COMMUNITY PHARMACY NI

Local Pharmaceutical Committee

formerly known as

PCC | Pharmaceutical Contractors Committee (NI)

University of ULSTER

Monitored Dosage System and Instalment Dispensing in Northern Ireland:

A Survey of Community Pharmacists and Patients

CONTENTS Page No.

Community Pharmacy NI commissioned the School of Pharmacy and Pharmaceutical Sciences, University of Ulster, to advise on survey content and data collection and also to perform anonymised data analysis. Please note the views contained in this document reflect those of the researcher involved in the independent data analysis and reporting, and do not necessarily reflect the opinions of CPNI.

Report Author: Dr R Morrissey.

Introduction

1.1 Medication Adherence

Drug treatments are the main tool used to prevent and manage chronic illness; over recent years different approaches have been developed to enhance and ensure that patients start and continue to take their prescribed treatment as instructed. The problem of the perceived lack of 'patient compliance' with drug regimens, where an element of blame is imposed on the patient or the healthcare provider, has been replaced with the concept of 'medication adherence[1]'.

Since the 1970s, adherence and in particular, medication adherence, have been described and defined by several authors. These include:

'The extent to which a person's behaviour coincides with medical or health advice[2]'

'Medication adherence refers to the extent to which a patient follows provider recommendations about day-to-day treatment with respect to the timing, dosage and frequency[3]'

'Medication adherence is ...the extent to which a patient acts in accordance with the prescribed interval and dose of a dosing regimen[3].'

Patients often don't adhere to their prescribed treatments with the reasons for this believed to be multi-factorial in nature with more than 100 factors having been identified as being associated with medication non-adherence[4]. Factors identified include environmental and social influences[1], and particularly in the elderly population, age-dependent factors such as vision, hearing, manual dexterity and cognitive ability[5]. Recent studies of patients with mental health problems have related depression and anxiety to lack of adherence to medical recommendations[1,6,7]. Indeed it is believed that all patients can have difficulty adhering to recommendations made by healthcare professionals especially when the advice requires self-administered care[1], with the typical estimate being that 40-60% of patients fail to take their medications as prescribed[8,9,10].

The World Health Organisation recognises two categories of non-adherence, preventable and non-preventable[1], with the former being most recognised by patients and healthcare providers; this includes most notably missed doses due to forgetfulness, changing medication schedules or busy lifestyles[11]. These types of preventable non-adherence can be addressed using targeted tailored interventions. Non-preventable lack of adherence includes life-threatening adverse effects. In the USA, an estimated one third of emergency department visits are due to unintentional overdose of medication, and the estimated annual rate of adverse drug events treated in A&E for individuals aged over 65 years of age is more than twice the rate of younger patients[12,13]. In the 1990s, it was estimated that the annual cost to the USA health system of illness due to non-adherence was $100 billion[14] and

in the UK it has also been cautiously estimated that £100 million per annum is wasted on medications unused and returned to community pharmacies[15]. It is therefore vital that strategies to improve and enhance safe medication use are implemented and also evaluated[13]. One potentially beneficial strategy which can be used is reminder packaging.

1.2 Reminder packaging

Reminder Packaging refers to two different categories; those that are pre-packed into blister packaging (calendar blister, unit dose and monitored dosage systems) or those that are packaged in pill boxes (dose administration aids, multi-compartment compliance aids). Monitored Dosage Systems (MDS) consist of drugs being manually packed into blister/bubble trays and then cold or heat-sealed with foil; an example of MDS is the Nomad® system. Patients can be provided with either weekly or monthly packs, but not all drugs are suitable for use in a MDS. Royal Pharmaceutical Society guidelines recommend that drugs should not be left in a sealed MDS for longer than eight weeks and must not be used for certain medications including: buccal tablets; dispersible/effervescent tablets; significantly hygroscopic preparations; and solid dose cytotoxics[16]. The considerable amount of time it can take for pharmacists to fill monitored dosage system has been previously noted in the literature[17].

1.3 Evaluation of Adherence Interventions including Reminder Packaging

Various strategies and interventions to improve medication adherence have been 'tried-and-tested.' As stated previously, reasons for medication non-adherence are multi-factorial, and therefore require a multi-faceted and patient-centred approach when trying to address the problem. Promising methods of improving patient adherence have used a combination of strategies including: patient education; self-rewards; telephone follow-up; social support; and behavioural skills[1,18,19,20,21,22,23]. However it has also been demonstrated that simple adherence interventions that result in even a small effect size at the individual patient level, when broadly introduced at population level, could provide significant cumulative patient benefit via leveraging therapeutic efficacy. This has been demonstrated via a recent retrospective US study using community pharmacy dispensing data from more than three million patients, which found such scalable results when calendarised blister packaging (CBP) was introduced in the pharmacy for once-daily oral ACE-inhibitors. The CBP of daily self-administered, long term use was associated with modest improvement in prescription refill adherence and persistence[24].

Specifically, cardiovascular researchers have recently placed great emphasis on medication adherence and have referred to it as the 'next frontier in quality improvement[25].' In a recent Cochrane Review update on reminder packaging for improving adherence to self-administered long-term medications, a meta-analysis on data from two cardiovascular trials assessing the impact of reminder packaging on blood pressure measurements, found that reminder packaging significantly decreased diastolic blood pressure (MD = -5.9mmHg,

p<0.001), but the same effect was not detected for systolic blood pressure[26,27,28]. A further study included in this Cochrane review reported that reminder packaging is preferred by patients with low literacy levels[26,29].

1.4 Instalment Dispensing

Instalment dispensing allows repeated dispensing of portions of a prescription over a set time period, either until the total quantity prescribed has been dispensed or stopped earlier, according to agreed criteria[30]. Instalment dispensing was originally used for the dispensing of substitute drugs (methadone or buprenorphine) to addicts on a daily basis; this was to encourage compliance and avoid giving patients large supplies of medication on a single occasion which may be commercially tradable on an illicit market[31].

Instalment dispensing can be requested by a GP via suitable endorsement of the prescription where issues of adherence, over or underuse, addiction etc. are suspected with patient safety being of primary concern. There has been little research on the use of instalment dispensing and its impact on medication adherence; some recent studies have investigated the use of instalment dispensing to reduce drug costs and wastage[30,32] with initial results suggesting that additional savings in the drug budget were not large enough to outweigh the extra costs to pharmacists providing this service. However, only a definitive randomised controlled trial could ascertain whether this is truly the case[30].

1.5 Rationale

Multiple dispensing services are provided by community pharmacists to patients in Northern Ireland, but meaningful data on the level of service provision is not available. The origin of service demand and drivers behind this are not fully understood. By surveying all community pharmacy contractors and their patients, unsubstantiated beliefs and service provision data can be explored and presented so as to inform future direction for these particular community pharmacy services.

2. Aims

Via surveying community pharmacist contractors in Northern Ireland and their patients in receipt of monitored dosage systems:

- Determine the current level of provision of instalment dispensing and monitored dosage systems in terms of numbers of items dispensed and patients in receipt of the service
- Determine the staffing and other resources required to deliver instalment dispensing and monitored dosage systems
- Gather opinion on the current issues affecting delivery of these services by community pharmacists
- Estimate the cost to community pharmacists of delivering instalment dispensing and monitored dosage systems to patients in Northern Ireland
- Investigate the age groups and types of patients in receipt of either instalment dispensing or a monitored dosage system
- Determine the level of domiciliary care provided to patients in receipt of a monitored dosage system
- Investigate who initiates monitored dosage systems and the reasons why
- Estimate the value of monitored dosage systems to patients in Northern Ireland

3. Methods

Two questionnaires were designed, one for administration to community pharmacists with the other being designed for completion by patients in receipt of a monitored dosage system. The questionnaires included closed and open questions together with rating scales. Both questionnaires were initially piloted with six pharmacy contractors who individually responded to the community pharmacist questionnaire and also administered the patient questionnaire to five patients, providing the final summary to CPNI. Based on the pilot results, a number of minor amendments were made to the documentation.

The finalised community pharmacist questionnaire (appendix 1) was sent by CPNI to all registered pharmacies in Northern Ireland (n=532) with an accompanying letter (appendix 2) requesting that the pharmacist with most knowledge of instalment dispensing and monitored dosage systems working within that pharmacy completes the questionnaire. The letter also assured the community pharmacists of anonymity and confidentiality of the information provided. Anonymity was achieved by assigning a unique ID number to each pharmacy. Whilst a list of pharmacies matched to the study identifier was kept securely by CPNI for the purpose of data checking, researchers at UU involved in the analysis of the data only received data containing the unique study ID number; no other specific identifiers were included. A first mailing of questionnaires was sent out followed by a second mailing approximately three weeks later. CPNI also sent out reminder e-mails to all contractors requesting surveys be returned by the closing date.

Patient questionnaires (appendix 3) were sent to each pharmacy together with the pharmacist questionnaire. Patients in receipt of monitored dosage systems were approached by the community pharmacist over a period of one week and asked to anonymously complete the patient questionnaire. All patient questionnaires were summarised by the community pharmacist with only this summary sent back to CPNI (appendix 4).

All quantitative data collected on the community pharmacy questionnaire and patient questionnaire summary was coded and entered directly into SPSS Version 19 for analysis. The data was initially plotted and described via the use of means, modes and standard deviations. Comparisons were made between independent and rural pharmacies and also between independent and multiple pharmacies (depending upon data distribution, usually using independent sample t-tests, with significance set at $p = 0.05$). Categorical data was compared using the Pearson Chi-squared test.

Qualitative data from open questions was transcribed onto an individual word document and entered into NVivo10 for analysis. The content was thematically analysed, coded and structured. Using the same identified structure an independent researcher also coded the document. The main emergent themes were identified and the percentage agreement between the two independent coders was then calculated for each theme and sub-theme.

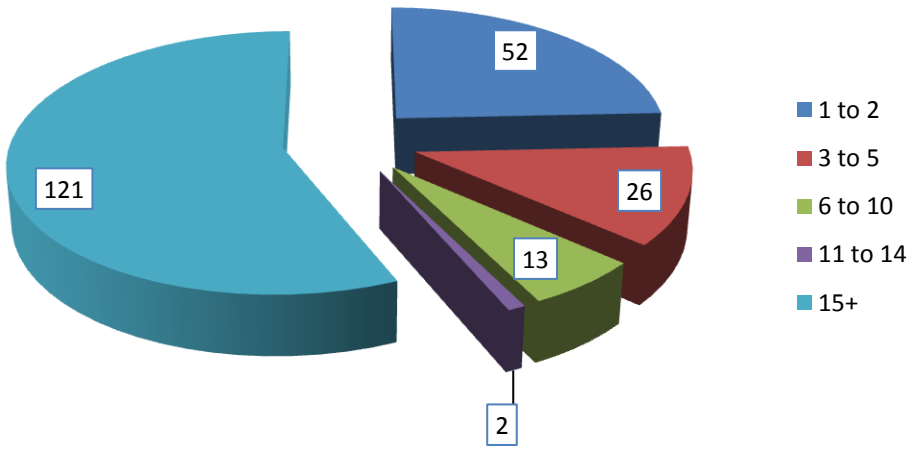
4. Results

4.1 Pharmacist Questionnaire

4.1.1 Pharmacy Demographics

Of the 532 questionnaires sent to contractors in Northern Ireland, 303 were returned and analysed representing a return rate of 57%. Approximately two-thirds (65.7%) of respondents were classed as urban pharmacies. 38.4% were described as independent whereas 61.6% of responses were from community pharmacists working in multiple ('chain/group') pharmacies. The number of contracts held by respondents (n=214) is shown in Figure 1 illustrating that over half of the respondents who answered this question had more than 15 contracts.

Figure 1: Number of contracts held by respondents (n=214)



4.1.2 Staff Employed

The skill mix of the workforce for all respondents was explored via questioning on full and part time employment of pharmacists, Accredited Checking Technicians (ACTs) and technician/dispensary assistants. Figure 2 shows figures declared where zero equates to a sole contractor working without any additional pharmacists employed. Of the 303 total respondents, 260 did not have an ACT working in their pharmacy, 35 had one ACT, and three respondents employed two ACTS whilst one pharmacy had three ACTs working there. As opposed to ACTs, more pharmacies declared the employment of technicians/dispensary assistants with the actual figures illustrated in Figure 3. There were no statistically significant differences in terms of numbers of staff employed and whether the pharmacy was in a rural or urban location; the same was true when comparing between independent and multiple pharmacies.

Figure 2: Number of pharmacists employed

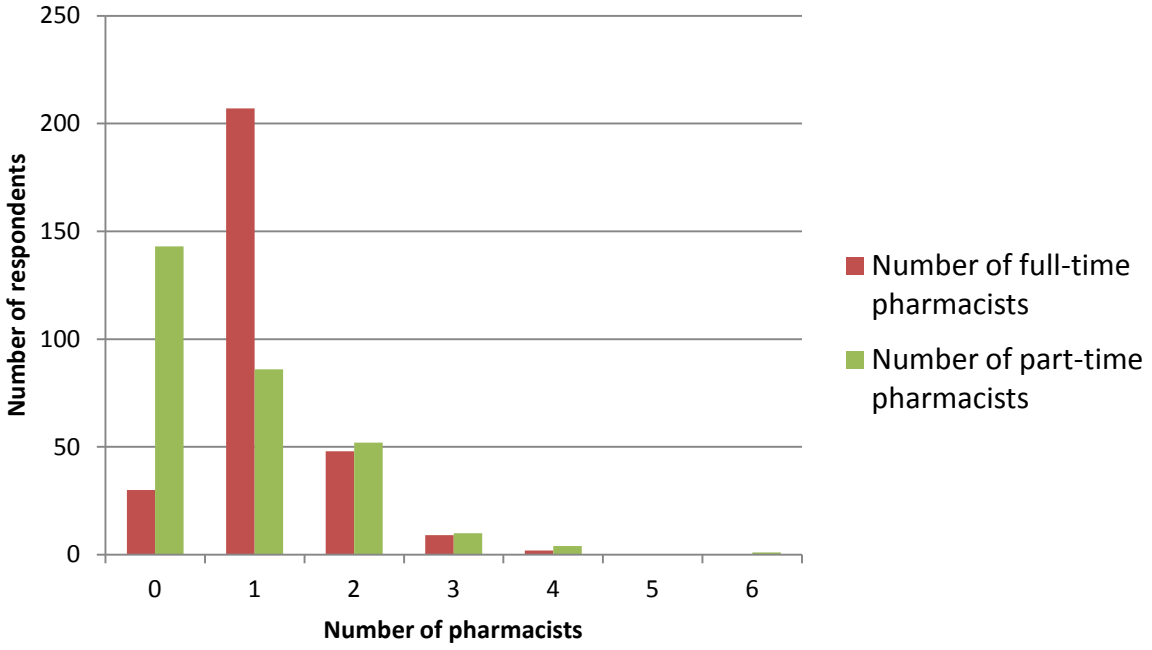
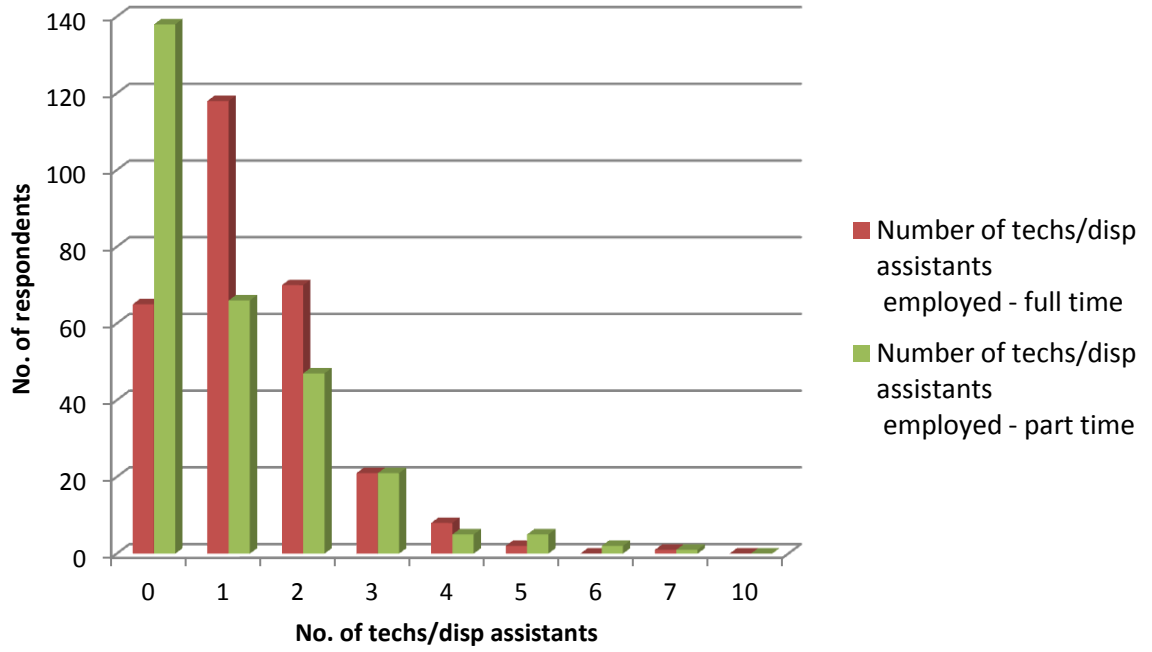


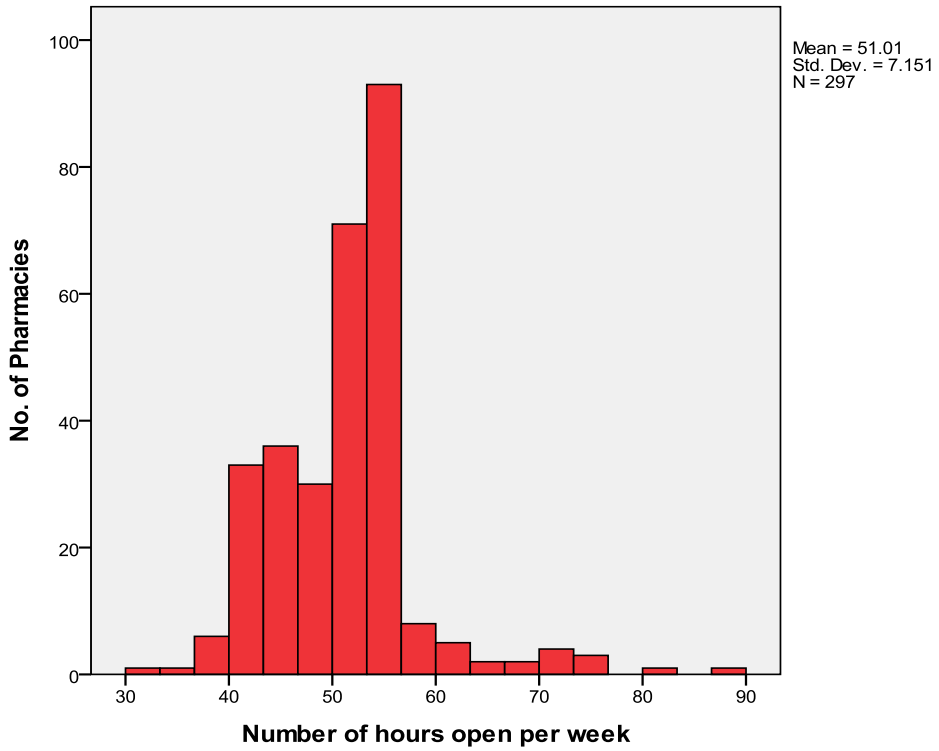
Figure 3: Number of technicians/dispensary assistants employed



4.1.3 Opening Hours

The number of hours the responding pharmacies were open per week are shown in figure 4 with a mean of 51 ± 7 hours and a range of 30-88 hours reported (n=297). There was no significant difference between urban and rural pharmacies in terms of opening hours (independent samples t-test, 51.3±7.4 hours urban versus 50.5±6.6 hours, p=0.3), but there was a significant difference between those classed as independent or multiple with multiples being open slightly longer hours (independent samples t-test, 49.9 ±6 hours independent versus 51.7±7.7 hours multiple, p=0.04).

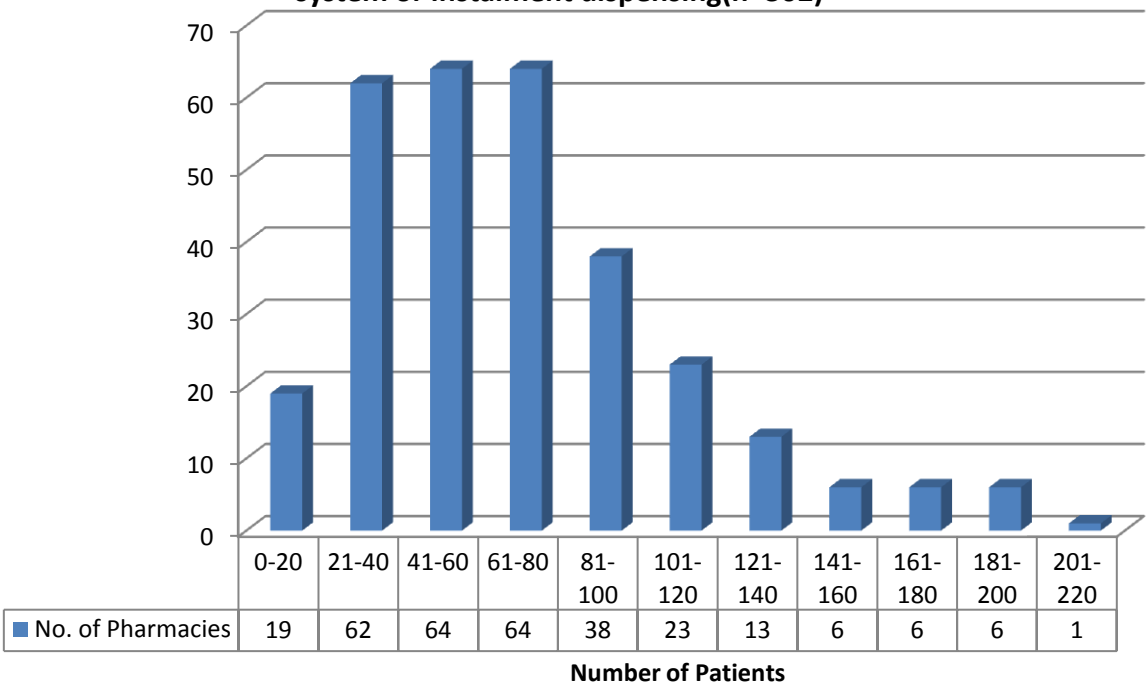
Figure 4. Number of hours respondent pharmacies are open per week



4.1.4 Instalment Dispensing and Monitored Dosage System Service Provision

Figure five illustrates the total number of patients receiving a regular multiple dispensing service (instalment dispensing or monitored dosage system) with responses from 302 community pharmacists.

Figure 5: Total Number of patients receiving either a monitored dosage system or instalment dispensing(n=302)



When broken down into whether they provide a daily, twice weekly, weekly, fortnightly Monitored Dosage System or Instalment Dispensing, weekly dispensing dominated the figures given; these are illustrated in Table 1.

Table 1: Type and Frequency of Multiple Dispensing Service provided by responding community pharmacies in Northern Ireland

	Instalment Dispensing (n=303)	Monitored Dosage System (n=300)
Daily	143	20
Twice weekly	132	18
Weekly	295	293
Fortnightly	180	30
Other frequency	48	19

Table 2 reflects the same as Table 1 but in terms of the number of patients provided with either MDS or ID with differing dispensing intervals. The total number of patients receiving

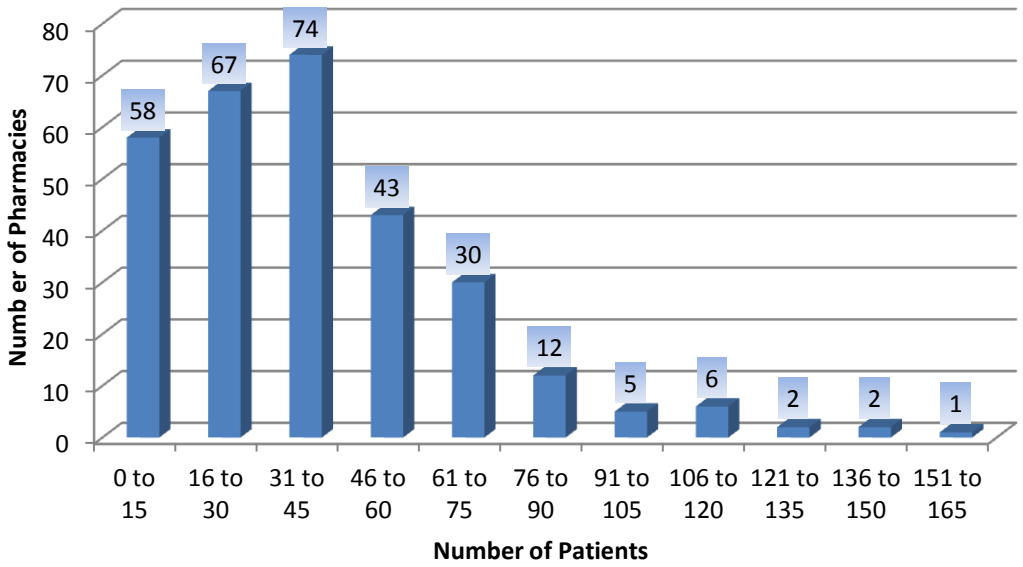
instalment dispensing was 9366 whilst the total number of patients in receipt of a monitored dosage system was reported to be 12535.

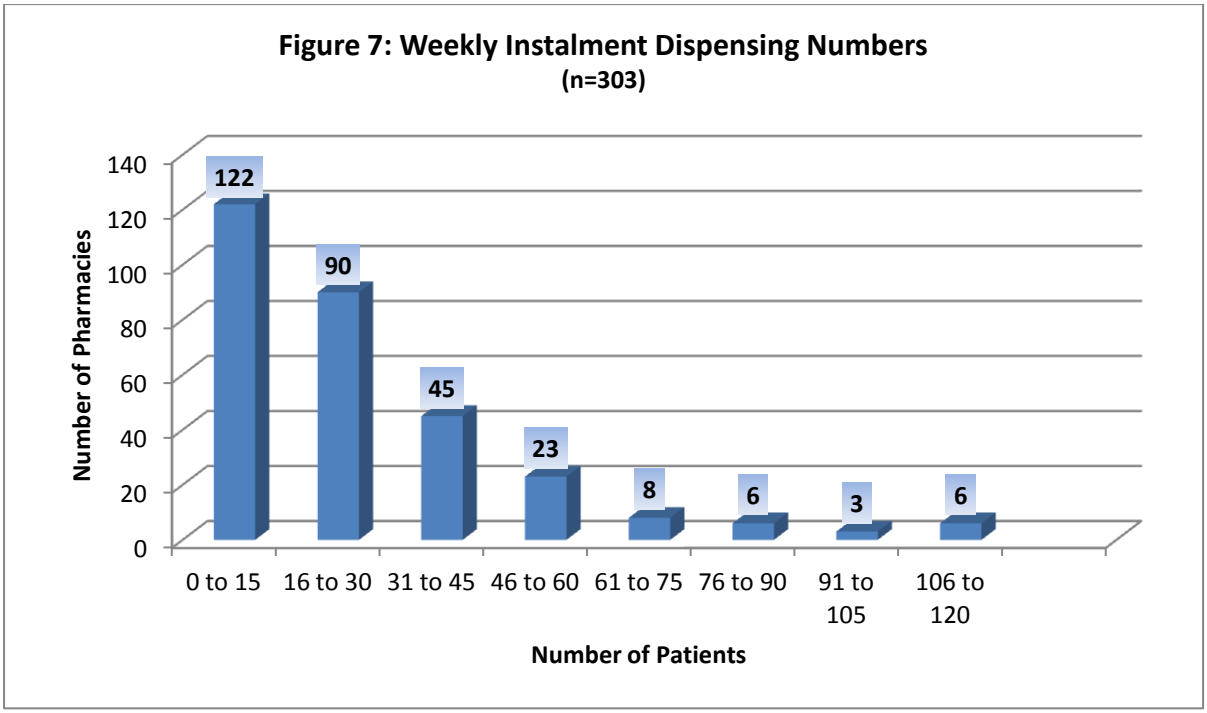
Table 2: Number of patients in receipt of a Multiple Dispensing Service

	Instalment Dispensing (n=303)	Monitored Dosage System (n=300)
Daily	393	48
Twice weekly	285	23
Weekly	8101	12046
Fortnightly	477	105
Other frequency	110	313
TOTAL	**9366**	**12535**
Average patients per pharmacy	**31**	**42**

Assuming the 57% return rate is reflective of all community pharmacies in Northern Ireland, these figures could be extrapolated to an estimated 16432 patients potentially receiving medications via instalment dispensing and 21991 patients being in receipt of medications dispensed into a monitored dosage system, approaching 40 000 patients in total in Northern Ireland. Weekly MDS and Instalment dispensing patient numbers are further illustrated in figures 6 and 7.

Figure 6: Total Number of Patients on Weekly MDS
(n=300 pharmacies)





Breaking the figures down into delivery of Instalment Dispensing and Monitored Dosage Systems into urban versus rural location of pharmacies, some statistically significant differences were detected. These significant differences are shown in Table 3.

Table 3: Average number of patients receiving a Multiple Dispensing Service, weekly Instalment Dispensing and weekly monitored dosage systms in urban versus rural community pharmacies (n=302)

Service Provided	Pharmacy Location		
	Urban (mean±1SD)	**Rural** (mean±1SD)	**Significance** (independent samples t-test)
Total weekly service	78.3±42.8	52.7±28.8	P<0.001
Weekly Instalment Service	31.5±24.4	17.7±17.5	P<0.001
Weekly Monitored Dosage System	42.9±29.6	35.0±23.2	P=0.01

The significantly larger number of patients in receipt of these services could be reflective of the larger footfall in urban pharmacies. Whilst this reflects the number of patients receiving these services in the differing locations, it may be fairer to the differing locations to further investigate these figures in terms of number of items dispensed as a percentage of total workload i.e. % of items dispensed as a percentage of total weekly items dispensed. Table 4 illustrates the total number of MDS, ID and other items dispensed per week in the respondent pharmacies, divided out further into location. Comparing urban versus rural,

only the difference in the number of instalment items dispensed per week is statistically significant (independent samples t-test, p<0.001).

Table 4: Average total number of items dispensed per week in all pharmacies and those in either urban or rural locations

	All Pharmacies Mean (Range)	Urban Mean	Rural Mean
Total number of items dispensed per week - instalment dispensing	116.5 (0-1200)	135.8	78.7*
Total number of items dispensed per week – monitored dosage system	313.1 (0-1671)	331.7	277.7
Total number of items dispensed per week - other	1344.4 (0 - 11 000)	1444.2	1129.0

*statistically significant difference

Converting the number of items dispensed to percentage workload and comparing the differences between rural and urban pharmacies again shows there is no statistically significant difference between %MDS of total items dispensed in urban versus rural pharmacies, but the statistically significant difference in terms of percentage instalment dispensing items of total number of items remains statistically significant (independent samples t-test, 8.0±6.4% urban versus 5.5 ±4.3% rural, p=0.006).

Table 5 illustrates the number of items dispensed by responding pharmacies further broken down into whether they were independent or multiple. The multiple and independent pharmacies showed no significant difference in terms of monitored dosage systems and Instalment dispensing of items, but multiple pharmacies reported dispensing significantly more *other* items per week (independent samples t-test, p=0.02). Many multiples are located in urban locations which may be explained again by a higher footfall.

Table 5: Total average number of items dispensed per week in all pharmacies and those categorised as independent or multiple/group.

	Independent (mean)	Multiple/Group (mean)
Total number of items dispensed per week - instalment dispensing	115.5	116.7
Total number of items dispensed per week – monitored dosage system	316.9	310.5
Total number of items dispensed per week - other	1049.4	1502.4*

*statistically significant difference

4.1.5 Ordering, Collection and Delivery

Table 6 shows a summary of the number of patients for whom prescriptions are ordered and collected on a monthly basis.

Table 6: Ordering and Collection of Prescriptions for all Respondents further broken down into Rural, Urban, Independent and Multiple

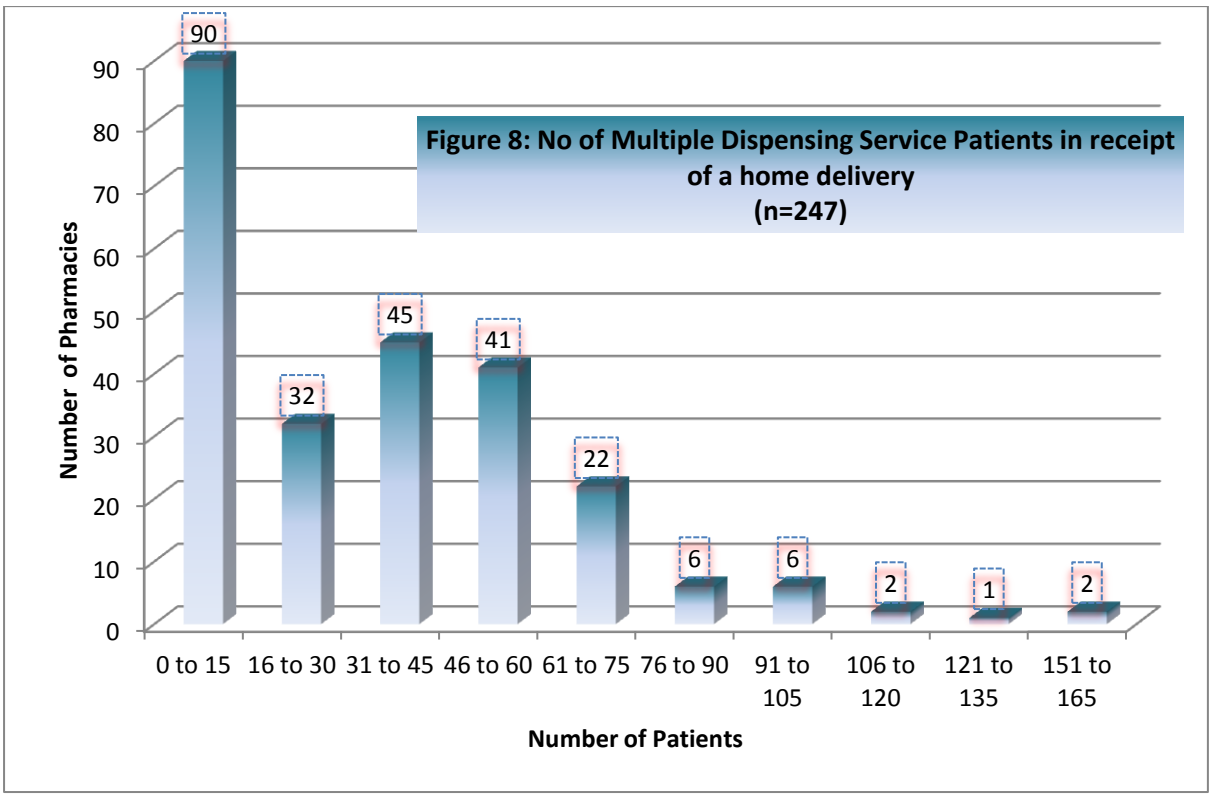
	Collection (mean no. of patients)	Ordering (mean no. of patients)
Instalment Dispensing - all (n=299)	21.1	15.3
Monitored Dosage System – all (n=301)	41.3	40.3
Other - all (n=22)	571.6	88.9
Instalment Dispensing - Rural	**16.1**	**11.1**
Instalment Dispensing - Urban	**23.6***	**17.5***
Monitored Dosage System - Rural	35.5	34.1
Monitored Dosage System - Urban	44.4	43.6*
Other - Rural	**785.3***	**62.1**
Other - Urban	**487.8**	**99.4**
Instalment Dispensing - Independent	**19.7**	**15.4**
Instalment Dispensing - Multiple	**21.8**	**15.2**
Monitored Dosage System - Independent	**39.2**	**37.6**
Monitored Dosage System - Multiple	**42.6**	**42.0**
Other - Independent	**600.0**	**104.4**
Other - Multiple	**557.5**	**81.5**

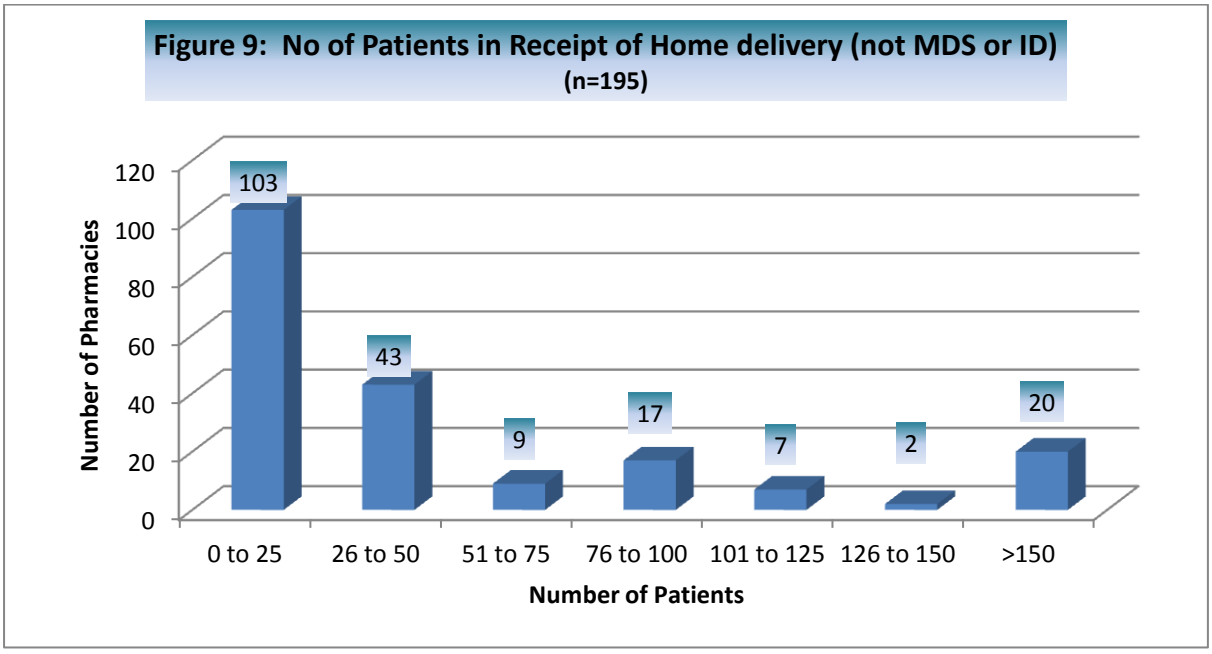
*statistically significant difference

There is no statistically significant difference between the number of prescriptions being collected or ordered by independent and multiple/group pharmacies. However, some differences do emerge again when comparing urban versus rural. Urban pharmacies collect more prescriptions for both MDS (independent samples t-test, p=0.006) and instalment dispensing (independent samples t-test, p=0.001). Urban pharmacies also order more prescriptions for MDS (independent samples t-test, p=0.004) and instalment dispensing (independent samples t-test, p=0.002). There is no difference between urban and rural pharmacies in terms of ordering all other types of prescriptions, but rural pharmacies collect

significantly more prescriptions (other items) reflecting the difference in location and differing patient needs.

82% of respondents reported that they provide a home delivery service to their patients. Figures 8 and 9 shows the number of patients in receipt of home delivery of monitored dosage systems, instalment items and other prescription items.





In terms of a home delivery service, being in an urban or rural location was significantly related to whether a service was provided (Pearson χ^2, n=174 urban versus n=75 rural,

p=0.002). It therefore appears that rural pharmacies are more likely to collect, but not deliver prescriptions to their patients. This is further supported by the weekly home delivery figures shown in Table 7 below where urban pharmacies are shown to deliver more prescriptions at a statistically significant level.

Table 7: Average number of patients receiving weekly home delivery of prescriptions

	Urban (mean)	**Rural** (mean)	**Statistical Significance (Independent Samples t-test)**
Patients receiving home delivery per week - instalment dispensing	7.2	2.6	P<0.001
Patients receiving home delivery per week – monitored dosage system	33.6	14.8	P<0.001
Patients receiving home delivery per week - other	52.7	32.8	P=0.037

4.1.6 Monitored Dosage System Boxes

Table 8 shows the types of boxes reported to be used for monitored dosage systems. Independent and Multiple pharmacies did not report a statistically significant difference in the types of boxes used (independent samples t-test, n=186).

Table 8: Types of MDS Boxes used (n=297)

	Type of Box		
	Refillable only	**Disposable only**	**Both Refillable and Disposable**
No. of Pharmacies	**2**	**174**	**121**

The average cost of a disposable tray is 50p and a refillable tray is £5. As with ordering, collecting and delivery of prescriptions, the provision of the trays is usually on a goodwill basis to the patients.

4.1.7 Staff Hours & Cost of Delivering Instalment Dispensing and Monitored Dosage Systems

Table 9: Total average hours spent by pharmacists and their staff on MDS and instalment dispensing

	Total no. of hours spent per week on ID by the pharmacist (mean±1SD)	Total no. of hours spent per week on ID by other pharmacy staff (mean±1SD)	Total no. of hours spent per week on MDS by the pharmacist (mean±1SD)	Total no. of hours spent per week on MDS by other pharmacy staff (mean±1SD)
All pharmacies (n=303)	3.2±3.2	4.1±5.9	9.5±9.5	12.4±12.2
Rural	2.3±2.3	3.6±5.0	9.1±11.5	11.2±11.9
Urban	3.7±3.5	4.4±6.3	9.7±8.4	13.0±12.3
Independent	3.2±3.0	4.0±6.3	9.6±11.6	12.1±12.0
Multiple	3.3±3.4	4.1±5.7	9.4±8.0	12.5±12.3

Table 10 equates the average number of hours per week spent by pharmacists and their staff into an average salary cost. Current salary ranges for pharmacists, technicians and dispensary staff has been estimated at £15-£23.35/hour, £8.45-£11.50/hour and £6.55-£9.75 per hour. The assumption is that the lower end of the pharmacist scale reflects the salary of a newly qualified pharmacist who often works with a more experienced pharmacist in a supportive role, with the more senior pharmacist assuming greater responsibility for services such as MDS. Additionally, in terms of other pharmacy staff, it is often the more experienced and well-trained members of staff that deliver the service in order to ensure both high quality delivery and accuracy of dispensing. With this in mind, figures have been calculated using the upper end of the pharmacist salary (£23.35/hour) and at the lower end of the technician salary (£8.45, reflecting mid-way for a dispensary assistant).

Table 10: Total average cost per pharmacy each week for delivery of a MDS service by one experienced pharmacist and one technician/dispensary assistant

Pharmacy Type	Cost of pharmacist working on ID (mean)	Cost of other pharmacy staff Working on ID (mean)	Cost of pharmacist working on MDS (mean)	Cost of other pharmacy staff Working on MDS (mean)	TOTAL cost per week of delivering Multiple Dispensing Service (mean)
All pharmacies (n=303)	£74.72	£34.65	£221.83	£104.78	£435.98
Rural	£53.71	£30.42	£212.49	£94.64	£391.26
Urban	£86.40	£37.18	£226.50	£109.85	£459.93
Independent	£74.72	£33.80	£224.16	£102.25	£434.93
Multiple	£77.06	£34.65	£219.49	£105.63	£436.83

The average estimated total staff cost per responding pharmacy per week is £435.98. Over a period of one year, this staff cost equates to £22 670.96. A response rate to the questionnaire of 57% is suggestive of reflection across Northern Ireland, therefore extrapolating these average figures across Northern Ireland to all contactors (n=532), the total staff costs of delivering a multiple dispensing service in Northern Ireland equates to just over £12 million (£12 060 950).

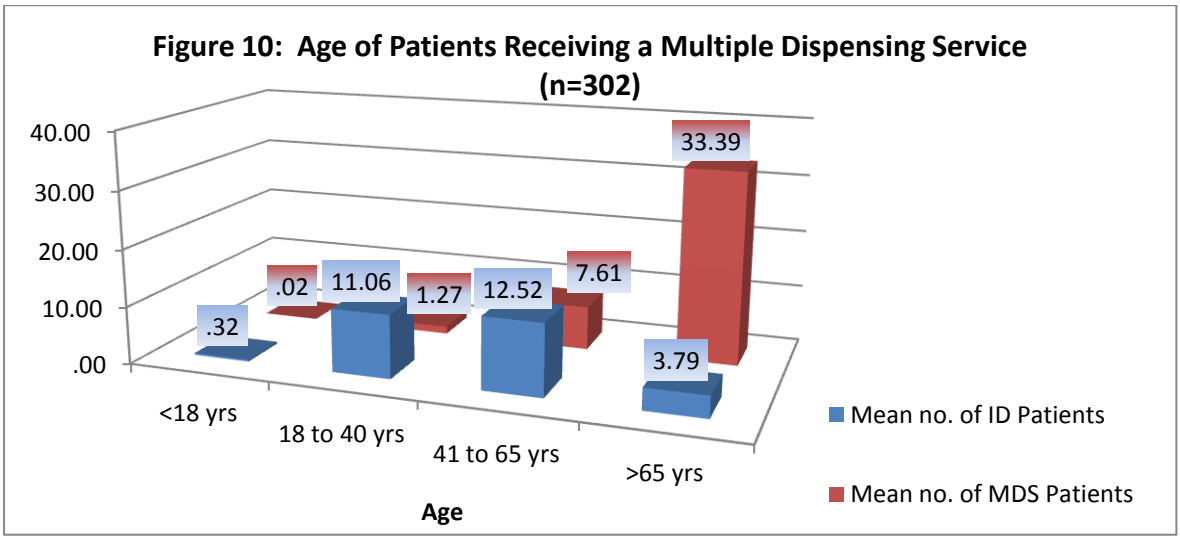
Based on the figures in Tables 9 and 10, it appears that 75% of the time spent on multiple dispensing is actually assigned to monitored dosage systems. In section 4.1.4 the estimated number of patients in Northern Ireland in receipt of a monitored dosage system is 21991, therefore the cost of pharmacy staffing to provide this service equates to just over £400 per patient, per year. This baseline figure does not include employer costs, nor does it take into account fixed elements such as overheads, equipment and costs of delivery/collection.

Similarly in section 4.1.4, the estimated number of patients in receipt of instalment dispensing across Northern Ireland was just over 16000, equating to a cost of ~£180 per patient per annum. Again, this is the basic figure excluding all other direct and indirect costs associated with the service delivery.

4.1.8 Age Groups and Patient Types

Figure 10 shows the average age and number of patients of that age in receipt of either instalment dispensing or a monitored dosage system. As may be anticipated, younger patients are in receipt of ID whilst the elderly (>65 years) are utilising monitored dosage systems.

Figure 10: Age of Patients Receiving a Multiple Dispensing Service (n=302)



The pharmacists were asked to categorise patients in receipt of ID or MDS into the categories: addiction; psychiatric/mental health issues; elderly; and other compliance issues with specification. Table 11 shows the categorisations made by the responding community pharmacists, whilst Tables 12 and 13 show the other compliance issues specified by those pharmacists who responded to these particular questions.

Table 11: Patient Categories receiving instalments or a monitored dosage system

	Monitored Dosage System (No. of Patients)				Instalment Dispensing (No. of Patients)			
	Addiction	Mental health/ psychiatric	Elderly	Other compliance issues	Addiction	Mental health/ psychiatric	Elderly	Other compliance issues
Mean	.8	5.5	33.2	2.0	10.9	12.7	3.7	1.2
Std. Deviation	1.9	6.8	24.6	7.0	12.0	12.1	9.3	5.3
Minimum	0	0	0	0	0	0	0	0
Maximum	19	43	130	98	75	71	65	70

Table 12: Reasons given by community pharmacists for patient non-compliance and therefore requiring an Instalment Dispensing (ID) Service (Not including addiction, psychiatric/mental health issues or older age-related issues)

Number of Pharmacists	Reason given by Community Pharmacist
4	Alcoholism/Alcohol issues
1	Patient attitude
2	Medicines for child where parents need assistance or are non-compliant
7	Complicated/complex regimen
4	Patient taking a high number of medicines
2	Non-compliance (general)
1	Didn't take medicines correctly
4	Epileptic patient
1	Essential to manage disease e.g. epilepsy but patients not very good at taking or re-ordering medication so weekly instalments used to manage disease better
5	History of overdose/suicidal risk
1	Initial titration of dose
1	Large amount of fluids, relatives of patient pick up weekly
2	Learning difficulties/low intelligence
1	Medicine shelf life
1	Medicines Management
1	Several different tablets & confused about when to take
1	Storage issues
1	Surgery can ensure patient taking medicines
1	Instalment dispensing used to replace MDS
1	Unable to look after their own medicines
1	Unknown reason for ID
2	Visually impaired/blind
1	Weekly extemporaneous dispensing
1	Weekly maintenance antibiotic
1	Younger patients who just don't take medicines
1	Patient forgets to take medicines
1	To limit number of tablets in patients house
3	Overuse/irrational use of medicines
1	Patient forgets to order medicines
1	Paediatric clinics (ADHD)
1	Pain killer abuse
1	Patient lives alone
1	Self-neglect

Table 13: Reasons given by community pharmacists for non-compliance leading to patients requiring a Monitored Dosage System (MDS) (Not including addiction, psychiatric/mental health issues or older age-related issues)

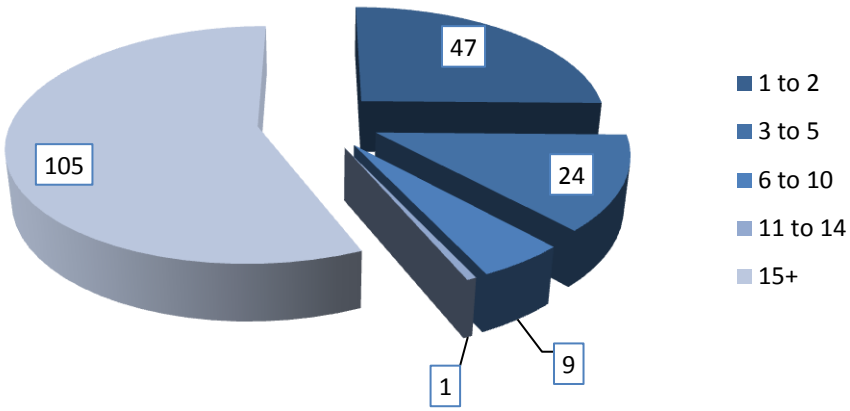
Reason given	Number of Pharmacists
Alcoholism/Alcohol issues	1
Medicines for child where parents need assistance or are non-compliant	1
Complicated/complex regimen	12
Patient taking a high number of medicines	16
Non-compliance (general)	4
Epileptic patient	4
History of overdose/suicidal risk	1
Learning difficulties/low intelligence	9
Several different tablets & confused about when to take	1
Unknown reason for MDS	2
Visually impaired/blind	11
Younger patients who just don't take medicines	1
Patient forgets to take medicines	6
Overuse/irrational use of medicines	3
Patient forgets to order medicines	1
Self-neglect	1
Cannot read and/or write	2
Carer gives medicines to patient	5
-Of which won't give to patient otherwise	1
-Of which official carer needs to supervise	1
Confused/memory issues/ dementia (young patient)	4
Dexterity problems e.g. due to rheumatoid arthritis	5
Physically disabled e.g. quadriplegic	10
At GP request (due to non-compliance)	1
Home Help service needs the box	1
Housebound	1
MS patient	2
Relative took patients tablets	1
Non-national (language barrier)	1
Patient would not take medicines	1
Recent hospital discharge	1
Seriously/terminally ill	2
Stroke patient	3

4.2 Patient Questionnaire

4.2.1 Responding Pharmacist Demographics

Of the 532 contractors in Northern Ireland, 254 returned patient survey summaries, representing a return rate of 48%. As for the pharmacist survey, approximately two-thirds (64.6%) of respondents were classed as urban pharmacies. 36.6% were described as independent whereas 63.0% of responses were from community pharmacists working in multiple ('chain/group') pharmacies. The number of contracts reportedly held by respondents (n=186) is shown in Figure 11 illustrating that 41.3% of the respondents who completed and summarised the patient questionnaires hold more than 15 contracts. The patient questionnaires were completed by 7045 patients in total representing an average return of 28 patients per contractor.

Figure 11: No. of Contracts held by Pharmacists who completed the Patient Questionnaire Summary



4.2.2 Domiciliary Care

Table 14 shows the breakdown of patients in receipt or not of domiciliary care and how they take medicines from their MDS. Forty-four percent of responding patients are in receipt of domiciliary care, with half of these patients reporting that the domicilary care worker (DCW) does not assist with medicine taking from their monitored dosage system.

Table 14: Average number of patients taking medicines from their MDS, if they receive informal help and whether they are in receipt of domiciliary care

	Domiciliary Care	
	Yes (mean)	No (mean)
Takes medicines From MDS Box themselves	3.0	11.3
Receives help taking medicines from MDS box from family informal carer	3.2	4.5
Takes medicines from MDS with help from DCW	6.0	N/A

4.2.3 Initiation of Monitored Dosage Systems (MDS)

Figure 12 shows who initiated the monitored dosage system as reported by the patients with GPs having started 37% of patients. Only 3.9% of the patients had their MDS initiated after a formal assessment by a pharmacist and 5.1% after an informal assessment. Table 5 shows the reasons reported by patients as to why their MDS was initiated with approximately half of the patients indicating they had too medicines to manage or were forgetting to take their medications.

Figure 12: Who initiated Patient Monitored Dosage Systems (n=6762 patients)

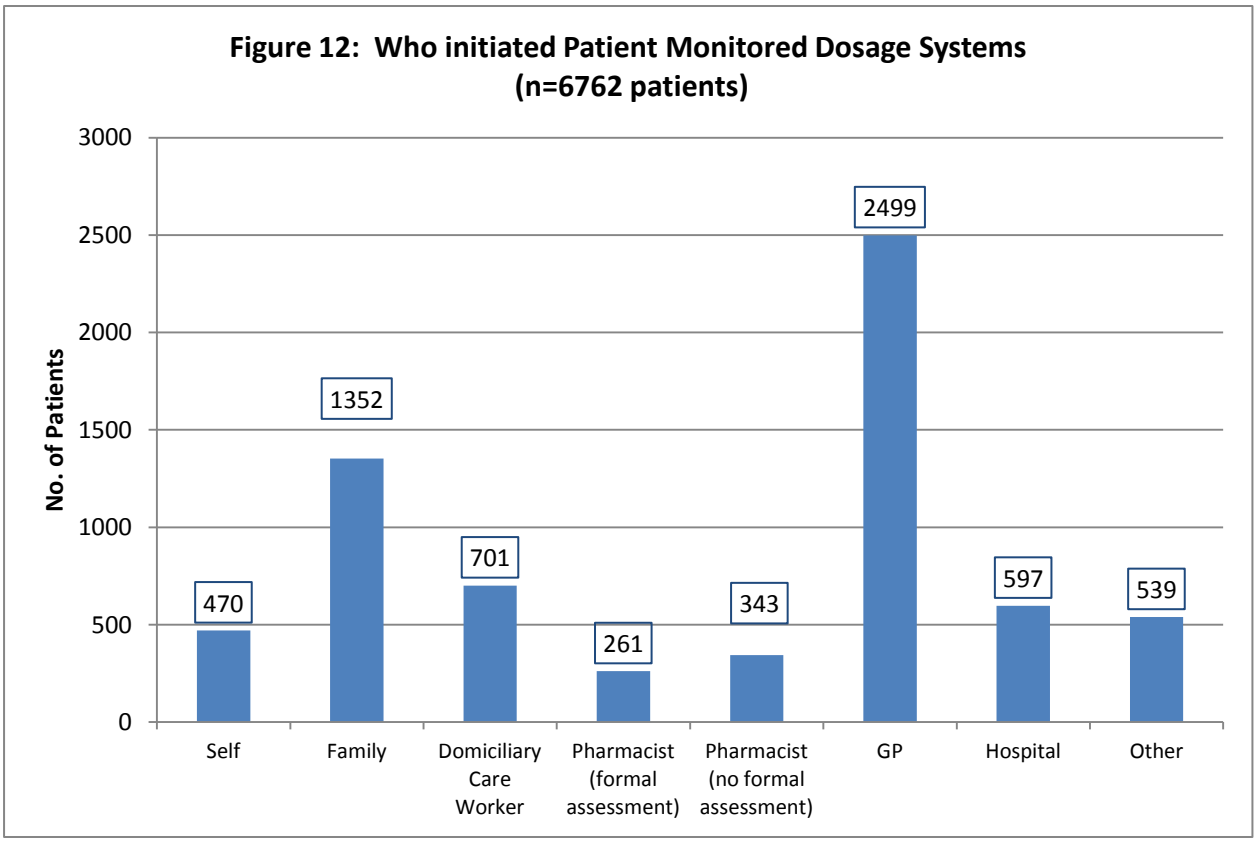


Table 15: Patient reported reasons as to why Monitored Dosage System was initiated

Reason Why MDS was Initiated	No. of Patients	% of Patients
Don't Know	162	2.3
Too many meds to manage	2315	33.0
Informal carer needs medicine in a box	371	5.3
Domiciliary Care worker needs meds in a box	1359	19.4
Convenience	309	4.4
Forgot to take medicines	1329	18.9
Overused medicines	473	6.7
Recommended	620	8.8
Other	82	1.2
TOTAL	**7020**	**100.0**

Other people who initiated the Monitored Dosage System as reported by the patients included: nurses (CPNs, MHTs, hospice, district, community rehab, COPD, CF); social workers; occupational therapists and consultant psychiatrists. The other reasons why patients believed a monitored dosage system was initiated are listed in Table 16.

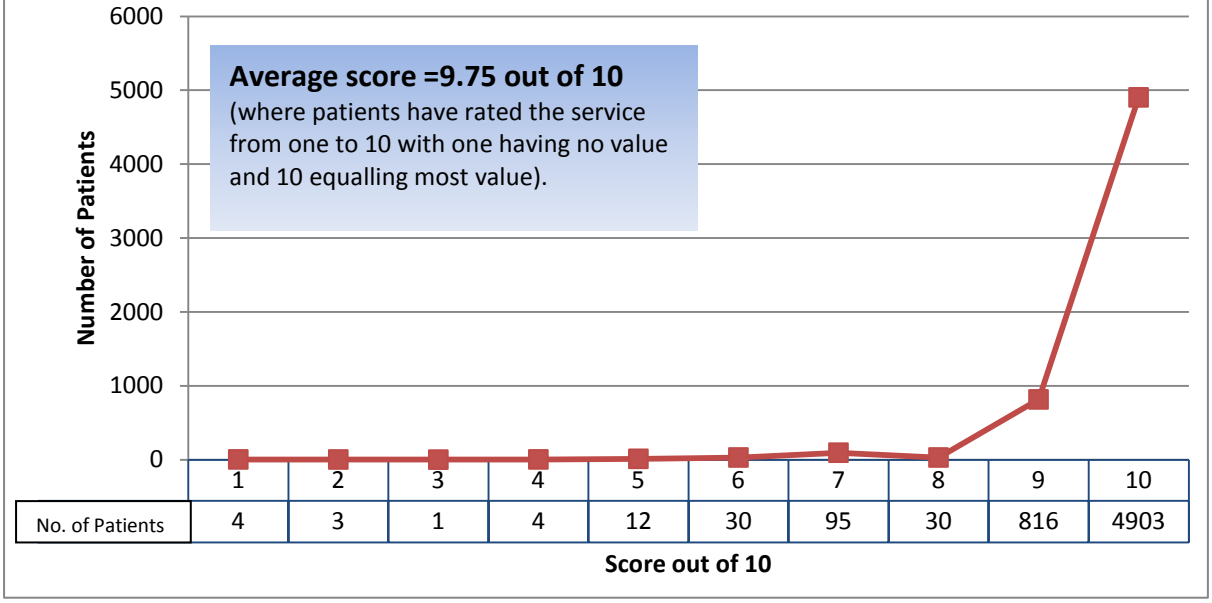
Table 16: Patient reported reasons why MDS was initiated.

Other reasons why MDS was initiated (patient reported)	Number of patient reports
arthritis in hands-unable to punch out tablets	1
Blind/other eyesight problems	4
care manager	1
Confused about medicines e.g. all white tablets	4
Daughter went on holiday	1
Dexterity problems	4
Recommended by doctor after brain injury	1
Mental handicap	1
Mental health issues	3
Mixed medicines up	1
New complex medication regime	1
Not compliant	1
Overdose	2
Promote independence	1
Social care request	1
Taking medicines at the wrong time	1
Addiction problems	1
Dementia	1
Family only call occasionally	1
Wife took husbands medicines	1
Stroke patient	1
Hospital recommended	1
COPD nurse recommended	1

4.2.4 Value of Monitored Dosage Systems to Patients

On a scale of 1-10, patients were asked to place a value on the monitored dosage system service; the results are shown in figure 13. The scale of 1-10 also reflected whether the patient believed they could cope without the monitored dosage system, with 1 indicating they could cope and 10 indicating that they could not cope with taking their medications without a MDS.

Figure 13: Value placed by Patients on Monitored Dosage Systems provided by their community pharmacist(n=5898)



	1	2	3	4	5	6	7	8	9	10
No. of Patients	4	3	1	4	12	30	95	30	816	4903

4.3 Pharmacist Questionnaire (Qualitative Analysis)

Question 11 of the pharmacist questionnaire asked the respondent to make any additional comments they may have about instalment dispensing and monitored dosage systems (see appendix 5); 156 pharmacists (51.5%) answered this open question.

Twenty-nine factors or themes (nodes) were identified within the answers given. A further 47 sub-classifications within the themes were also identified. From these, the main emergent themes, with more than 30 references made to each theme or its sub-classification, were identified by both data coders; these are shown in Table 17.

Emergent theme	Number of times referenced (two research coders)	% Agreement
1. Communication	43	86.8
2. Compliance Aid	58	89.5
3. Essential and Valuable Service	98	80.0
3 (i) Appreciation (sub-classification of Essential and Valuable Service)	33	93.8
4. Healthcare Resource Usage	32	90.3
4 (i) Patient Remains in the Community	42	91.1
5. GP Request	34	94.1
6 (ii). Ordering/Receiving/Collecting Prescriptions (sub-classification of main Theme – Patient Satisfaction/Patient Request)	43	85.2
7. Payment	117	75.6
7 (i) Cost to the business (sub-classification of main Theme – Payment)	50	85.1
8 (ii) Patient Safety (Sub-classification under main theme - Pharmacist feels pressure to provide this service)	57	82.8
8 (iv) Medication Changes (Sub-classification under main theme - Pharmacist feels pressure to provide this service)	72	83.5
8 (viii) Resource Issues (Sub-classification under main theme - Pharmacist feels pressure to provide this service)	68	81.2
9. Financial model needs to change (Sub-classification under main theme – Potential withdrawal of service)	31	92.6
11. Time	190	67.0

Examples of comments made relating to each of these themes and their sub-classifications are as follows:

Communication

"The make-shift system that is in place, coupled with the lack of communication between GPs, social care and private domiciliary care companies has placed pharmacists, care workers, family carers and patients in an impossible position of trying to provide care at no cost, absorbing costs and endeavouring to keep to board imposed limits (Respondent 206)".

"Communication is difficult when patients go into hospital-often we are not informed (Respondent 505)."

"Communication could well be enhanced between hospital/GP/pharmacy and family that all parties hear the same recommendation within a reasonable time slot (Respondent 402)."

Compliance Aid

"Compliance is a major problem and we have had numerous scenarios whereby after a period of time on a MDS patients have been able to reduce their meds at next review as find when taken properly they aren't actually needed (Respondent 187)."

"The MDS systems have been invaluable regarding providing information on patient compliance, thereby allowing us to inform prescribers in changes in formulation e.g. from metformin 'TDS' dosing to once daily XL dosage (one patient returned approx 30x28 of metformin 500mg, the GP assumed the patient was taking his metformin three times daily when in effect he only took a morning dose for 2-3 years). We have also prevented another patient lapsing into secondary care as they used to on a regular basis due to non-compliance and over-dosage (Respondent 178)."

"We are a source of support and a point of contact to promote general health and wellbeing to those patients as well as aiding their compliance (Respondent 487)."

Essential and Valuable Service

"I feel it is an essential service for various, vulnerable people in the community, ensuring they have correct medication in a home setting (Respondent 542)"

"This is a very important and valuable service for patients (Respondent 329)."

"This is a very valuable service to both patients and carers and this needs to be recognised as a commissioned service (Respondent 132)."

"MDS and instalment dispensing is an essential service being provided to people of various ages with a particular need (Respondent 249)."

Essential and Valuable Service - Appreciation

"MDS greatly appreciated by elderly/housebound patients with very little support (Respondent 185)."

"Although very labour intensive, it is a highly appreciated service (Respondent 507)."

"It is very beneficial and not always appreciated by Department on how this prevents hospital admission etc (Respondent 174)."

Healthcare Resource Usage

"I have firsthand experience in dealing with patients who have had several hospital admissions due to medication errors and the use of instalment dispensing has made a HUGE difference (Respondent 437)."

"Without the MDS system a lot of patients who are treated in their homes would have limited/no help with their medicines and the result would be a huge drop in medicines compliance and increased hospital admittance rates (Respondent 395)."

"Some patients, for a variety of well-founded reasons, are simply not capable of taking charge of medicating themselves.... By providing these patients with MDS...the pharmacists improve their provision of healthcare and should therefore save money by avoiding hospital stays (Respondent 169)."

Healthcare Resource Usage - Patient remains in the community

"Most practitioners agree MDS allows vulnerable patients to live at home more independently- it also prevents hospital admissions (Respondent 31)."

"....I know several patients who have been able to remain in primary care without frequent hospital admissions (Respondent 142)."

GP Request

"It is often requested by GP's and patients, but the cost of the service is funded by the pharmacy (Respondent 81)."

"Doctor's request us to prepare patients medicines in medibox-usually for elderly confused patients... (Respondent 485)."

"In this area a lot of the MDS volume is actually initiated by the GP (Respondent 394)."

"We are having ~1 new patient a week needing a MDS tray. Often the GP just writes dispense weekly on a script but doesn't even inform us that he would like it dispensed in a MDS tray. We either

contact them or the patient's family appear and inform us that the doctor said it would be supplied by the pharmacists in a weekly box (Respondent 513)."

Ordering/Receiving/Collecting Prescriptions

"The administration of ordering and receiving prescription from surgeries is very time consuming too. While most surgeries are sympathetic we don't receive a great deal of co-operation in receiving scripts on time (Respondent 69)."

"Many patients who receive MDS dispensing are elderly and require assistance with the re-ordering and collection of prescriptions as well as the delivery of their MDS (Respondent 59)."

"Couldn't really say how long is spent on MDS's during the working week as they seem all consuming ordering, collecting and assembling (Respondent 39)."

"Patients are getting the correct medication, their compliance is being monitored, reduced stress of ordering their medication, having the script in the pharmacy on time, family members and carers are administering correctly and I firmly believe if our patients did not receive their medication correctly there would be more visits to the GP, patients not receiving correct medication and increased hospitalisation (Respondent 482)."

Payment

"The current payment for instalment dispensing and in particular MDS does not equate to the time spent dispensing for these procedures. In addition when no refillable MDS is used the payment does not cover provision of refillable boxes. In addition when you consider the benefits instalment and MDS dispensing provides in terms of compliance, disease management and addiction management the payment is not reflective (Respondent 331)."

"The payment received for producing the dispense weekly service does not reflect the amount of work involved (Respondent 283)."

"We have ceased taking on new patients for MDS dispensing.... I consider the current payment for MDS not sufficient to meet the cost of service (Respondent 184)."

Cost to the Business (sub-classification of main theme – Payment)

"This is a necessary service which I am providing at a loss to the business. It is often requested by GP's and patients, but the cost of the service is funded by the pharmacy (Respondent 81)."

"By the time you factor in the time, the cost of the packs, other staff time and delivery costs I am losing money to provide this service (Respondent 38)."

Patient Safety (sub-classification of main theme – Pharmacist feels pressure to provide this service)

"They increase safety- especially instalment dispensing for addiction and mental health issues (Respondent 221)."

"Since accuracy is the key to safety only qualified pharmacists provide and maintain the service in this practice since we have no semi-qualified technicians (Respondent 137)."

"This service is essential in providing safe use of medicines in the community in many patients. I have firsthand experience in dealing with patients who have had several hospital admissions due to medication errors and the use of instalment dispensing has made a HUGE difference (Respondent 437)."

"Many of our patients rely on this service for the safe administration of their medication (Respondent 343)."

Medication Changes (sub-classification of main theme – Pharmacist feels pressure to provide this service)

"Medication changes in MDS-communication from GP/family can be poor (Respondent 504)."

"A lot of time and care is also spent keeping records correct- these patients often have many medication changes. Changes must be made to prescriptions, computer PMR, charts and cards used for re-ordering (Respondent 264)."

"We often find ourselves re-doing MDS trays due to changes of medication mid week – or changes due to hospital admissions/discharge. This is often unplanned and done during the course of normal dispensing duties (Respondent 139)."

Resource Issues (sub-classification of main theme – Pharmacist feels pressure to provide this service)

".... Availability of resources (manpower/facilities) for provision of an increased MDS service. ...Number of MDS has to be at a manageable level (Respondent 504)."

"MDS systems overstretch pharmacy resources due not only to the cost of the systems but also the staff time involved in dispensing, ordering, prescriptions, ensuring all records are up to date and all prescriptions received and checked in advance of dispensing (Respondent 203)."

"Who is initiating this form of dispensing? It seems to be mainly initiated in hospital or asked for by carers and in the majority of cases there seems to be no medical need for it and it is just for convenience to patients. This is resulting in a huge waste of resources in community pharmacy - they are extremely time-consuming (Respondent 202)."

Financial model needs to change (sub-classification of main theme – Potential Withdrawal of service)

"I will be faced with no option but to withdraw this much needed service if current financial model is not improved (Respondent 176)."

"Instalment and MDS patients require a lot more effort to manage than normally dispensed items for patients... it becomes impossible to provide a service like this and make any profit for a business to pay staff and other costs. A service like this cannot be undertaken on the basis that we may not make any money from it, but we will "probably" make up the cost elsewhere. The continued lack of a properly structured pharmacy contract which takes into account the actual costs involved in providing the individual components to the very high standard that we require. A realistic review of

the costs of service would be a good start. At the moment, the numbers do not stack up (Respondent 19)."

Time

"The process is enormously time consuming. A total of 3 days per week of a pharmacist's time is devoted to administering the process (Respondent 137)."

"Extremely time consuming for very little remuneration (Respondent 135)."

"Very time consuming but rewards are clear, especially for those elderly patients struggling to cope with multiple medications (Respondent 478)."

"This process takes a lot of time and requires the pharmacist to concentrate fully for long periods of time (Respondent 62)."

"MDS service has now become so time consuming and labour intensive- I either now complete them early in the morning before the shop opens (to free up time for other duties during working hours and to stop being called away and then having to restart the checking process) or pay a locum for 3-4 days. We make up 4 weeks at a time as this improves efficiency. However, very often our MDS patients have their medication changed either by GP's or hospital attendances. This means re-working each pre-prepared medibox - time and effort that is not compensated for by the initial dispensing fee (Respondent 60)."

Three further themes which were referenced in the text 25-30 times included: cost savings to the health service; home help/carer requests for monitored dosage systems; and patient vulnerability. Specific comments included:

"In my opinion the use of this service is reducing costs as we in the pharmacy are only ordering it when it is required. Before, surgeries where re-issuing items that were not being used (respondent 437)."

"Many patients are being pushed into MDS by home helps and other groups who insist on it-so why should it be provided for free? (Respondent 27)."

"Carers attending patients living alone insist on MDS boxes to help patient with medication (Respondent 63)."

"This is an essential, underpaid service for many vulnerable people who have long been customers and deserve an excellent pharmaceutical service to keep them out of hospital and let them continue to live in the community (Respondent 222)."

5. Discussion and Conclusions

The surveys presented were conducted in order to gain a better understanding of the number of patients currently in receipt of instalment dispensing and monitored dosage systems. At present, preparation and delivery of monitored dosage systems is not a commissioned service.

This appears to be the first comprehensive survey, with an excellent response rate and appropriate sample size, on this topic within Northern Ireland. In 2001, Nunney *et al*. conducted a similar study in the Leeds Health Authority area, where responses were obtained from 123 pharmacies, of whom, 80% were supplying compliance aids to 1328 patients (an average of 14 patients per pharmacy) [33]. Extrapolation of their figures suggested that over 100 000 patients living in their own home were in receipt of a monitored dosage system. This local study can be extrapolated so as to estimate that 22 000 patients could now be in receipt of a monitored dosage system in Northern Ireland alone, and it could be implied that monitored dosage system dispensing must surely also have increased in the rest of the UK over the last decade.

The pharmacies surveyed did not differ in terms of workforce with this lack of difference being maintained between independent and multiple pharmacies, and also between those categorised as being in an urban or rural location. However it was noted that urban pharmacies are serving more patients and their percentage workload associated with instalment dispensing was significantly higher when analysed in this manner.

Whilst rural pharmacies are providing fewer patients with reminder packaging and doing less instalment dispensing than urban pharmacies, they are collecting significantly more prescriptions from doctor's surgeries on their patients' behalf. This possibly reflects the differing needs of patients living in rural areas who may live a large distance from their health centre, but are being provided by their community pharmacist with the convenience of being able to collect their prescription items directly from one central location.

Over 80% of pharmacists reported that they provide a delivery service to their patients; this is usually a complimentary service and adds to the goodwill of service provision. The cost to individual pharmacists in providing this service was not captured in this survey, but it can be assumed that the cost to the pharmacy business could be rising significantly due to recent increasing motor insurance and diesel/petrol costs.

Question two of the survey asked pharmacists to provide information on how many monitored dosage system boxes they were providing for no additional fee, but the answers received reflected that the respondents did not fully understand or interpret this question correctly. Due to the lack of reliability, the answers to this question had to be removed from the data analysis. It would be useful to know whether any community pharmacists are presently charging patients directly for the provision of monitored dosage systems. The general understanding is that they do not do this and this is reflected in the answers given to the pharmacist survey open question.

Of the types of boxes provided, disposable boxes are used predominantly, with only two pharmacists reporting they used refillable boxes alone and 40.7% of respondents reporting that they used both available types.

The pharmacists reported the hours spent by them and their staff in providing both instalment dispensing and monitored dosage systems. A simple calculation based on average salaries, and not including employer and other costs suggests that provision of instalment dispensing costs £180 per patient per year, whilst provision of monitored dosage systems is costing almost three times this

amount per patient per annum. Instalment dispensing currently attracts a dispensing fee for each dispensing episode (currently 49p per item) whereas no specific fee structure currently exists for monitored dosage system services.

The majority of patients receiving monitored dosage systems were aged over 65 years; this would be as expected as the elderly take more medications and often have multiple co-morbidities. The proportion of elderly people within the population is increasing; recent figures in Northern Ireland revealed that in June 2009, 1.6% (n=28 700) of the population was aged 85 years and over. This represents a 22% increase in the size of this age category over a seven-year period i.e.2002-2009. Based on these figures it is projected that by 2021, the number of persons aged 85 years and over in Northern Ireland will increase by 67% to a figure of 47 900[34]. With this in mind, the demand for monitored dosage systems will probably continue to rise.

Those in receipt of instalment dispensing were more often aged 18 to 65 years; this is also as expected with mental health and addiction problems influencing the need to prescribe in this manner so as to ensure patient safety as much as to influence medication adherence.

Reasons given for lack of adherence were varied and numerous reflecting: specific disease states e.g. epilepsy; disabilities e.g. blind, paraplegic; patient behaviours e.g. irrational or overuse of medicines; lack of social support; patient health beliefs or attitude; literacy levels; and environment. All have previously been reported in the literature[1,4,5] and again reflect the multi-factorial reasons behind poor medication adherence and persistence in taking drugs for long term conditions.

The patient questionnaires focused on their social support by questioning whether they had a domiciliary care worker and whether this person assisted them in taking their medications. In addition, the source of initiation of the monitored dosage system and reasons for this was explored. Approximately two-fifths of the patients who completed the questionnaire in response to the request from the community pharmacist had a domiciliary care worker assigned to their care. This equates to an average of 12 patients per pharmacy; of these, half of the patients confirmed that their domiciliary care worker was not assisting them in taking their medications via their monitored dosage system. The current perception is that domiciliary care workers, and also informal care workers, will not assist patients unless the medications are contained within a compliance aid. Additionally, community pharmacists report that due to the significant costs to their business and resources required to provide monitored dosage systems to patients, they are not driving the increase in monitored dosage systems, but that this is coming from other healthcare professionals. This is supported by the results of this survey where patients reported that their GP primarily initiated the monitored dosage system (37%), followed by family members (20%) and then domiciliary care workers (10%). Hospital pharmacists seemed to have started the compliance aid in a reported 9% of cases. Interestingly, only 4% of monitored dosage systems were recommended by community pharmacists after performing a formal assessment. Informal assessment by the pharmacist resulted in 5% of reminder packaging initiations.

Many healthcare staff perceive monitored dosage systems as a solution for all patients suspected to be poorly compliant or displaying signs of confusion. However pharmacists are aware that inappropriate use of these compliance aids can lead to overdose or treatment failure, as well as increasing risks of dispensing errors due to secondary dispensing[35]. Pharmacists are also aware of the drugs that are unsuitable for inclusion in monitored dosage system due to their particular chemical or storage problems and any handling requirements. This knowledge is unique to the pharmacy profession and would suggest that pharmacists should be more involved in the formal assessment of patients and determination of suitability of their drug regimens for containment in a multi compartment compliance aid.

The qualitative results of this work certainly support the quantitative findings where the main emergent themes related to time, payment and provision of an essential and valuable service. Without an appropriate remuneration model for provision of monitored dosage systems by community pharmacists, the way forward appears bleak as pharmacists report provision of this service often at a loss to their business due to the significant resources required.

Conclusions from these results suggest that whilst patients highly value the service they receive from community pharmacies, the current position cannot be financially maintained by community pharmacy. The way forward could possibly be a multi-factorial commissioned service (for a multi-factorial problem) which allows in-depth, but convenient formal assessment of patients, their compliance and their medication regimes. This would be followed by recommendation of a number of strategies addressing specific patient needs, which may or may not, also incorporate the need for a compliance aid. This patient-centred approach would also introduce the concept of concordance[36] which underpins successful future medication adherence and persistence.

However proposed future models actually 'look', these should be piloted, and ideally be assessed within the stringent confines of a randomised controlled trial, prior to roll-out to the general population. This does highlight the concern of what happens to patients and service delivery by community pharmacists in the interim, but interim measures should be implemented, so as to allow time to properly assess and evaluate the best patient-centred care pathways and medication adherence models (which can, where needed, incorporate use of instalment dispensing or monitored dosage systems).

References

1. Sabate E, Adherence to long-term therapies – evidence for action. World Health Organisation, 2003. http://www.who.int/chp/knowledge/publications/adherence_full_report.pdf (Last accessed 15/08/2012)
2. Haynes R. Compliance in Healthcare, Ed. Haynes R, Sackett D, Taylor D. Baltimore: John Hopkins University Press, 1979.
3. Cramer JA *et al.* Medication compliance and persistence: terminology and definitions. Value Health 2008; 11:44-47.
4. Bosworth HB. Improving patient treatment adherence: a clinician guidebook. New York: Springer, 2010.
5. Murray D M *et al*. A conceptual framework to study mediation adherence in older adults. The American Journal of Geriatric Pharmacotherapy 2004; 2(1): 36-43.
6. Di Matteo MR *et al*. Depression is a risk factor for noncompliance with medical treatment: meta-analysis of the effects of anxiety and depression on medication adherence. Archives of Internal Medicine 2000; 160: 2101-2107.
7. Ziegelstein RC *et al*. Patients with depression are less likely to follow recommendations to reduce cardiac risk during recovery from a myocardial infarction. Archives of Internal Medicines 2000; 160: 1818-1823.
8. Esposti *et al*. A retrospective population based analysis of persistence with antihypertensive drug therapy in primary care practice in Italy. Clinical Therapeutics 2002; 24(8): 1347-1357.
9. Jones JK *et al*. Discontinuation of and changes in treatment after start of new courses of antihypertensive drugs: a study of a United Kingdom population 1995; 311: 293-295.
10. Stewart RB & Cluff LE. A review of medication errors and compliance in ambulant patients. Clinical Pharmacology and Therapeutics 1972; 13(4): 463-468.
11. Stone VE. Strategies for optimising adherence to highly active antiretroviral therapy: lessons from research and clinical practice 2001; 33(6): 865-872.
12. Budnitz DS *et al*. National surveillance of emergency department visits for outpatient adverse drug events. Journal of the American Medical Association 2006; 296: 1858-1866.
13. Wakefield BJ *et al*. User perceptions of In-Home Medication Dispensing Devices. Journal of Gerontological Nursing 2008; 34(7): 15-25.
14. Lewis A. Nonadherence: a $100 billion problem. Remington Report 1997; 5:14-15.
15. National Audit Office. Prescribing costs in Primary Care, London, The Stationery Office, 2007.
16. Tandy C & Bamford L. Medication Compiance Aids. European Geriatric Medicine 2010; 1:314-316.

17. McElnay JC *et al*. Dispensing of medicines in compliance packs. International Pharmaceutical Journal 1992; 6(1): 10-15.
18. Morisky DE *et al*. Five-year blood pressure control and mortality following health education for hypertensive patients. American Journal of Public Health 1983; 73: 153-162.
19. Oldridge NB & Jones NL. Improving patient compliance in cardiac rehabilitation:effects of written agreement and self-monitoring. Journal of Cardiopulmonary Rehabilitation 1983; 3:257-262.
20. Swain MS & Steckel SB. Influencing adherence among hypertensives. Research Nursing and Health 1981; 4: 213-222.
21. Mahoney MJ *et al*. Relative efficacy of self-reward, self-punishment and self-m onitoring techniques for weight loss. Journal of Consulting and Clinical Psychology 1973; 40:404-407.
22. Daltrpy LH & Godin G. The influence of spousal approval and patient perception of spousal approval on cardiac participation in exercise programs. Journal of Cardiopulmonary Rehabilitation, 1989; 9:363-367.
23. Taylor CB *et al*. Smoking cessation after myocardial infarction: effects of a nurse-managed intervention. Annals of Internal Medicine 1990; 113: 118-123.
24. Zedlar B *et al*. A pharmacoepidemiologic analysis of the impact of calendar packaging on adherence to self-administered medications for long-term use. Clinical Therapeutics 2011; 33(5): 581-597.
25. Ho M *et al*. Medication adherence Its importance in cardiovascular outcomes. Circualation 2009; 119: 3028-3035
26. Mahtani KR *et al.* Reminder packaging for improving adherence to self-administered long-term medications (Review) 2011; 12(3): CD005025.
27. Simmons D *et al*. Can medication packaging improve glycaemic control and blood pressure in type 2 diabetes? Diabetes Care 2000; 23(2): 153-156.
28. Scneider PJ *et al*. Impact of medication packaging on adherence and treatment outcomes in older ambulatory patients. Journal of the American Pharmacists Association 2008; 48: 58-63.
29. Kripilani S *et al*. Interventions to enhance medication adherence in chronic medical conditions: a systematic review. Archives of Internal Medicine 2007; 167(6): 540-550.
30. Millar J *et al*. Does a system of instalment dispensing for newly prescribed medicines save NHS costs? Results from a feasibility study. Family Practice 2009; 26(2): 163-8.
31. Strang J *et al*. Does prescribing for opiate addiction change after national guidelines? Methadone and buprenorphine prescribing to opiate addicts by general practitioners and hospital doctors in England, 1995-2005. Addiction 2007; 102:761-770.
32. Millar JS *et al*. A pilot study to investigate the use of instalment dispensing as a method of reducing drug wastage owing to adverse drug reactions. British Journal of General Practice 2003; 53: 550-552.

33. Nunney JM *et al*. How are multi-compartment compliance aids used in primary care? The Pharmaceutical Journal 2001; 267: 784-789.
34. The Northern Ireland Statistics and Research Agency (NISRA). Single year population estimates of the number of persons aged 85 years and over in Northern Ireland. NISRA, 2010.
35. Athwal D *et al*. Compliance aids: an elephant in the room. The Pharmaceutical Journal 2011; 286: 75-76.
36. RPSGB. From compliance to concordance: achieving shared goals in medicine taking. Report from the Royal Pharmaceutical Society, London, 1997.

Appendix 1: Pharmacist Survey on Instalment Dispensing and Monitored Dosage Systems (MDS)

Which of the following best describes your pharmacy? (Please circle) **URBAN** **RURAL**

Which of the following describes your pharmacy? (Please circle) **INDEPENDENT** **MULTIPLE**

- If you circled multiple please indicate the number of contracts you have:

  1-2 **3-5** **6-10** **10-15** **15+**

How many hours do you open per week? ☐

Skill mix of workforce in each pharmacy

	Total Number	Full time	Part time
All Pharmacists (including contractor)			
Accuracy Checking Technicians (ACTs)			
Technician/Dispensary assistant/other who assists with MDS or instalment dispensing			

1. For how many patients in total do you provide a regular, multiple dispensing service? (**Include** all patients receiving daily, weekly, MDS etc. medicines in this figure, but **exclude** Methadone, Subutex, residential home and nursing home patients)

☐

For the remaining questions we would like you to consider instalment dispensing patients and MDS patients separately. By instalment dispensing, we mean the provision of a multiple dispensing service where medicines are not provided in a compliance box. MDS patients are considered to be those patients who do receive their medicines in a weekly compliance box, i.e. disposable MDS trays AND refillable Dosette boxes. Please include all patient groups within your response.

2. How many patients do you currently have on:

	Instalment Dispensing?	**MDS?**
Daily		
Twice weekly		
Weekly		
Fortnightly		
Other		
TOTAL		

- Of these MDS patients, how many MDS boxes do you provide per week for no additional dispensing payment i.e. no multiple dispensing or medicines management fees?

For certain patients, within both categories, important and necessary elements of this service are the roles the pharmacist plays in ordering prescriptions on time, collecting the prescriptions from the GP surgery, ensuring medication changes are identified, and providing information to the patient about such changes.

3. On a monthly basis, how many patients do you order prescriptions for:

Instalment Dispensing?	
MDS?	
All others? (not MDS or instalment)	

4. On a monthly basis, how many patients do you collect prescriptions from GP surgeries for:

Instalment Dispensing?	
MDS?	
All others? (not MDS or instalment)	

5. How many patients do you have in the following age groups for:

Instalment Dispensing?	Under 18 years old	
	18-40 years old	
	41-65 years old	
	Over 65 years old	
MDS?	Under 18 years old	
	18-40 years old	
	41-65 years old	
	Over 65 years old	

6. What is the total number of items dispensed per week for:

Instalment Dispensing?	
MDS?	
All others? (not MDS or instalment)	

7. What is the total number of hours spent per week on:

Instalment Dispensing?	By the pharmacist	
	By other pharmacy staff	
MDS?	By the pharmacist	
	By other pharmacy staff	

8. Which of the following types of MDS box do you use? (please circle) **Refillable**

Disposable

- If you provide both refillable and disposable please provide the total number per week of each:

Type of MDS box	**Total number of patients per week**
Refillable	
Disposable	

9. How many patients would you have in each of the following categories for:
(Please select the single most relevant option for each patient. We are aware some patients will fall into more than one category but for the purposes of this survey please select what you consider to be the main reason.)

	Instalment Dispensing	**MDS**
Addiction		
Psychiatric/Mental Health Issues		
Elderly (e.g. dementia, limited dexterity, complex regime)		
Other Compliance Issues (please specify)		

10. Do you do home deliveries? (please circle) **Yes**

No

- If yes, how many patients do you deliver to per week for:

Instalment Dispensing?	
MDS?	
All others? (not MDS or instalment)	

11. Please provide any additional comments you have regarding instalment and MDS dispensing in the box below.

Appendix 2: Letter to Community Pharmacists

Dear Colleague,

Multiple dispensing services (i.e. instalment dispensing and MDS) are valuable services offered by community pharmacies across Northern Ireland. We are keen to collect information on the provision of these services and the associated work carried out on a daily basis in community pharmacies for these patients. This is an important piece of work which will form a key evidence base to assist us in our ongoing negotiations and service development.

You will find attached two surveys. It is worth noting that these surveys should **exclude** Methadone, Subutex, residential home and nursing home patients.

The first survey is for the pharmacist to complete. Initially it addresses the overall multiple dispensing service and then goes on to focus separately on the instalment dispensing and MDS (both refillable and disposable compliance boxes) services you provide. **We would suggest it is the pharmacist most familiar with these groups of patients who completes the pharmacist survey.** For questions 3, 4 and 6 we appreciate it is difficult to give the exact number of items for "all others", however we ask that you give as accurate a figure as you possibly can.

The second survey focuses specifically on patients who receive MDS boxes as part of the multiple dispensing and medicines management services (in this patient survey please do not include patients who receive MDS boxes as a goodwill gesture from your pharmacy) and is for the pharmacy staff to complete with as many of your MDS patients as possible. We have provided five copies of the patient survey; you may photocopy further copies of the patient survey as required or contact CPNI offices to have a template form emailed to you. There is also a patient results summary form for you to collate the results of the patient surveys.

We would appreciate it if you could complete the pharmacist survey and the patient surveys (with as many of your MDS patients as possible) at your earliest convenience and return to CPNI in the envelope provided, on, or before Friday 16th March, 2012. The only forms we require you to return to CPNI are the pharmacist survey and the patient results summary form. The forms that are to be returned are green in colour. The results obtained from this survey will provide important evidence to inform service development and remuneration within the new community pharmacy contract; for this reason we would greatly appreciate your co-operation.

All information received will be treated completely confidentially and results will be anonymised. Once again thank you for taking the time to assist us in this matter. Do not hesitate to contact us if you require any further information.

Yours sincerely,

Appendix 3: CPNI Survey for Patients Receiving Pharmacy-Filled MDS Boxes

Please provide answers to each of the following questions:

1. Do you take the medicines from the MDS yourself? (please circle) **Yes** **No**

   - If no, who helps you take your medicines? (please circle)
     Family
     Informal carer
     Domiciliary care worker
     Other (please specify) _____

2. Do you have a domiciliary care worker who visits you daily? (please circle) **Yes** **No**

   - If yes, do they help you with taking your medicines? (please circle) **Yes** **No**

3. Who initiated your MDS box? (please circle)
   Self
   Family
   Domiciliary care worker
   Pharmacist
   - Was this following a formal medicines management assessment? (please circle) **Yes** **No**

   GP
   Hospital
   Other (please specify) _____

4. Why was the MDS box initiated? (Please circle)
   Don't know
   Too many medicines to manage
   Informal carer needs medicines in a box
   Domiciliary care worker needs medicines in a box
   Convenience
   Forgot to take medicines
   Overused medicines
   Recommended (if so, please specify by who)
   _____
   Other (please specify) _____

5. What value do you place on the MDS service

1 2 3 4 5 6 7 8 9 10

No value — High value

(Could easily cope without it) — (Unable to cope without it)

Appendix 4: Community Pharmacy MDS Survey

Patient Results Summary Form

Which of the following best describes your pharmacy? (Please circle)	**URBAN**	**RURAL**
Which of the following describes your pharmacy? (Please circle)	**INDEPENDENT**	**MULTIPLE**

- If you circled multiple please indicate the number of contracts you have:

1-2 **3-5** **6-10** **10-15** **15+**

Once you have collected all your MDS patient responses please total the numbers for each category in the following table. This is the ONLY form you will return for patient responses. Individual patient surveys do not need to be returned.

Type of patient		**Total Number Of Patients**
Takes medicine from MDS box themselves **(no domiciliary care service)**		
Receives help taking medicine from MDS box from family /informal carer **(no domiciliary care service)**		
Takes medicine from MDS box themselves **(do receive domiciliary care service)**		
Receives help taking medicine from MDS box from family /informal carer **(do receive domiciliary care service)**		
Receives help from domiciliary care worker to take medicines from MDS box		
		Total Number of Patients
Who initiated MDS box?	Self	
	Family	
	Domiciliary Care Worker	

*By formal assessment we mean the patient has undergone a 'Managing your Medicines' assessment with the pharmacist	Pharmacist-**with** formal assessment*	
	Pharmacist-**without** formal assessment	
	GP	
	Hospital	
	Other e.g. district nurse, social worker (please specify)	
Why was MDS box initiated?	Don't know	
	Too many medicines	
	Informal carer needs medicines in MDS	
	Domiciliary care worker needs medicines in MDS	
	Convenience	
	Forgot to take medicines	
	Overused medicines	
	Recommended e.g. other healthcare professional	
	Other (please specify)	
Value placed on MDS Service	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	
	10	