 (66.4%)	62 (76.7%)	46 (73.2%)	13 (92.3%)	48 (72.9%)	55 (73.2%)	311 (72.2%)
female	85 (64.2%)	52 (64.0%)	34 (54.4%)	6 (42.9%)	27 (40.3%)	47 (62.3%)	250 (57.9%)
member of ethnic minority	16 (11.8%)	28 (34.7%)	14 (22.8)	0.0	5 (8.1%)	22 (29.9%)	85 (19.8%)
has complex health problem	58 (43.7%)	32 (40.0%)	25 (40.4%)	5 (35.7%)	19 (29.5%)	37 (49.3%)	177 (41.0%)
has chronic health problem	81 (61.7%)	51 (62.7%)	39 (61.4%)	5 (35.7%)	35 (53.2%)	50 (67.2%)	261 (60.5%)

Table 2. Site of occurrence of reported error

Site	New Zealand (% of reports) N=66	Other countries combined (% of reports) N=365	Total
Doctor's office	36.4	69.3	64.3
Hospital	21.2	11.0	12.5
Patient's home	18.2	7.1	8.8
Pharmacy	10.6	3.0	4.2
Laboratory	9.1	5.5	6.0
Emergency Department	9.1	2.5	3.5
Telephone contact	6.1	5.8	5.8
Nursing Home	4.5	5.2	5.1
Radiology	0	2.7	2.3
Other	10.6	6.8	7.4

Discussion

This international study of reports medical errors observed by general practitioners in their everyday clinical practices showed that not only can general practitioners identify and report on medical errors but also that they can offer solutions. Knowledge of the healthcare system they work in enabled doctors to propose and implement practical ways to prevent and remedy medical errors. Despite these positive findings from this study, nearly half of general practitioners' solutions for overcoming medical error (313/683; 45.8%) were unhelpful expressions of the 'name, blame, shame' culture.

Surprisingly, only a small minority of the other more practical solutions for overcoming medical errors in primary care required additional resources (69/683; 10.1%), and these resources were almost always time rather than money. Dutch doctors suggested fewer preventive strategies than general practitioners in other countries because they made fewer reports. Overall, most general practitioners participating in this country had and reported on their view of ways to make safer the healthcare they provided their patients.

Specific changes to practice such as creating workable strategies for dealing with abnormal test results in a timely manner, repeating back oral instructions, and storing drugs in different places if they could be dangerous in combination were all practical suggestions for alleviating common errors observed by New Zealand general practitioners. General practitioners in all six countries also favoured various double-checking systems. Some suggested solutions were beyond the power of individual general practitioners to implement—such as providing topical steroid medicines in smaller tubes, using standardised codes in laboratory test reports, and having an anticandida agent available that did not interact with warfarin; some solutions would eventuate over time—such as 'more experience', and an evidence base for alternative medicine; and some solutions had already been implemented before the report was made—such as changing computer templates and instituting double-checking systems.

This study captures a snapshot view of general practice medical errors and error prevention strategies in six countries—but it is not representative of each country's general practitioners, practices, patients, or medical errors and it does not define differences between countries. Instead, it generates questions and testable hypotheses. Before this study, there were theoretical grounds to suppose that doctors in New Zealand might be more forthcoming about medical errors they encounter than doctors in other more litigious countries. This theory seems to be supported by the finding from the recent review of hospital records that there was a 'remarkably' high level of acknowledgement of medical injury in New Zealand hospitals' patient records.¹⁸

By contrast, in the current study, many more reports from New Zealand than from other countries attributed the reported error to an event originating outside the general practice, just as in the review of hospital records,³ a good deal of the adverse events happening in hospitals appeared to originate in other settings. Together, these findings from two studies suggest reluctance on the part of New Zealand's doctors to acknowledge involvement in medical errors—even when they are prepared to report on them. These results also cast doubt on the ability of the present medical complaints

and injury compensation systems in New Zealand to resist the same sort of “closed-ness” that the tort jurisdictions encourage.

The Accident Compensation Corporation’s 1992 definition of medical error specifically blamed individuals for harms relating to healthcare provision. Forthcoming changes to the ACC definition are much more consistent with internationally accepted approaches to reducing harms from medical care.

Regardless of pending legislative changes, our study suggests that there may be at least as much need to address in New Zealand as in other countries the medical culture that promotes blame and discourages the objective scrutiny of medical errors that would make healthcare safer for patients. As well, mistakes themselves need to be better understood, rather than the downstream effects of mistakes. New Zealand is the only one of the countries involved in this study that has no national error reporting system encouraging awareness of health system errors. Evolutions in New Zealand’s primary healthcare structures over the past decade have increasingly focused on improving quality but safety is neglected as a specific focus.

It is both a strength and a weakness of our study that it depended for its data on reports of physicians. Many types of errors reported from observations (such as forgetting to order medications or tests, using an out-of-date vaccination, or failing to recognise the need for an urgent appointment) could not be revealed by any other means. However, the reports cannot be denominated nor rates estimated, as they can from retrospective reviews of hospital records.³ Moreover, we depended for this study on groups of volunteer reporters in different countries. We cannot define differences between countries statistically because these general practitioners did not represent their peers and their reports cannot be assumed to represent all possible observable errors in their practices.

Importantly however, the reports may well reflect the values and attitudes towards medical errors in these countries. Participants chose to report events they felt safe in reporting, or events that triggered a concern that they wanted to share. We thought the types of events general practitioners in different countries might choose to report could be quite different but found that they were similar. This unexpected homogeneity suggests that the data collection tool is reliable and implies that further medical errors research in primary care settings might be able to aggregate data from these countries. We also expected more differences than we found in the solutions offered. Regardless of the malpractice environment they practised in, general practitioners in all six countries tended to resort to ‘don’t make mistakes’ as their default suggestion for preventing, averting, or remedying errors. All these countries seemed to be at much the same stage of understanding medical errors in primary care settings.

We report here only the solutions offered by the primary care doctors generating error reports in our study. It is likely that many more ways of ‘fixing’ medical errors exist and would work but to discuss these is beyond the scope of this investigation. For all countries except Australia¹¹ and the US¹⁵ PCISME was the first study to systematically investigate medical errors and their solutions in primary care settings. This analysis of PCISME data shows that the practising environment may make it difficult for physicians to think in terms of ‘systems’ or to imagine alternatives to their immediate realities—yet despite this, in searching for solutions to medical

errors, asking those involved in providing care for their ideas may be a rewarding strategy.

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Acknowledgements: International management of the study was provided by the Robert Graham Center of the American Academy of Family Physicians, with financial support from the Commonwealth Fund. In New Zealand, the study was funded by the Otago Medical Education Foundation.

We gratefully acknowledge the time and effort made by the participating general practitioners and family physicians of the six countries involved in this study. We also thank the international principal investigators and their research teams: Michael Kidd and Meredith Makeham (Australia), Walter Rosser and Neil Drummond (Canada), Aneez Esmail and Martin Roland (England), Chris van Weel (the Netherlands), and Tony Kuzel and Steven Woolf (United States). We are also grateful for the administrative support for the study provided by Raewyn Crump at the Dunedin School of Medicine.

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