



## Quality use of medicines activities in New Zealand hospitals from 2000 to 2002

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### Abstract

**Aims** To review current activities promoting Quality Use of Medicines (QUM) in New Zealand hospitals in 2000–2002, and to identify attitudes to possible centralisation of activities.

**Method** Questionnaire-based cross-sectional survey of 30 New Zealand public hospitals. Respondents were chief pharmacists in all hospitals employing at least one pharmacist.

**Results** Twenty-nine hospitals (96.7%) responded; 3 were linked to a tertiary hospital for QUM activities. From the 26 independent hospitals, 64 Drug Utilisation Reviews (DURs) and 63 hospital-wide campaigns were reported, and 103 medicines information bulletins produced. Nineteen (63.3%) hospitals had their own hospital formulary. Twenty-four percent of respondents reported they would use centrally-developed guidelines only if in total agreement with their own. All hospitals reported disseminating drug expenditure information; feedback comments were predominantly from financial and nursing managers. All hospitals reported providing some form of drug information service (DI) and two-thirds a drug utilisation service (DU); 70% of total dedicated staff-time to these services was in tertiary hospitals. An increase in staff-time (fulltime-equivalent staff/100 beds) for clinical pharmacists, and DU+DI pharmacists, was associated with an increase in the number of DURs undertaken ( $p < 0.05$ ).

**Conclusion** A range of activities to promote QUM were undertaken in New Zealand hospitals, with greater activity in tertiary and secondary hospitals. Respondents reported some resistance to centrally-developed guidelines. Promotion of QUM may be assisted by an increase in clinical pharmacy resources.

Quality Use of Medicines (QUM) in New Zealand and Australia evolved from the World Health Organisation (WHO) statement on rational drug use.<sup>1</sup> This stated that 'Rational use of drugs demands that the appropriate drug be prescribed, that it be available at the right time at a price people can afford, that it be dispensed correctly, and that it be taken in the right dose at the right intervals and for the right length of time. The appropriate drug must be effective, and of acceptable quality and safety'.

From the 1980s onwards, 'rational use of medicines' became a prominent theme, promoted by the WHO, the International Network for Rational Use of Drugs, and national governments.<sup>1–3</sup>

In 1992, in Australia, consumer and healthcare organisations' concerns about the effective and safe use of medicines led to QUM becoming the fourth arm of their National Medicines Policy.<sup>4</sup> (Others were: ensuring the availability of safe, high-

quality, effective medicines; providing equity of access to cost-effective medicines; and maintaining the viability of the pharmaceutical industry).

The objectives of Australia's QUM policy were to achieve: judicious selection of management options (use of medicines only where appropriate); appropriate choice of medicine and dosage regimens (choice of the most effective medicine whilst considering benefit, risk, cost, etc); safe use of medicines (minimising misuse, overuse, and underuse; and taking action to solve medication related problems such as adverse effects).<sup>4</sup>

In New Zealand, health professionals' concerns about the safe and effective use of medicines have resulted in hospitals and other organisations undertaking activities to promote QUM.<sup>5-7</sup>

In 1993, the Pharmaceutical Management Agency (PHARMAC) was established in New Zealand to manage the list of pharmaceuticals subsidised by the Government for use in the community. In February 2002, PHARMAC launched the National Hospital Pharmaceutical Strategy (NHPS) to manage the purchasing of pharmaceuticals in New Zealand hospitals. The NHPS included 'promotion of Quality in the Use of Medicines' as one of three main areas of focus.<sup>8</sup> (Others were the management of prices for pharmaceuticals, and the assessment of new medicines.)

The NHPS proposed the development of a national programme for QUM in New Zealand hospitals with some activities centrally-coordinated by PHARMAC. During a consultation exercise, stakeholders raised concerns at the QUM proposals, and at other proposals within the Strategy.<sup>8</sup> The present study has been undertaken therefore, independently of PHARMAC, to determine the level of QUM activity in New Zealand Hospitals prior to the introduction of a centralised QUM strategy, and to ascertain attitudes to the introduction of such a policy.

## **Aims**

The aims of the present study were:

- To examine levels of activity for the promotion of Quality Use of Medicines in New Zealand Hospitals in 2000 to 2002.
- To identify attitudes to possible centralisation of some QUM activities.

## **Method**

A questionnaire was developed and administered to chief pharmacists at all 30 New Zealand hospitals with at least one pharmacist onsite. The topics included in the questionnaire were: guideline development; drug utilisation reviews (DURs); dissemination of drug expenditure data; hospital formularies; bulletins on medicine use; campaigns to improve prescribing; sources of economic information; and staffing levels for drug utilisation and drug information activities.

In the questionnaire, Drug Utilisation Reviews (DURs) were defined as audits of medicine use undertaken in clinical areas, where data is collected on the use of particular medicines, plus data on relevant patient factors. Decision-makers were defined as those persons given authority to decide whether/how particular medicines could be used in clinical areas—e.g. senior managers/clinical leaders/advisory committees.

Drug Utilisation activities were defined as assessment of new medicines, formulary and guideline development, bulletin writing, education campaigns, and DURs. Drug information activities were not specifically defined as they are usually understood to be the provision of information on drugs in

response to specific requests. Some aspects of QUM (such as systems for monitoring adverse drug events and clinical pharmacy interventions) were considered to be beyond the scope of this study.

Four senior pharmacists pilot tested the questionnaire for face validity, ambiguity, and time to complete. In addition, the questionnaire was reviewed by a health-policy researcher and a statistician. The questions were open, closed, or continuous. For the continuous questions, respondents were asked to give their opinion on a scale of 1–6 where '1 = always' and '6 = never'. Hospitals and chief pharmacists were identified from a list published by the New Zealand Healthcare Pharmacists' Association. The questionnaire was posted to all 30 chief pharmacists in June 2002. To improve the response rate, telephone contact was made with respondents prior to posting the questionnaire and at follow-up.

For analysis, hospitals were classified as tertiary (6 hospitals), secondary (12), or rural/special (11). Tertiary hospitals were those with all specialities onsite; secondary, most specialities onsite but some visiting specialists; rural/special hospitals were small hospitals with only visiting specialists, or hospitals for a special group of patients (e.g. psychiatric). The New Zealand Ministry of Health provided advice and validated the group allocations. Hospitals were further divided into independent hospitals (undertaking QUM activities independently) and hospitals under the auspices of a local tertiary hospital. Results are presented as the total activity and activities undertaken by independent hospitals.

Categorical data were tabulated. Summary statistics were calculated for continuous data and medians were compared using the Kruskal-Wallis test.<sup>9</sup> Regression analysis was undertaken for several variables (number of: DURs undertaken, bulletins developed, campaigns undertaken) against staff resources for clinical pharmacy, drug utilisation, and drug information per 100 beds.<sup>9</sup> For the Kruskal-Wallis test and regression analysis, a level of  $p < 0.05$  was considered statistically significant.

## Results

The questionnaire was sent to 30 hospitals and it was completed by 29 of them, a response rate of 96.7%. One pharmacist declined to answer the questionnaire because their hospital was affiliated to a larger hospital where policy decisions were made. In addition to this hospital, three other hospitals undertook QUM activities under the auspices of a local tertiary hospital, and 26 hospitals were considered independent.

For the independent hospitals, a total of 64 DURs were undertaken over the 2-year period (Table 1). DURs were undertaken in a greater proportion of tertiary hospitals, than in other hospitals. Reviews were undertaken on 29 medicines/groups, but mainly on antibiotics. Respondents indicated that (resources permitting) they would like DURs to be undertaken on all medicines with safety/cost concerns. Thirteen hospitals reported that a total of 103 bulletins with information on medicine use have been produced since July 2000 (median 6, range 0–24; Table 1). Bulletins were produced predominantly in tertiary hospitals.

**Table 1. Drug Utilisation Reviews (DURs), bulletins, and campaigns**

| <b>Variable</b>   | <b>All hospitals (29)</b> | <b>Tertiary (6)</b> | <b>Secondary (12)</b> | <b>Rural/special (11)</b> |
|---|---------------------------|---------------------|-----------------------|---------------------------|
|   | n (%)                     | n (%)               | n (%)                 | n (%)                     |
| <b>Drug Utilisation Reviews</b>   |                           |                     |                       |                           |
| Total number of DURs undertaken   | 67                        | 23                  | 28                    | 16                        |
| DURs undertaken by independent hospitals                                | 64                        | 23                  | 28                    | 13                        |
| Total hospitals undertaking >1 DUR                                      | 19 (65.5)                 | 5 (83.3)            | 8 (66.7)              | 6 (54.5)                  |
| Mean  | 2.5                       | 3.8                 | 2.5                   | 1.6                       |
| Median [range]  | 1 [0-12]                  | 2.5 [0-12]          | 1 [0-9]               | 1 [0-6]                   |
| <b>Bulletins and Campaigns</b>  |                           |                     |                       |                           |
|   | n (%)                     | n (%)               | n (%)                 | n (%)                     |
| <i>Total number bulletins produced and disseminated</i>                 | 125                       | 37                  | 58                    | 30                        |
| Bulletins produced by independent hospitals                             | 103                       | 37                  | 58                    | 8                         |
| Number of independent hospitals producing and sending out own bulletins | 13 (44.8)                 | 5 (83.3)            | 6 (50)                | 2 (18.2)                  |
| Median [range]  | 5 [0-24]                  | 6 [0-12]            | 3 [0-24]              | 0 [0-6]                   |
| <i>Total number hospital-wide campaigns</i>                             | 76                        | 13                  | 36                    | 27                        |
| Hospital-wide campaigns undertaken by independent hospitals             | 63                        | 13                  | 36                    | 14                        |
| Number of independent hospitals running campaigns                       | 15 (62.1)                 | 4 (66.7)            | 7 (58.3)              | 4 (36.4)                  |
| Median [range]  | 1 [0-20]                  | 1.5 [0-7]           | 1 [0-20]              | 1.5 [0-5]                 |
| <i>Total number of ward/unit based campaigns</i>                        | 39                        | 4                   | 20                    | 15                        |
| Ward/unit based campaigns undertaken by independent hospitals           | 37                        | 4                   | 20                    | 13                        |
| Hospitals reporting campaigns   | 13 (44.8)                 | 2 (33.3)            | 6 (50)                | 5 (45.5)                  |
| Hospitals reporting "nil"   | 3 (10.3)                  | 0                   | 1 (8.3)               | 2 (18.2)                  |
| Hospitals reporting "don't know"  | 13 (44.8)                 | 4 (66.7)            | 5 (41.7)              | 4 (36.4)                  |

**Table 2. Details of formularies**

| Formularies                                       | All hospitals (29) |           | Tertiary (6) |          | Secondary (12) |          | Rural/special (11) |           |
|---|--------------------|-----------|--------------|----------|----------------|----------|--------------------|-----------|
|   | n                  | (%)       | n            | (%)      | n              | (%)      | n                  | (%)       |
| <b>Hospitals using a formulary</b>                | 25                 | (86.2)    | 6            | (100)    | 9              | (75)     | 10                 | (90.9)    |
| Non-tertiary hospitals using a tertiary formulary | 6                  | (20.7)    | 0            |          | 1              | (8.3)    | 5                  | (45.5)    |
| No formulary                                      | 4                  | (13.8)    | 0            |          | 3              | (25)     | 1                  | (9.1)     |
| Median number of revisions in past 10 years       | 3                  |           | 5.5          |          | 2              |          | 3                  |           |
|   |                    | (% of 25) |              | (% of 6) |                | (% of 9) |                    | (% of 10) |
| Number revised in past 3 years                    | 18                 | (72.0)    | 4            | (66.7)   | 5              | (55.5)   | 9                  | (90.0)    |
| Hard copy only                                    | 14                 | (56.0)    | 2            | (33.3)   | 6              | (66.7)   | 6                  | (60.0)    |
| Hard copy and internet                            | 10                 | (40.0)    | 3            | (50.0)   | 3              | (33.3)   | 4                  | (40.0)    |
| Internet only                                     | 1                  | (4.0)     | 1            | (16.7)   | 0              |          | 0                  |           |
| <b>Formularies having:</b>                        |                    |           |              |          |                |          |                    |           |
| Preferred Medicines List                          | 25                 | (100.0)   | 6            | (100.0)  | 9              | (100.0)  | 10                 | (100.0)   |
| Antimicrobial guidelines                          | 19                 | (76.0)    | 6            | (100.0)  | 6              | (66.7)   | 7                  | (70.0)    |
| Policies concerning medicine use                  | 18                 | (72.0)    | 6            | (100.0)  | 7              | (77.7)   | 5                  | (50.0)    |
| Paediatric dosing guidance                        | 9                  | (36.0)    | 4            | (66.7)   | 2              | (22.2)   | 3                  | (30.0)    |
| Acute Medical Guidelines                          | 8                  | (32.0)    | 2            | (33.3)   | 3              | (33.3)   | 3                  | (30.0)    |
| Emergency Resuscitation Guidelines                | 4                  | (16.0)    | 1            | (16.7)   | 1              | (11.1)   | 2                  | (20.0)    |
| Other   | 3                  | (12.0)    | 1            | (16.7)   | 2              | (22.2)   | 4                  | (40.0)    |

Fifteen respondents reported that 73 hospital-wide campaigns (to improve an aspect of prescribing) were undertaken. No such campaigns were reported by the remaining 11 independent hospitals. Three hospitals linked to a tertiary hospital reported 3 campaigns. Of the 29 hospitals, 25 hospitals had hospital formularies (86.2%). Nineteen (63.3%) of these hospitals had their own formulary, whilst six used a formulary from a nearby tertiary hospital (Table 2). All formularies had a preferred medicines list (100%), and the majority had antimicrobial guidelines (76%), and policies relating to medicine use (72%).

Fewer hospitals had paediatric guidelines (31%) or acute medical guidelines (27.6%). Only four had emergency resuscitation guidelines. All tertiary hospitals had policies related to medicines use and antimicrobial guidelines, but fewer secondary and rural/special hospitals had these documents. Amongst hospitals with formularies, 18 formularies (72%) had been revised in the past 3 years. In the past 10 years, formularies have been revised more frequently in tertiary hospitals than in other hospitals. Formularies were issued to house surgeons, registrars, pharmacists, wards, and departments—but less frequently to consultants compared to other doctors. Only five hospitals issued copies to general practitioners and two to community pharmacists.

Hospitals reported sending drug expenditure data to financial managers, nurse managers, consultants, nurses, and ‘others’ (e.g. Medicines and Therapeutics committees [MTCs] or Chief Executive Officers). Feedback comments were more often received from financial managers in tertiary hospitals than from financial managers in other hospitals ( $p=0.04$ ) (Table 3).

Most respondents indicated where they would source economic information (Table 4). The most popular response was to search the drug literature, ask an independent source, or ask the supplier. More than a quarter of respondents would attempt to calculate ‘numbers needed to treat’, ‘cost saving for a shorter hospital stay’, or ‘cost for an event saved’—but only three would attempt ‘cost per life year gained’, and only one would attempt cost per ‘quality adjusted life year’.

Overall, decision-makers only infrequently requested the development of guidelines/criteria for use for medicines, except if there were safety/cost concerns (Table 5). Regarding DURs, decision-makers rarely requested these (with the exception of decision-makers in tertiary hospitals who requested DURs for new medicines more frequently than decision-makers in other hospitals,  $p=0.01$ ). Clinicians occasionally requested help from pharmacists in developing guidelines/criteria for use, but rarely requested DURs to audit medicine use.

Respondents reported mixed opinions on the possible centralised coordination of some QUM activities (Table 6). Three respondents reported ‘Yes’ they would use guidelines/criteria for use for new medicines if developed by PHARMAC (four if developed by an independent group). Providing there was agreement with the supporting evidence, 19 respondents would use guidelines if developed by PHARMAC, and 20 if developed by an independent group. Of the other respondents, 7 would only use guidelines if in total agreement with their own organisation (and if developed by PHARMAC), or four only if developed by an independent group. For the fourth option, one hospital would not accept guidelines developed by an independent group, but no hospital chose this option with respect to PHARMAC.

**Table 3. Drug expenditure feedback/comments**

Answers are on a scale: Always=1, Never=6

| Variable   | All hospitals (29)<br>median | Tertiary (6)<br>median | Secondary (12)<br>median | Rural/special (11)<br>median | Probability<br>(Kruskal-<br>Wallis) |
|--|------------------------------|------------------------|--------------------------|------------------------------|-------------------------------------|
| How often, on average, are comments received back on data from:                                      |                              |                        |                          |                              |                                     |
| Ward nurses?   | 4.5                          | 5                      | 5                        | 4                            | 0.5285                              |
| Nurse managers/supervisors?  | 4                            | 4                      | 3                        | 3.5                          | 0.5429                              |
| Financial Managers?  | 3                            | 2                      | 4                        | 2.5                          | 0.0357                              |
| Consultants?   | 3                            | 3                      | 4                        | 3                            | 0.7202                              |
| Others? (Tertiary: MTC, CEOs, clinical director) (Secondary: MTC, CEO medical director, pharmacists) | 2                            | 2                      | 3                        | n/a                          | 0.4795                              |

**Table 4. Sources of economic information (all hospitals)**

| Number of respondents reporting use of sources / attempts to calculate: |                 |                    |              |                      |            |                   |
|---|-----------------|--------------------|--------------|----------------------|------------|-------------------|
| Variable  | Drug literature | Independent source | Drug company | Attempt to calculate | Don't know | Don't wish to use |
| Cost per Quality Adjusted Life Year (QALY)                              | 20              | 11                 | 13           | 1                    | 2          | 1                 |
| Cost per life year gained   | 19              | 13                 | 12           | 3                    | 2          | 1                 |
| Cost per event saved  | 17              | 12                 | 9            | 7                    | 1          | 0                 |
| Cost for shorter hospital stay  | 11              | 9                  | 6            | 11                   | 1          | 1                 |
| Numbers Needed to Treat (NNT)   | 18              | 9                  | 8            | 9                    | 2          | 1                 |
| Mean  | 17.0            | 10.8               | 9.6          | 6.2                  | 1.6        | 0.8               |

**Table 5. Decision-makers, clinicians, and requests for guideline and DUR development**

Answers are on a scale: Always=1, Never=6

| Variable  | All hospitals median | Tertiary (6) median | Secondary (12) median | Rural/special (11) median | Probability (Kruskal-Wallis) |
|---|----------------------|---------------------|-----------------------|---------------------------|------------------------------|
| <i>Decision-makers</i>  |                      |                     |                       |                           |                              |
| How often do <b>decision makers</b> request that clinicians develop guidelines/criteria for medicines already in use? | 4                    | 5                   | 4                     | 3.5                       | 0.9244                       |
| How often do <b>decision makers</b> request guidelines/criteria for use when there are safety/cost concerns?          | 3                    | 2                   | 3                     | 4                         | 0.2577                       |
| How often do <b>decision makers</b> request DURs to review the use of new medicines?                                  | 6                    | 3                   | 6                     | 6                         | 0.0143                       |
| How often do <b>decision makers</b> request DURs to review the use of medicines already in use?                       | 6                    | 4                   | 6                     | 6                         | 0.0161                       |
| <i>Clinicians</i>   |                      |                     |                       |                           |                              |
| How often do <b>clinicians</b> request help from pharmacist with guideline development for medicines already in use?  | 3                    | 4                   | 3                     | 3                         | 0.5674                       |
| How often do <b>clinicians</b> request DURs to review the use of medicines already in use?                            | 5                    | 5                   | 5                     | 5.5                       | 0.5417                       |
| How often do <b>clinicians</b> request DURs to review the use of new medicines?                                       | 6                    | 5                   | 5.5                   | 6                         | 0.5023                       |

**Table 6. Centralised guideline and DUR development**

| <b>Variable</b>   | <b>All hospitals<br/>(29)</b> | <b>Tertiary<br/>(6)</b> | <b>Secondary<br/>(12)</b> | <b>Rural/special<br/>(11)</b> |
|---|-------------------------------|-------------------------|---------------------------|-------------------------------|
|   | n (%)                         | n (%)                   | n (%)                     | n (%)                         |
| <b>Guidelines Development</b>   |                               |                         |                           |                               |
| If guidelines/criteria for use for new medicines were developed by PHARMAC, would they be used in your hospital?  |                               |                         |                           |                               |
| a) Yes  | 3 (10.3)                      | 0                       | 2 (16.7)                  | 1 (9.1)                       |
| b) Yes if we assessed them as fair and evidence based   | 19 (65.5)                     | 6 (100)                 | 7 (58.3)                  | 6 (54.5)                      |
| c) Yes only if in total agreement with our own guidelines   | 7 (24.1)                      | 0                       | 3 (25.0)                  | 4 (36.4)                      |
| d) No   | 0                             | 0                       | 0                         | 0                             |
| If guidelines/criteria for use for new medicines were developed by an independent evaluation group* would they be used in your hospital? (*Independent evaluation group such as a Clinical Pharmacology Department, hospital Drug Information Department or PreMeC) |                               |                         |                           |                               |
| a) Yes  | 4 (13.8)                      | 1 (16.7)                | 1 (8.3)                   | 2 (18.2)                      |
| b) Yes if we assessed them as fair and evidence based   | 20 (69.0)                     | 5 (83.3)                | 8 (66.7)                  | 7 (63.6)                      |
| c) Yes only if in total agreement with our own guidelines   | 4 (13.8)                      | 0                       | 2 (16.7)                  | 2 (18.2)                      |
| d) No   | 1 (3.4)                       | 0                       | 1 (8.3)                   | 0                             |
| <b>DUR development</b>  |                               |                         |                           |                               |
| If DURs for new medicines were developed by PHARMAC would they be used in your hospital?  |                               |                         |                           |                               |
| a) Yes  | 2 (6.9)                       | 0                       | 1 (8.3)                   | 1 (9.1)                       |
| b) Yes if happy with design and supporting evidence   | 20 (69)                       | 5 (83.3)                | 8 (66.7)                  | 7 (63.6)                      |
| c) Would prefer to develop own audit  | 1 (3.4)                       | 1 (16.7)                | 0                         | 0                             |
| d) No don't wish to participate   | 0                             | 0                       | 0                         | 3 (27.3)                      |
| e) No insufficient staff to participate   | 6 (20.7)                      | 0                       | 3 (25.0)                  | 1 (9.1)                       |
| If DURs for new medicines were developed by an independent group, would they be used in your hospital?  |                               |                         |                           |                               |
| a) Yes  | 2 (6.9)                       | 0                       | 2 (16.7)                  | 0                             |
| b) Yes if happy with design and supporting evidence   | 21 (72.4)                     | 5 (83.3)                | 8 (66.7)                  | 8 (72.7)                      |
| c) Would prefer to develop own audit  | 1 (3.4)                       | 1 (16.7)                | 0                         | 0                             |
| d) No don't wish to participate   | 0                             | 0                       | 0                         | 0                             |
| e) No insufficient staff to participate   | 5 (17.2)                      | 0                       | 2 (16.7)                  | 3 (27.3)                      |

Two hospitals reported 'Yes' they would use DURs if developed by either PHARMAC or an independent group (Table 6). Providing they agreed with the design and supporting evidence, 20 hospitals would use DURs if developed by PHARMAC, and 21 hospitals would use DURs if developed by an independent group. One tertiary hospital would prefer to develop their own DURs. Six hospitals (5 if developed by an independent group) reported they had insufficient staff to participate in DURs if developed by PHARMAC.

Two-thirds of hospitals provided a drug utilisation (DU) service with 10.1 Full Time Equivalents (FTE) staff employed, 6.9 FTE in tertiary hospitals. All hospitals provided a drug information service with 10.7 FTE employed, 7.5 FTE in tertiary hospitals. Two-thirds of hospitals provided a clinical pharmacy service to the majority of wards (one-third to less than 50% of wards). Regression analysis indicated an association between an increase in staff-time (FTEs/100 hospital beds) and an increase in DURs undertaken, for both clinical pharmacists and DU+DI pharmacists ( $p < 0.05$ ). In addition, there was an association between an increase in clinical pharmacist staff-time and an increase in the number of campaigns undertaken ( $p < 0.05$ ). Neither group demonstrated any association with bulletins produced.

## Discussion

The present study indicates that a wide range of activities to promote QUM were being undertaken in New Zealand hospitals: Drug Utilisation Reviews and campaigns were undertaken, formularies, bulletins and drug expenditure data were disseminated. The type of DUR activity in New Zealand hospitals was similar to that reported in other countries.<sup>12-16</sup> The present study did not examine outcomes from the DURs undertaken in the period, but previous research indicates that DURs and feedback are an effective method of improving the quality use of medicines.<sup>7,17,18</sup>

The present study examined the level of activity in educational strategies (bulletins and campaigns) but not the quality or effects, of these strategies. Surveys from other countries also report the use of these strategies.<sup>13,16</sup> Bulletins may be less effective at influencing medicine use than complex interventions such as educational outreach visits and local opinion leaders.<sup>19,20</sup> Further research could determine the use of such complex strategies in New Zealand hospitals.

The dissemination of drug expenditure information may assist in the targeting of activities to promote QUM. In common with other countries, the present study reports that hospital pharmacists send drug expenditure information to key members of hospital staff.<sup>12,14-16</sup> Financial managers in tertiary hospitals appear to give more feedback than financial managers in other hospitals. In addition, most respondents had some knowledge of where to source pharmacoeconomic information—although use of this information in decision-making was not examined.

Researchers in other countries report the use of pharmacoeconomic information in formulary decision-making in hospitals.<sup>13,16,22,26</sup> Other researchers have identified barriers to the use of this information - lack of high-quality, concise, generalisable information from a trusted source and the need for training and education in pharmacoeconomics for decision-makers.<sup>27,28</sup> These barriers may also apply in New Zealand.

In common with reports from other countries, most New Zealand hospitals used a formulary<sup>13,15,21-25</sup> the majority of formularies having a preferred medicines list, policies relating to medicine use, and antimicrobial guidelines. Given the growing level of antibiotic resistance, more hospitals may consider developing antibiotic guidelines in future.

Information on the contents of hospital formularies in other countries is limited: Thurmann et al (Germany 1997) reported that 80% of hospital formularies had antimicrobial treatment guidelines; Fijn reported that 64% of Dutch hospitals had antibiotic policies and policies on medicine use.<sup>24,25</sup> Regarding formulary revision, the present study reported 72% of New Zealand hospital formularies have been revised in the past 3 years compared with 46% of hospitals surveyed in the Netherlands in 1999.<sup>25</sup> Fewer hospitals in New Zealand issued formularies to GPs or community pharmacists ( $\leq 20\%$ ) compared with hospitals in the Netherlands (31%).<sup>24</sup> Expense may be a major barrier to more widespread distribution. This may be overcome in future as electronic versions become available.

Studies in other countries indicate that guidelines for appropriate use of specific medicines are used in hospitals and appear to be reviewed/approved by drug and therapeutics committees.<sup>12,13,15,16,22-24</sup> The present study indicated that guidelines were used in New Zealand hospitals but that whilst decision-makers and clinicians had some interest in the development of guidelines/criteria for use (particularly if there were safety/cost concerns), they rarely requested DURs. This suggests that policy-making is of some importance to these groups, but that audit of implementation may be seen by them as less important. Decision-makers in tertiary hospitals, requested DURs for new medicines more frequently than decision-makers in other hospitals, perhaps reflecting a stronger commitment to the 'quality-audit' cycle.

The study reported some resistance to the centralised development of guidelines and DURs with up to 24% of hospitals requiring total agreement with own guidelines, and 20% requiring agreement with the design and evidence-base for DURs. Since guidelines and DURs are linked (DURs are usually undertaken to assess prescribing before and after the launch of guidelines), resistance to both is not surprising.

Attempts to centralise guideline and DUR development are an example of the New Zealand Government maintaining some central control whilst devolving responsibility for healthcare provision to the individual DHBs. There are indications that issues of central versus local control are causing increasing tension in the New Zealand health system.<sup>10</sup> The majority of respondents in the present study indicated a preference for local agreement before participating in a centralised program of activities. This is consistent with earlier research that indicated that policies are more effectively implemented when there is local involvement in their development.<sup>11</sup> Nationwide involvement in guideline development with assistance from a nationally-funded independent centre may be more acceptable to hospitals.

In New Zealand, the majority of staff-time for drug utilisation, drug information, and clinical pharmacy was allocated in tertiary hospitals. There was a significant correlation for the number of DURs undertaken and staff-time (FTEs/100 hospital beds) for clinical pharmacists and DU+DI pharmacists. Since audit-feedback (DURs) is reported to be an effective method of changing prescribing,<sup>19,20</sup> an increase in staff-time dedicated to these activities could be recommended. Furthermore, a study in the

US indicated that hospitals providing DI and DU services show reduced overall costs of care.<sup>29</sup>

It is possible that some QUM activities in clinical areas may have been missed by this survey. A survey of clinical directors may have identified more activity. However, the survey was undertaken by chief pharmacists for two reasons: firstly because they were considered to have a hospital-wide view of QUM activities, and secondly to avoid double-counting of activities. Another limitation could be that the numbers of each staff group sent drug expenditure figures may have influenced the number of feedback comments received.

The information collected in the survey was mainly factual, but the accuracy of responses relied on good record-keeping or memory—e.g. number of bulletins produced, campaigns, and DURs undertaken. It is possible there may be some positive recall bias in the numbers of bulletins and campaigns reported, since detail of content was not sought. The estimates of numbers of DURs should be more accurate since details of the DURs were requested in the survey.

## Conclusion

This survey indicates that a wide range of activities to promote quality use of medicines were undertaken in New Zealand hospitals in the period 2000 to 2002. In general, more activities per hospital were undertaken in tertiary and secondary hospitals where there was a greater number of clinical pharmacists and pharmacists dedicated to DU and DI activities. An increase in staff-time for clinical pharmacy, DU, and DI is recommended for hospitals in New Zealand to assist in the promotion of QUM. There may be some resistance to accept centralisation of guideline and DUR development and local issues and staff resources will need to be given consideration.

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**Acknowledgements:** The authors are grateful to the chief pharmacists responding to the survey, to the Ministry of Health for assistance with classifying hospitals, and to the pharmacists who took part in the focus group and pilot-testing of the questionnaire. There were no external sources of funding for the project and no potential conflicts of interest to declare.

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