Pharmaceutical Society of New Zealand

Impact of Medicine Therapy Assessment

Tom Love, Craig Wright

5 December 2013

sapere research group

About Sapere Research Group Limited

Sapere Research Group is one of the largest expert consulting firms in Australasia and a leader in provision of independent economic, forensic accounting and public policy services. Sapere provides independent expert testimony, strategic advisory services, data analytics and other advice to Australasia's private sector corporate clients, major law firms, government agencies, and regulatory bodies.

Wellington Level 9, 1 Willeston St PO Box 587 Wellington 6140 Ph: +64 4 915 7590 Fax: +64 4 915 7596	**Auckland** Level 17, 3-5 Albert St PO Box 2475 Auckland 1140 Ph: +64 9 913 6240 Fax: +64 9 913 6241	
Sydney Level 14, 68 Pitt St GPO Box 220 NSW 2001 Ph: + 61 2 9234 0200 Fax: + 61 2 9234 0201	**Canberra** Unit 3, 97 Northbourne Ave Turner ACT 2612 GPO Box 252 Canberra City, ACT 2601 Ph: +61 2 6267 2700 Fax: +61 2 6267 2710	**Melbourne** Level 2, 65 Southbank Boulevard GPO Box 3179 Melbourne, VIC 3001 Ph: + 61 3 9626 4333 Fax: + 61 3 9626 4231

For information on this report please contact:

Name:	Tom Love
Telephone:	04 915 5357
Mobile:	021 440 334
Email:	tlove@srgexpert.com

Contents

Appendices

Tables

Figures

Executive summary

This analysis was commissioned by the Pharmaceutical Society of New Zealand. The goal of the analysis is to estimate the direct impact of Medicine Therapy Assessment (MTA) upon health service costs, in order to assess the cost-effectiveness of MTA. This report should be read in conjunction with a companion report provided for the Pharmaceutical Society by Sapere Research Group, which provides an updated literature review and discussion of evidence for the effectiveness of MTA services.

MTA is a service, described in the Framework of National Pharmacist Services, which reviews patients and their prescribed medicines. MTA has been studied in New Zealand and in other settings, but this is the first attempt to measure the impact of MTA on the basis of linking routine datasets, allowing larger sample sizes than has been the case in other studies

The approach taken in this study is to look at the impact of MTA upon acute hospital admissions in the year following the MTA, and to quantify the direct cost saving in hospital admissions attributable to MTA. To estimate this impact we collected information on a large number of patients who had received an MTA, and then selected 'control patients', who were similar to the MTA patients in their demographic and health care utilisation characteristics. This allowed us to compare acute inpatient admissions for MTA patients against admissions for similar patients who had not received the service, while taking into account patient characteristics such as age, prior hospital admission, and complexity of medication regime.

MTA had a clear beneficial impact in some, but not all of the PHOs who contributed data to the study. Among those where there was beneficial impact we found that, for patients aged 60 or more and who lived in rest homes, there was a statistically significant reduction in acute inpatient admission in the MTA group compared to patients who have not received MTA. At 2012/13 caseweight prices, this reduction on average is equivalent to $578.35 for each MTA delivered.

We found that, for patients aged 60 or more who did not live in rest homes, there was a reduction in acute inpatient admissions, equivalent to a cost of $201.57. This result is not statistically significant, but is strongly suggestive of benefit in wider patient groups than those in rest homes. Re-analysis with a larger dataset might find significant effects for these patients.

The major issue in the interpretation of this analysis is that MTA appears to be effective in some PHOs, but not in others, and that PHOs appear to select patients for the service in different ways. This means that, if the benefit observed here is to be realised more broadly, it will be important to work with the organisations delivering MTA to make sure that the service is well focussed upon those patients who have the most benefit to gain from it.

Acute hospital admission is a narrow definition of the benefit which patients might experience as a consequence of MTA services. This narrow definition allows a specific quantitative analysis, which can be expressed in dollar terms. But it is important to remember that there are a wider range of beneficial consequences for patients, including improved quality of life, fewer medicine interactions and side effects, and fewer falls. The

estimate of benefit from MTA presented here should therefore be considered a lower limit for the true benefit of the service.

Overall, MTA appears to have a tangible impact upon reducing hospital admissions. At a return of over $500 per MTA for some patient groups, it can be a cost effective intervention. It is rare to find, in health care, that a direct intervention that requires funding resources has the potential to result in short term financial return. But it appears that MTA can fall into this category, for at least some groups of patients, and that it can offer direct reductions in the risk of acute hospital admission for some of the most vulnerable patients in our health system.

1. Background

This analysis was commissioned by the Pharmaceutical Society of New Zealand. The goal of the analysis is to estimate the direct impact of Medicine Therapy Assessment (MTA) upon health service costs, in order to assess the cost-effectiveness of MTA. MTA is a service, described in the Framework of National Pharmacist Services, which reviews patients and their prescribed medicines. The Pharmacy Council of New Zealand has defined competency standards, assessed by portfolio, for pharmacists who wish to provide the service, requiring higher qualifications and the submission of case studies of MTA review.

There is a growing body of literature describing process outputs and perceptions of pharmacist interventions, but far fewer studies reporting hard clinical and/or economic outcomes and results. This reflects that, in general, there has been some movement away from requiring justification for the intervention, to finding ways to improve implementation. Even where there are hard outcomes, due to differences in interventions, the broader context in which the studies occur, and methodologies used, it is generally not possible to compare or extrapolate the results.

This means that, while MTA has been studied in a number of settings, the direct cost benefit is not clearly described in the literature, and some studies are ambiguous about the effects. This reflects the complexity of the intervention, and the wide range of implementation of the service in different countries, and with different population groups. The goal of this analysis is to describe the observed benefit of MTA as actually practiced in a New Zealand setting, with a large enough sample to achieve statistically significant results.

MTA is intended to improve current utilisation and potential prescribing of medicines for individual health service users, and to improve their health related outcomes. The service involves multi-disciplinary team assessment of the therapy used by an individual, and direct counselling of the individual about their medicines and medical conditions. The DHBNZ service specification defines people for whom MTA should be used, reproduced in Appendix 1

In practice, different pharmacists and Primary Health Organisations (PHOs) operate MTA in different ways. Anecdotally, different approaches are used to prioritising MTA in different PHOs, and the patient population who receive the service is likely to vary considerably in different areas with different age profiles and health needs.

The goal of this analysis is specifically to estimate the impact of MTA upon acute hospital admissions. This is a very narrow definition of benefit from MTA, and it is likely that the intervention has a much broader beneficial impact for patients who receive it. This means that any positive impacts identified in this project will in effect represent a lower limit for the benefit of MTA. Using this quite narrow, stringent approach means that a positive effect of MTA found in this analysis is likely to be the tip of a larger iceberg of benefit for patients.

A secondary goal of the analysis is to indicate patient groups where particular benefit from MTA can be observed, and therefore where the service could potentially targeted with the greatest impact.

2. Methods

The study was conducted with routinely collected information from national datasets, linked to data on MTAs conducted by pharmacists in a number of PHOs. The Pharmaceutical Society identified a number of pharmacists and PHOs who currently provide MTA, and these were invited to contribute data. We received data from 5 PHOs within the timeframe of the study.

We consulted with the Office of the Privacy Commissioner before collecting patient information. The Office advised that our proposed privacy safeguards and information management protocol were appropriate for the purpose.

PHOs sent MTA information, consisting of a patient NHI number and date of MTA delivery, directly to the Ministry of Health. The Ministry of Health encrypted the NHI numbers of these MTA patients, and then deleted the received NHI numbers. We used the encrypted NHI numbers to link the patients who had received MTA to national datasets, which also use consistently encrypted NHI, and to extract additional information about that patient group. At no time did the analysts conducting the study have direct access to information which identified a patient.

The analysis was conducted in two steps. Because we expected a range of effectiveness of MTA in different PHOs as it is applied in different ways to different populations, we initially tried to determine which PHOs delivered MTA in a way which has an effect upon acute hospital admissions. Having identified those PHOs where we see a positive effect, we conducted a second analysis on patients within those PHOs in order to estimate the size of the effect in those PHOs.

The analysis took the form of multivariate poisson regression. The dependent variable in the regression is the number of acute inpatient hospital admissions experienced by the patient in a one year period after the MTA was delivered. Because it may take some time for medication changes recommended in a MTA to be implemented, we defined the twelve month period for followup from two months to fourteen months post the MTA date for an individual patient.

In order to assess the impact made by providing MTA, we selected control patients from national datasets, to compare with the MTA case patients provided by PHOs. Controls were matched with the MTA cases on a number of key characteristics which are expected to determine the risk of acute admission. We were then able to compare the number of acute admissions post MTA for MTA patients and for a similar group of patients who had not received the service. This allows a direct estimate of the impact of MTA upon acute hospital admissions. At the same time, we were able to control for additional factors which might have affected the risk of hospital admission within the overall multivariate regression.

Control patients were matched with MTA case patients on the following criteria:

- Age in five year bands;
- Sex;
- Ethnicity in categories of Maori; Pacific; Other;
- DHB of domicile;

- Acute admission to public hospital in the twelve months prior to the MTA;
- New Zealand Deprivation 2006 quintile, based on meshblock of patient residence

In addition to these factors, we modelled a number of other factors which might influence the risk of admission with the multivariate regression. These were:

- Publically funded rest home residence
- Total number of Level One Anatomic Therapeutic Categories in which the patient received medication;
- The individual classes of Level One Anatomic Therapeutic Categories of medication received by the patients;
- Total number of Level Two Anatomic Therapeutic Categories in which the patient received medication;
- The number of acute inpatient admissions in public hospital experienced by the patient in the twelve months prior to the MTA.

SAS statistical software was used for the analysis.

While some PHOs provided data on MTAs which had been performed over a long period of time, we constrained the sample for analysis to those which occurred between 1 July 2007 and 30 June 2012. This is because we required a full year of data before the earliest MTA and after the last MTA, in order to select the control patients and to adjust for risk of hospital admission.

Whether a patient resided in a rest home was identified either by the PHO providing the MTA data, or by linking with Ministry of Health payment data to see if rest home funding had been paid for that patient. This has the limitation that some information may be missing for patients who fund their own rest home care, and do not therefore appear on the Ministry of Health funding dataset.

The national datasets from which information was extracted were:

- Demographic information: capitation quarterly registers using the latest master NHI;
- Hospital admissions from the National Minimum Dataset;
- Rest Home data from the Client Claims Processing System;
- Community dispensed pharmaceuticals from the national Pharmhouse dataset.

This method, based upon using matched controls for the patients who have had MTA, allowed us to make the most direct possible comparison between the risk of hospitalisation for patients who have, and have not, had MTA services. Having measured the difference in number of hospitalisations in a twelve month period between the two groups, we were able to estimate the average impact of MTA on acute hospital admissions and therefore, using the caseweighted cost of hospital admission, estimate the direct cost saving impact of MTA upon acute hospital care.

3. Results

3.1 Data collection and matching

We received data from five PHOs. The size of the dataset from the different groups varied substantially, with some small numbers, and some very substantial datasets. Table 1 shows the number of MTA cases and matched control patients from each PHO.

Table 1 MTA cases and controls used for analysis

PHO	MTA Cases	Matched Controls
1	406	18,055
2	391	8,229
3	34	658
4	865	13,576
5	172	4,296
Total	1,868	44,814

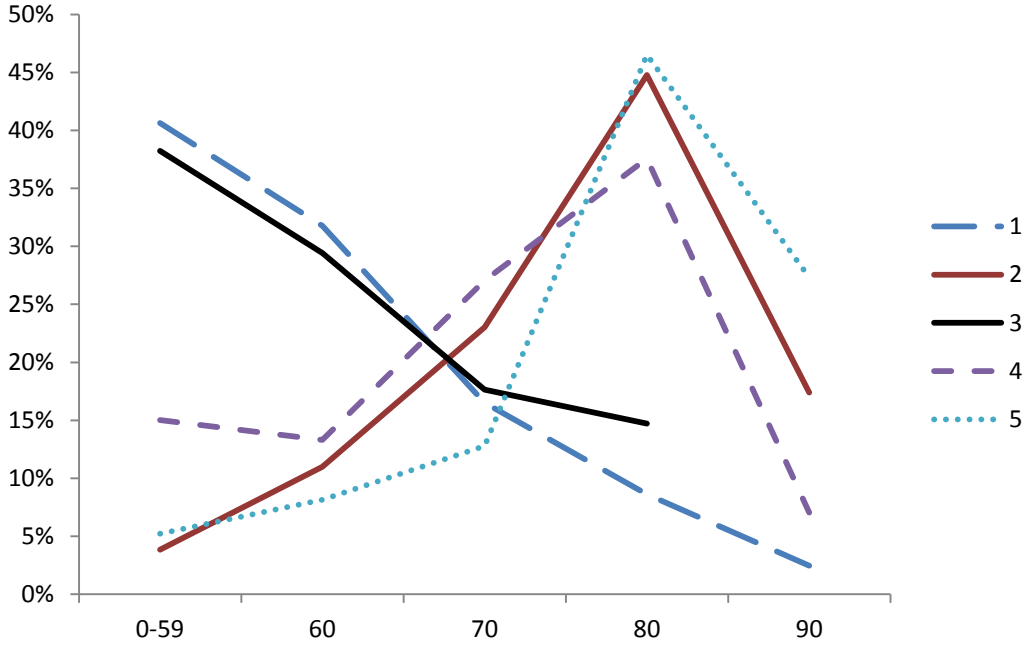
Data were generally very complete, with the exception that 29% of records were missing NZDep06. This is likely to be a result of rest home residence, which may reduce the accuracy of geocoding and therefore assigning deprivation scores.

3.2 Population receiving MTA

The population receiving MTA had significantly different characteristics in different PHOs.

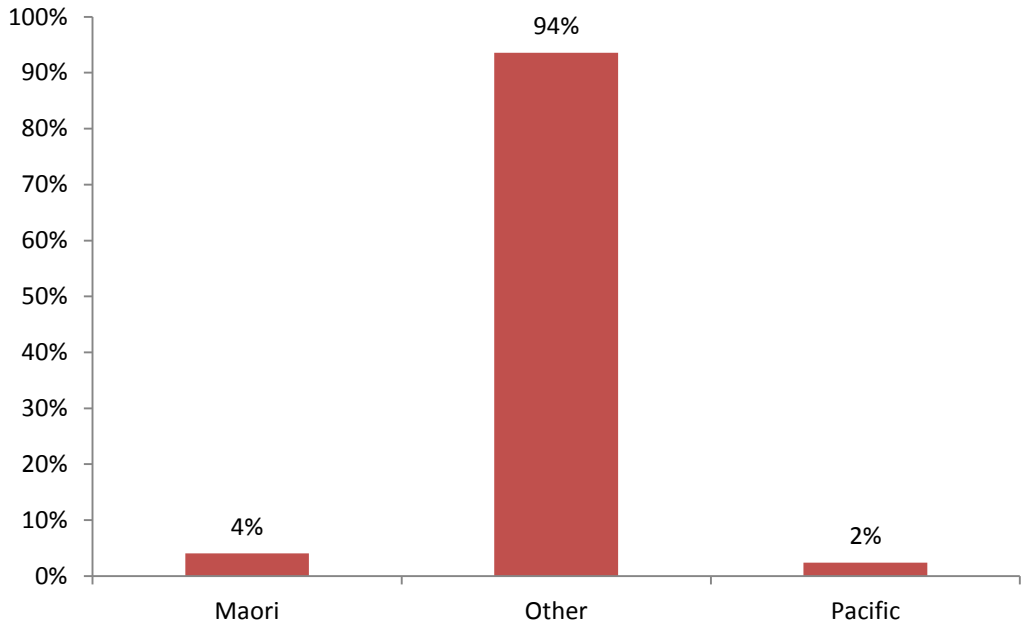
There are two distinct kinds of age distribution in the patients receiving MTA (Figure 1). PHOs 2, 4 and 5 have a peak in the age of MTA patients for people aged in their 80s, and generally appear to target the service to older patients. PHOs 1 and 3 have a very different pattern, with the majority of MTA patients aged under 60, and a decreasing number of older patients. It was expected that PHOs would use different approaches to delivering MTA, but this suggests radically different approaches in targeting the service.

Figure 1: Age distribution of people receiving MTA



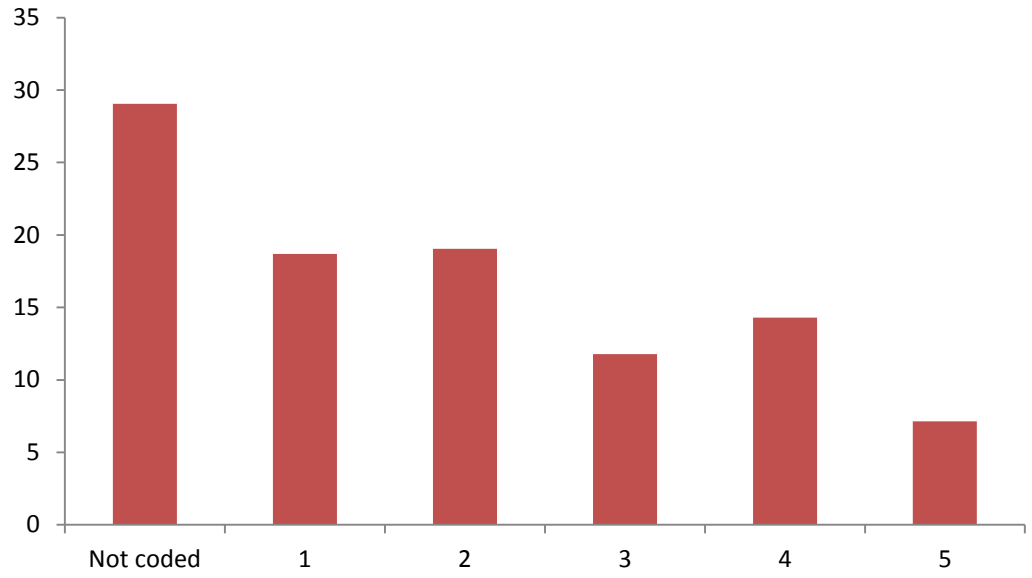
The population receiving MTA in the PHOs who participated are strongly weighted towards other ethnic groups, including New Zealand European, rather than Maori or Pacific patients (Figure 2).

Figure 2: Ethnic distribution of MTA patients



The deprivation profile of MTA patients, although somewhat limited by the poor geocoding of rest home residents, tends to be skewed towards the less deprived end of the range.

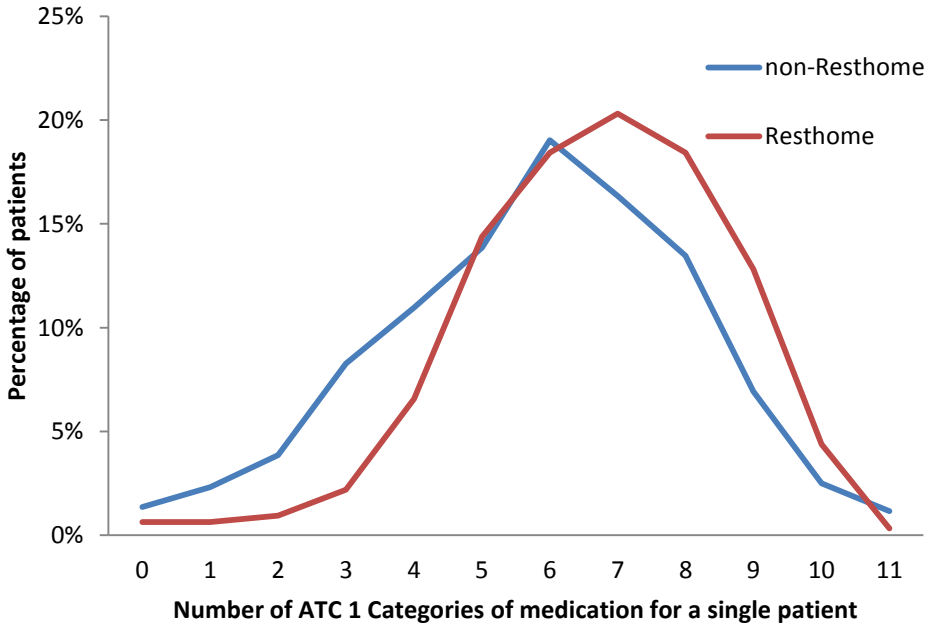
Figure 3: Deprivation distribution of MTA patients



The split of MTA patients across the sexes was 63% female, 37% male.

62% of patients were not resident in a rest home, while 38% did live in a rest home. Patients in rest homes tend to receive more varieties of medication than those who live at home.

Figure 4: Rest home residence and number of categories of medication



As might be expected, the population of people receiving MTA tend to be older, and tend to be women. The deprivation profile suggests a somewhat less deprived population, although there may be limitations to the extent that standard deprivation measures are meaningful for an aged population. The major surprise in the descriptive statistics of MTA patients is the heterogeneity in age distribution across PHOs, with two distinct patterns. Two of the PHOs appear to have a policy of targeting the service to younger patients, while the others have a quite different profile, targeted towards older patients.

3.3 Analysis

3.3.1 Identifying PHO effects

The initial model fitted demographic effects with a dummy variable for each of the five PHOs patients were enrolled in, and an interaction effect between PHO and age bands, to take into account the different age profiles of patients across PHOs. This initial analysis indicated significant effects among patients aged over 60, and in PHOs 1, 2 and 5.

In this initial model we also fitted a variable indicating rest home residence, which had positive interactions with the intervention effect. Consequently, we analysed data separately for rest home and non-rest home patients.

3.3.2 Impact on acute hospitalisation

We fitted two final regression models to the data, one for rest home patients and one for patients who did not live in rest homes. In both cases we only included patients aged 60 or more years.

Full model results are reported in Appendix 2 .

The key result of the regression analyses is the coefficient on the variable indicating whether a patient received MTA or not (labelled 'cc' in the full models reported in the appendix). Since the outcome variable is a count of the number of acute hospital admissions experienced by a patient, an estimated coefficient for this variable of greater than one would indicate that having an MTA is associated with having more acute admissions, and a negative coefficient would mean that an MTA is associated with fewer hospital admissions. The coefficient is negative for both rest home and non-rest home residents, but the effect is greater for those living in rest home (Table 2).

Table 2: MTA impact on acute hospital admission

Rest home status	Estimated MTA effect	Estimated Odds Ratio	p-value
Non rest home	-0.0883	0.915	0.2279
Rest home	-0.2232	0.800	0.0376

The conventional test for statistical significance is that the p-value of the estimate should be less than 0.05, to indicate that the result is robust and unlikely to have been observed by chance. The result for non-rest home patients is not significant according to this criterion, although the result for rest home patients does meet the test of statistical significance.

The original estimate can be converted to an odds ratio for count of hospital admissions (column three in Table 2). Because the odds ratios are not far from 1.0, they can to a reasonable approximation be interpreted as relative risks. This interpretation produces a clearly understandable result from the analysis:

A patient in a rest home, aged over 60, who receives an MTA is likely to have 80% of the future hospital admissions of a similar patient who does not receive an MTA.

While the result for patients not resident in rest homes is not statistically significant, it is suggestive that MTA appears to work to reduce acute admissions. It is possible that further analysis of patient subgroups, or a larger dataset, might find significant effects for non rest home patients. The result for non rest home patients is very suggestive, but not conclusive.

3.3.3 Cost effectiveness

In the National Minimum Data Set hospital admissions are weighted to reflect the cost of admission. These costweights are applied to nearly all inpatient hospital admissions. The reduction in hospital admissions attributable to MTA can therefore be converted into an estimated average cost of admission avoided by MTA.

We measured the actual cost weights of MTA patients, reflecting the complexity and cost of hospital admission experienced in this population. We applied the estimated odds ratio for admissions reduction to this cost weight, and therefore estimated how much additional costweight would have been incurred if the patients had not received MTA.

At a national standard price for 2012/13 of $4614.36 per cost weight:

- **On average, an MTA for a non-rest home resident aged 60 or over could potentially avoid $201.57 in hospital admissions at 2012/13 prices.**
- **On average, an MTA for a rest home resident aged 60 or over is highly likely to avoid $578.35 in hospital admissions at 2012/13 prices.**

4. Discussion

The main conclusions from this analysis are:

- That MTA appears to be effective in reducing subsequent acute hospital admission in patients aged over 60 who live in rest homes; and
- That the cost equivalent of the avoided admissions for those patients is $578.35 per MTA performed.

This analysis has deliberately been framed narrowly. It has looked only at a very specific kind of benefit which could be expected from MTA (acute hospital admission), and has not tried to estimate the wider range of benefits which the literature suggests could result, such as improved quality of life, delayed entry to rest home, or fewer medication errors. The strength of the narrow approach to estimating benefit is that it allows a direct quantitative estimate of the impact of MTA, in a way which can be expressed in simple financial terms. But it should not be forgotten that the broader range of positive consequences of MTA suggested in a range of studies are also likely to have a positive influence upon the lives of patients. The results of this study therefore represent a minimum estimate of the benefit which is likely to accrue from a well delivered MTA. The fact that even with a relatively narrow measure of benefit from the service, a positive result can still be found, indicates a strong positive impact from MTA as implemented in a range of PHOs in New Zealand.

As well as the impact of MTA in avoided acute hospitalisations, the analysis suggests a number of questions and issues for the way that MTA is implemented. We found considerable differences in the age profile of MTA patients across PHOs, and anecdotally suspect that there is substantial variation in the way that MTA is implemented. There may be benefit in work to compare PHO models for delivering MTA, and systematically comparing different targeting and delivery approaches, and their effectiveness. In particular, we have found a substantially larger effect for patients in rest homes. It would be worth further analysis to tease out the extent to which this is explained by higher levels of polypharmacy in this group of patients.

There are a number of limitations to the analysis presented here:

- While larger than previous studies of MTA, the sample size was still small for some PHOs, and a larger dataset may provide more power to find positive effects for different patient groups. In particular, elements of benefit for younger patients may have been undetected with smaller numbers of younger patients, or preventive benefits for such patient groups could occur in a longer timeframe than considered in our analysis;
- There appear to be many differences in the way that MTA is delivered. We have been able to control for some of these, including age profile, but there may be other aspects of variation in MTA delivery which we have not been able to know about or control for;
- There may be some selection bias among the PHOs who agreed to take part and present data. This potentially limits the generalizability of the result. But this speaks to a broader issue: while we have measured a real benefit of MTA from actual delivery of the service in as part of routine care, the corollary is that it is important to understand what aspects of

the models in the three PHOs we included make MTA successful, and how they can be transferred for implementation in other PHOs.

- The issue of selection bias also limits what can be inferred for some populations. The population included in the data analysed here is largely female, European and less socioeconomically deprived. Data on more varied populations would help to ensure that the findings are applicable to Maori and Pacific ethnic groups, and to more deprived populations.

This analysis is based upon real MTAs delivered as part of routine care, and therefore includes variation in how MTAs are delivered, although these were all delivered within the context of a PHO rather than as standalone community pharmacy. While this variation can complicate the interpretation of results, it is also a strength of the analysis. The result that there is a direct impact of MTA on acute hospital admissions has been found in a real world service, delivered routinely in a number of different settings. This means that, so long as some of the issues around ensuring effective models of delivery are addressed, we can be confident that it is possible to achieve at least the level of benefit observed in these results.

The key issue raised in this study, therefore, is the variable delivery of MTA, and how pharmacists working with professional colleagues can ensure that it is delivered in a way that achieves its full potential. The pharmacists who provided the interventions analysed in this study were highly qualified, all with postgraduate qualifications and training at a higher level than required for usual community pharmacy practice. Delivering MTA to its full potential will require continued focus from the profession and from service delivery organisations both in defining and delivering the service, ensuring that the workforce is well equipped to provide this kind of care, and focussing on patient populations with the capacity to benefit.

Overall, MTA appears to have a tangible impact upon reducing hospital admissions. At a return of over $500 per MTA for some patient groups, it can be a cost effective intervention. It is rare to find, in health care, that a direct intervention that requires funding resources has the potential to result in short term financial return. But it appears that MTA can fall into this category, for at least some groups of patients, and that it can offer direct reductions in the risk of acute hospital admission for some of the most vulnerable patients in our health system.

We are grateful for the participation in this analysis of the following organisations, which each contributed data for the project:

- East Health
- Compass Health
- Medwise
- Northcare
- WellHealth

Appendix 1 Users of MTA

People accessing MTA should be referred by their general practitioner or another registered health care provider. The DHBNZ service specification gives the following definition of people who should access the service:

People who agree to participate and who:

a) Have one or more chronic disease states; and

b) Have two or more comorbidities; and

c) Meet one or more of the following conditions:

    a. Taking four or more medicines and/or 12+ doses per day

    b. At increased risk of medicine-related problems, including:

d) Have experienced significant changes in their medicine regimen during the last 3 months

e) Taking or about to commence taking one or more medicines with a high risk of adverse effects

f) Have symptoms of a medicine adverse effect

g) Are experiencing or are at risk of experiencing sub-optimal response to pharmacotherapy

h) Are non-adherent or unable to manage their medicines

i) Have literacy or language difficulties, dexterity problems, impaired sight, or cognitive deficiencies that impact on their ability to manage medicines

j) Have multiple prescribers

k) Have had a recent admission to hospital (especially if there had been a medicine change) e.g. within 4 weeks

Appendix 2 Fitted models

Model for non-rest home residents

The key parameter, cc, indicates the fitted value for whether patients received MTA or not. In this case the coefficient, -0.0883 indicates a lower number of acute admissions in the year following MTA, although the result does not reach statistical significance.

Parameter		DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept		1	-0.7091	0.116	-0.9365	-0.4817	37.36	<.0001
gender	F	1	-0.1031	0.0155	-0.1334	-0.0727	44.23	<.0001
dep5		1	0.0579	0.0128	0.0327	0.083	20.39	<.0001
mpo	M	1	0.0034	0.0787	-0.1507	0.1576	0	0.9653
mpo	O	1	-0.2824	0.0533	-0.3868	-0.178	28.09	<.0001
cc	1	1	-0.0883	0.0732	-0.2317	0.0552	1.45	0.2279
age10	60	1	-0.4792	0.0324	-0.5428	-0.4157	218.71	<.0001
age10	70	1	-0.152	0.0277	-0.2062	-0.0978	30.18	<.0001
age10	80	1	0.2776	0.0259	0.2268	0.3284	114.6	<.0001
atc2	0	1	-1.9144	1.5539	-4.96	1.1311	1.52	0.2179
atc2	1	1	-1.0403	0.3921	-1.8089	-0.2718	7.04	0.008
atc2	2	1	-0.5508	0.2335	-1.0085	-0.0931	5.56	0.0184
atc2	3	1	-0.7994	0.1519	-1.097	-0.5017	27.71	<.0001
atc2	4	1	-0.5379	0.1305	-0.7937	-0.282	16.98	<.0001
atc2	5	1	-0.7755	0.1229	-1.0163	-0.5346	39.82	<.0001
atc2	6	1	-0.5351	0.1135	-0.7576	-0.3127	22.23	<.0001
atc2	7	1	-0.3435	0.109	-0.557	-0.1299	9.94	0.0016
atc2	8	1	-0.2261	0.1056	-0.4332	-0.0191	4.58	0.0323
atc2	9	1	0.062	0.1026	-0.1392	0.2632	0.37	0.5457
atc2	10	1	0.1669	0.1014	-0.0319	0.3656	2.71	0.0999
atc2	11	1	0.2521	0.1015	0.0531	0.4511	6.17	0.013
atc2	12	1	0.3002	0.1022	0.0998	0.5005	8.62	0.0033
atc2	13	1	0.3727	0.1041	0.1687	0.5768	12.82	0.0003
atc2	14	1	0.4612	0.1059	0.2537	0.6688	18.98	<.0001
atc2	15	1	0.4705	0.1079	0.259	0.6819	19.02	<.0001
atc2	16	1	0.4634	0.1163	0.2354	0.6914	15.86	<.0001
atc2	17	1	0.7721	0.1182	0.5404	1.0038	42.65	<.0001
atc2	18	1	0.9182	0.1366	0.6505	1.1859	45.19	<.0001
atc2	19	1	0.5172	0.1654	0.1931	0.8413	9.78	0.0018
atc2	20	1	0.636	0.1958	0.2523	1.0197	10.55	0.0012
atc2	21	1	0.5176	0.258	0.012	1.0233	4.03	0.0448
atc2	22	1	-0.0886	0.4913	-1.0517	0.8744	0.03	0.8568
atc2	23	1	-0.2747	0.6879	-1.6231	1.0736	0.16	0.6896
atc1	0	1	0.6816	1.4828	-2.2247	3.5879	0.21	0.6458
atc1	1	1	-0.444	0.3686	-1.1663	0.2784	1.45	0.2284

atc1	**2**	1	-0.4371	0.2346	-0.8969	0.0227	3.47	0.0624
atc1	**3**	1	0.0577	0.1719	-0.2791	0.3946	0.11	0.7369
atc1	**4**	1	0.1094	0.1593	-0.2028	0.4216	0.47	0.4921
atc1	**5**	1	0.0721	0.1488	-0.2197	0.3638	0.23	0.6283
atc1	**6**	1	0.003	0.1434	-0.278	0.284	0	0.9832
atc1	**7**	1	-0.0073	0.141	-0.2837	0.2691	0	0.9586
atc1	**8**	1	-0.1818	0.1381	-0.4525	0.0889	1.73	0.1882
atc1	**9**	1	0.0857	0.1399	-0.1884	0.3598	0.38	0.5401
atc1	**10**	0	0	0	0	0	.	.
ai		1	0.2017	0.0441	0.1152	0.2882	20.89	<.0001
acute		1	0.1454	0.0104	0.1251	0.1658	196.17	<.0001
dhb2	**CAP**	1	0.0555	0.0284	-0.0001	0.1112	3.83	0.0504
dhb2	**OTH**	1	0.1023	0.0386	0.0266	0.178	7.01	0.0081
dhb2	**SAK**	1	-0.1171	0.0254	-0.1669	-0.0673	21.26	<.0001
d		1	-0.1426	0.0306	-0.2027	-0.0826	21.66	<.0001
g		1	-0.1402	0.046	-0.2305	-0.05	9.27	0.0023
m		1	-0.146	0.0301	-0.2051	-0.087	23.49	<.0001
Scale		0	1.0055	0	1.0055	1.0055		

Model for rest home residents

The key parameter, cc, indicates the fitted value for whether patients received MTA or not. In this case the coefficient, -0.2232 indicates a lower number of acute admissions in the year following MTA, and the result is highly statistically significant.

Parameter		**DF**	**Estimate**	**Standard Error**	**Wald 95% Confidence Limits**		**Wald Chi-Square**	**Pr > ChiSq**
Intercept		1	-4.9844	1161.714	-2281.9	2271.932	0	0.9966
gender	**F**	1	-0.0366	0.0456	-0.1258	0.0527	0.64	0.4222
dep5		1	0.0743	0.0322	0.0112	0.1374	5.32	0.021
mpo	**M**	1	0.6433	0.3997	-0.1401	1.4267	2.59	0.1075
cc	**1**	1	-0.2232	0.1073	-0.4336	-0.0128	4.32	0.0376
age10	**60**	1	-0.4097	0.1135	-0.6321	-0.1874	13.04	0.0003
age10	**70**	1	-0.0647	0.0695	-0.201	0.0715	0.87	0.3518
age10	**80**	1	0.1851	0.0538	0.0798	0.2905	11.86	0.0006
atc2	**0**	1	-30.7851	32757.07	-64233.5	64171.89	0	0.9993
atc2	**1**	1	-16.1555	29644.73	-58118.8	58086.45	0	0.9996
atc2	**2**	1	-15.112	19441.22	-38119.2	38088.98	0	0.9994
atc2	**3**	1	3.4238	1161.714	-2273.49	2280.341	0	0.9976
atc2	**4**	1	3.7239	1161.714	-2273.19	2280.641	0	0.9974
atc2	**5**	1	4.1905	1161.714	-2272.73	2281.107	0	0.9971

atc2	**6**	1	3.929	1161.714	-2272.99	2280.846	0	0.9973
atc2	**7**	1	4.0532	1161.714	-2272.86	2280.97	0	0.9972
atc2	**8**	1	4.2182	1161.714	-2272.7	2281.135	0	0.9971
atc2	**9**	1	4.4408	1161.714	-2272.48	2281.357	0	0.997
atc2	**10**	1	4.0173	1161.714	-2272.9	2280.934	0	0.9972
atc2	**11**	1	4.1654	1161.714	-2272.75	2281.082	0	0.9971
atc2	**12**	1	4.1134	1161.714	-2272.8	2281.03	0	0.9972
atc2	**13**	1	4.4236	1161.713	-2272.49	2281.34	0	0.997
atc2	**14**	1	4.4419	1161.714	-2272.47	2281.358	0	0.9969
atc2	**15**	1	4.4268	1161.714	-2272.49	2281.343	0	0.997
atc2	**16**	1	4.5408	1161.714	-2272.38	2281.457	0	0.9969
atc2	**17**	1	4.5594	1161.714	-2272.36	2281.476	0	0.9969
atc2	**18**	1	4.197	1161.714	-2272.72	2281.114	0	0.9971
atc2	**19**	1	4.1663	1161.714	-2272.75	2281.083	0	0.9971
atc2	**20**	1	5.0382	1161.714	-2271.88	2281.955	0	0.9965
atc2	**21**	1	4.5054	1161.714	-2272.41	2281.422	0	0.9969
atc2	**22**	1	4.2107	1161.714	-2272.71	2281.127	0	0.9971
atc2	**23**	1	-15.0272	9611.543	-18853.3	18823.25	0	0.9988
atc2	**24**	0	-14.6444	0	-14.6444	-14.6444	.	.
atc1	**0**	1	16.5731	30913.81	-60573.4	60606.53	0	0.9996
atc1	**1**	1	1.3868	28622.57	-56097.8	56100.58	0	1
atc1	**2**	1	1.0407	1.151	-1.2153	3.2966	0.82	0.3659
atc1	**3**	1	0.3302	0.3454	-0.3468	1.0073	0.91	0.3391
atc1	**4**	1	-0.3086	0.288	-0.8731	0.2559	1.15	0.2839
atc1	**5**	1	-0.125	0.2557	-0.6261	0.3761	0.24	0.6249
atc1	**6**	1	-0.086	0.2438	-0.5639	0.3918	0.12	0.7242
atc1	**7**	1	0.033	0.2329	-0.4236	0.4895	0.02	0.8874
atc1	**8**	1	-0.1105	0.2333	-0.5678	0.3468	0.22	0.6358
atc1	**9**	1	-0.2291	0.236	-0.6917	0.2335	0.94	0.3316
atc1	**10**	0	0	0	0	0	.	.
ai		1	0.0949	0.0727	-0.0476	0.2373	1.7	0.1919
acute		1	0.17	0.0162	0.1382	0.2018	109.75	<.0001
dhb2	**CAP**	1	-0.0414	0.1278	-0.2918	0.2091	0.1	0.7461
dhb2	**OTH**	1	-0.2074	0.1478	-0.4971	0.0824	1.97	0.1607
dhb2	**SAK**	1	-0.0139	0.0812	-0.173	0.1452	0.03	0.8638
d		1	-0.0909	0.0629	-0.2142	0.0324	2.09	0.1483

g	1	0.0402	0.0819	-0.1202	0.2007	0.24	0.623
m	1	-0.0389	0.0612	-0.1588	0.081	0.4	0.5249
Scale	0	1.0717	0	1.0717	1.0717		