Pharmacist 'intelligent' Referrals to a Liaison Psychiatry Team

Julie Brooks

Doctor of Philosophy

Aston University
Birmingham

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Antipsychotic medications are associated with an increased risk of falls, delirium and cerebrovascular events; and all can cause death (1-7). It is crucial that patients prescribed these agents receive regular specialist review to optimise therapy and prevent harm (8, 9). When antipsychotic prescribing in an acute hospital was investigated, it was found that only a third of patients on these agents were reviewed by the hospitals psychiatry team (8, 10, 11). A novel pharmacist referral system was developed to establish whether pharmacy could help improve patient's access to psychiatric services to facilitate medication review.

345 patients (44%, n=345) were reviewed by a pharmacist and 152 (44%) referrals made. Nearly half (n=69, 20%) of the referrals were generated by a pharmacist using the newly implemented system. Pharmacy referrals focussed on medication safety, this was different to those generated by medical staff whose emphasis was on symptoms and behaviour. In addition to referrals the pharmacists were found to have a clinical impact on patient care in an additional 91 (26%) patients.

The adverse consequences (ADRs) of antipsychotics were implicated in 45 patient admissions, confirming the real potential for patient harm. The pharmacist referral system identified the majority (n=39, 87%) of the ADRs. Following psychiatry review, 69% (n=31) of patient's medication was adjusted following mental health assessment where both the patient's mental and physical health needs were considered.

The pharmacy referral service was found to enhance the clinical management of the vulnerable mental health patient in the hospital setting. It was an alternative to the traditional model of pharmacy in which clinical pharmacy services were targeted according to patient need rather than by physical ward location. Although, the model was demonstrated in mental health, it is felt that it could have a wider use according to the prescription of any high-risk medication.

Word count = 299

Key words

Antipsychotic, pharmacist, referrals, mental health, prescribing

Acknowledgements

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Definitions and Abbreviations

Detail	Definition
Antipsychotic	All medicines listed in The British National Formulary (Chapter 4.2.1) as an antipsychotic medication.
CMHT	Community Mental Health Trust
Pharmacist	A person registered with the General Pharmaceutical Council to practice pharmacy in the UK
PIR	Pharmacist 'intelligent' referral process. A new referral process introduced by the PhD candidate for this research, whereby a pharmacist can refer an inpatient at City Hospital, Birmingham to the hospitals liaison psychiatry team (RAID)
Band 7 Pharmacist	A Hospital Pharmacist (Band 7,), funded by a research grant from Pharmacy Research UK (The Galen Award) for 1 day a week (0.2 wte) to aid the research in Phase II.
NNH	Number Needed to Harm. The total number of patients needed to be prescribed the medication for one patient to experience harm.
NNR	Number needed to Refer. The total number of patients needed to be prescribed the medication for one patient to be referred.
PhD Candidate	Hospital Pharmacist (Band 8a) currently working as a 0.5wte Psychiatric Liaison Pharmacist at City Hospital, Birmingham.
Psychiatric Liaison Pharmacist	A pharmacist who is employed to work with the RAID team looking after patients with Mental Health conditions within the hospital inpatient setting.
RAID	Rapid Assessment Interface and Discharge Team. A Psychiatric liaison service operating in City Hospital, Birmingham.
RiO®	Electronic patient information system developed by Birmingham and Solihull Mental Health Trust.
Specialist Pharmacist	The PhD candidate. A senior hospital clinical pharmacist (Band 8a) working as a 0.5 wte psychiatric liaison pharmacist at City Hospital, Birmingham. Conducting this research.
Study Medication	Antipsychotics and mood stabiliser's as identified in BNF chapter 4.2 and drugs for dementia as described in BNF chapter 4.11.

SCR®	Summary Care Record. A system currently available to all hospital pharmacists at City Hospital, Birmingham. This allows the pharmacist to access GP medication records for inpatients within the hospital.
SWBH	Sandwell and West Birmingham NHS Trust.

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Chapter 1:
Introduction and Literature Review

1.1 Dementia

In the UK in 2015 it is estimated that 850,000 people live with dementia, a disease that carries a massive personal, family, social and economic cost (12). The Alzheimer's Society (2015) reports that the financial cost of dementia in the UK is currently £26 billion per year and that this number will continue to rise as patient numbers increase. It estimates that there will be over a million people with dementia in the UK by 2025 and by 2030 there will be around 65 million people worldwide (13). Furthermore, it is estimated that at any time up to a quarter of patients in general acute hospitals will have dementia (14).

The Oxford English dictionary defines dementia as 'a chronic or persistent disorder of the mental processes caused by brain disease or injury and marked by memory disorders, personality changes, and impaired reasoning'(15). The word itself is taken from Latin meaning of de- "without" and *ment* "mind" and the important thing to note is that it involves a serious loss of cognitive ability in a previously unimpaired person, beyond that would be seen in the normal ageing process. It is a syndrome rather than a disease which makes a definitive diagnosis more difficult to achieve, as it is based on a collection of signs and symptoms. These can include problems with memory, thinking, language, understanding and judgment. People with dementia can also have problems with inappropriate behavior, in controlling their emotions or they may become apathetic. Personality changes as well as delusions can also occur (16). There are four main types of dementia (Table 1), the most prevalent of which is Alzheimer's disease which accounts for around 50-60% of all diagnoses (12). Patients can also have a mixed dementia where they have characteristics of two of the main types (13). Other types of dementia also exist such as that associated with alcohol misuse, Huntington's disease, hydrocephalus and Creutzfeldt-Jakob disease but these are much less common (12, 13).

Dementia Type and UK prevalence	Pathophysiology	Symptoms and Characteristics of disease
Alzheimer's Disease (50-60%)	Still largely unknown. Thought to be related to a deficiency in acetylcholine but now linked with amyloid plaques and neurofibrillary tangles possibly related to a variation in the ApoE gene on chromosome 19.	Gradual loss in sense of time and place. Sufferers forget things they have just said or done, although memory from past events may remain clear. As the disease progresses sufferers find it increasingly difficult to perform simple tasks, including washing, eating and dressing without supervision. End stage disease often requires 24 hour care and can last for many years. Patients usually die of another cause such as infection or stroke rather than complications due to Alzheimer's disease.
Vascular (10-20 %%)	Caused by Insufficient blood supply to the brain leading to infarction, commonly stroke(s). Prevention may be possible by cardiovascular risk reduction strategies in earlier age.	Loss of short term memory, loss of sense of time, progressive decline in other abilities. Often either an abrupt onset or obvious neurological event that precedes the emergence of signs and symptoms. People often have a greater awareness of their disability than is seen in Alzheimer's disease. May be a relative preservation of personality but increased likelihood of problems with unpredictable behaviour or changeable emotions.
Lewy Body (10%)	A primary degenerative dementia like Alzheimer's disease	Characterised by fluctuating cognitive function.

	which is closely related to Parkinson's disease.	Visual hallucinations and features of Parkinson's Disease more common than memory decline. Sleep disorders common. Sensitive to antipsychotic medications due to association with Parkinson's disease leading to symptom exacerbation.
Fronto-temporal (includes Picks Disease) (5%)	Young onset dementia with a strong genetic link, with an autosomal dominant pattern of inheritance. Frontal temporal lobe degeneration.	Damage to the frontal lobe leads to personality changes. Poor interpersonal and personal conducts with loss of insight are common characteristics with an insidious onset and gradual decline.

Table 1. Dementia pathophysiology, symptoms and incidence (12, 13, 16-18)

Currently, there is no known cure for dementia and no pharmacotherapeutic agent with proven ability to halt disease progression (13). As such, management is centred on symptom control to improve quality of life. There are a multitude of symptoms that the dementia patient can exhibit. The most difficult ones to treat are generally those associated with aggressive behaviour and changes in personality, which are distressing both to the patient and those around them. These symptoms are collectively known as the 'behavioural and psychological symptoms of dementia' (BPSD), they are multifaceted and varied but generally occur in between 60-80% dementia sufferers at some point in their disease (Figure 1) (16, 19).

Behavioral and Psychological Symptoms of Dementia (BPSD)	
Behavioral Symptoms	**Psychological Symptoms**
Agitation	Anxiety
Aggression	Apathy
Cursing	Depression
Disinhibition	Delusions
Irritability	Euphoria
Restlessness	Hallucinations
Screaming	
Shadowing	
Wandering	

Figure 1. Behavioural and Psychological Symptoms of Dementia (13, 18, 20).

The pharmacotherapeutic agents prescribed to patients to manage these symptoms centre around two broad categories of drugs which aim to either manage symptoms or preserve cognitive function(1):

1. Acetylcholinesterase (AChE) inhibitors and N-Methyl-D-aspartate (NMDA) receptor antagonists in Alzheimer's Dementia
2. Antipsychotics and anxiolytics

AChE inhibitors and NDMA receptor antagonists are both currently recommended treatment options in the UK by the National Institute for Clinical Excellence (NICE) for the management of Alzheimer's dementia (21). Research into their effectiveness in other types of dementia is on-going (22), but as Alzheimer's disease is specifically associated with neurotransmitter depletion their benefit is thought to be the greatest in this type of dementia. As such they are only licensed and endorsed by NICE for use in these patients (21). The aim of therapy with AChE inhibitors is to preserve cognitive function by inhibiting the breakdown of acetylcholine which is a key neurotransmitter associated with memory. Depleted brain levels of acetylcholine are known to correlate closely with disease severity in Alzheimer's dementia (17). AChE inhibitors have no effect on lost cholinergic neurones and so have no overall effect on the progression of the disease but have demonstrated modest improvement in cognition and perception of symptom severity (23). Little clinical differences have been demonstrated between the three available agents (rivastigmine, galantamine and donepezil) and as such all are recommended by NICE if they are started by a specialist, reviewed regularly and evidence of benefit is seen (21, 23-27). The NMDA receptor antagonist memantine acts through the neurotransmitter glutamate which is associated with memory and learning. Currently, it is recommended by NICE for patients with moderate to

severe Alzheimer's disease although there is increasing evidence supporting its use in Lewy body associated disease (1, 21, 27).

Antipsychotic drugs act on monoamine receptors in the brain, blocking their effects and therefore impacting on mental and cognitive function. They are broadly classified as either first generation (or typical) or second generation (or atypical) agents, with the difference being the amount of selectivity demonstrated. The currently available antipsychotics available in the UK and the class in which they belong are shown in figure 2. Typical agents are characterised by strong and non-selective antagonism for the dopamine D2 receptors in both the cortical and striatal areas of the brain. As such they can cause a range of side effects. Haloperidol is the most commonly used agent in this group as it causes the least antimuscarinic and sedating side effects (2). However, it has more pronounced extrapyramidal side effects. In a report produced by The Medicines Healthcare Products regulatory authority (MHRA) on 14th April 2015 306, (13%) of the 2,424 adverse reactions to haloperidol were for dyskinesia's, dystonia's and movement disorders (28).These movement disorders are caused by the blockage of the dopamine receptor in the basal ganglia which leads to Parkinson's disease like symptoms such as slow movement, stiffness and tremor (1, 2).

Antipsychotic Medications	
Typical (First Generation agents)	**Atypical (Second Generation agents)**
Chlorpromazine	Amisulpiride
Flupentixol	Aripiprazole
Levomepromazine	Clozapine
Pimozide	Olanzapine
Pipotiazine	Quetiapine
Prochlorperazine	Risperidone
Promazine	
Haloperidol	
Zuclopenthixol	

Figure 2. Antipsychotic medications currently licensed for use in the UK (1)

Atypical agents have complex pharmacology, but all exhibit dopamine (D2) receptor blockade like the typical agents but with a lower affinity for the receptor. In addition to this lower D2 receptor affinity at therapeutic doses they also selectively antagonize mesolimbic D2 receptors more so than those in the nigrostriatum and prefrontal cortex. As a result side effects related to the nigrostriatal blockade such as the extrapyramidal symptoms and dystonia's occur less frequently.

In addition to dopamine D2 actions atypical antipsychotics are serotonin (5-HT) antagonists at the 5-HT2A subtype. This pharmacological effect mitigates the negative symptoms of schizophrenia by disinhibiting the dopamine in the nigrostriatum and prefrontal cortex (1-3). Patient response, as well as side effect profile varies significantly between the agents in this group and is an important consideration when selecting an agent for patient use. Commonly reported side effects include weight gain, type II diabetes, hyperlipidaemia, QT prolongation, myocarditis and sexual side effects.(1-3)

The 2009 Banerjee report made serious and damming claims about the use of antipsychotics in the dementia patient suggesting that up to 144,000 of the 180,000 antipsychotic prescriptions were inappropriate, and that by reducing the prescribing of these agents 1,800 deaths and 1,620 cerebrovascular events per year could be prevented (29). These facts were the subject of much media attention and brought dementia management to the forefront of the public domain (Figure 3) (30-33). However, the Banerjee report was not the first time that concerns surrounding the use of antipsychotics were documented. Apprehension regarding their use as chemical restraints in the elderly was first documented nearly thirty years ago, highlighting that this is not a newly identified problem (34). Despite these concerns, prevalence data suggests that the use of these agents is widespread both nationally and internationally (6).

Figure 3. Media headlines following the release of the Banerjee report in 2009.(30-33)

Antipsychotic prescribing in dementia is generally directed towards the management of agitation, aggression, hallucinations and delusions or any other BPSD symptoms causing distress to the patient or their family and friends (6). As Banerjee highlighted, research has shown an increase in morbidity and mortality with the use of both typical and atypical antipsychotics as they may worsen symptoms and increase the risk of stroke and early death (35, 36). It has been suggested that up to 21% of dementia sufferers will experience extrapyramidal side-effects when treated with typical antipsychotics (5, 37); other side-effects include sedation and anticholinergic effects (38). However, it is documented that a smaller incidence of these adverse effects are reported with the use of atypical in comparison to typical antipsychotics due to their pharmacological selectivity (3, 4). An antipsychotic in a dementia patient should only be prescribed following consideration of the causes of the disturbed behaviour and the benefits and risks of treatment (6, 13, 29, 38-44). Low doses should be trialled initially and only increased following assessment of response and the development of any adverse effects (1, 45). In the UK, risperidone is the only antipsychotic licensed for use in dementia and it is indicated for short term use (maximum of 6 weeks) in persistent aggression associated with Alzheimer's dementia with frequent and regular review (44). Despite this a wide range of antipsychotics are used off licence even though a large multicentre study concluded that the adverse effects of atypical antipsychotics (olanzapine, quetiapine and risperidone) outweigh their benefits in treating behavioural disturbances in Alzheimer's disease (46). The DART-AD trial in 2008 echoed these conclusions based on a study of chlorpromazine, haloperidol, risperidone, thioridazine and trifluperazine in Alzheimer's disease. This trial concluded that for most patients, stopping antipsychotic therapy has no overall detrimental effect on functional and cognitive status. Although value was seen in the most severe behavioural disturbances, any potential benefits must be weighed against the known risk of adverse effects. The follow-up study demonstrated a higher mortality rate in patients in which treatment was continued, providing further support for the recommendations of regular symptom review for continued need (27, 47).

Anxiolytics such as the benzodiazepines are an alternative treatment strategy for the management of behavioural problems, but their use is limited by the risk of dependence and of disinhibiting effects as well as evidence suggesting their association with increased risk of hip fractures due to sedation leading to falls (48). Adverse effects are more significant with increasing age due to pharmacokinetic changes effecting drug distribution, metabolism and excretion and as such drowsiness and respiratory depression can be significant. These agents have a use for the short term management of severe anxiety disorders or given on an as required basis for patients who have rare but significant episodes of agitation (1, 27).

In summary, there is evidence to support the use of antipsychotics and anxiolytics in dementia in a small patient population with severe and distressing symptoms, when prescribed by a specialist and benefit is assessed regularly. There is however still significant concern that these agents are over prescribed and that many vulnerable elderly patients are at risk of harm. As such antipsychotics use should only be prescribed under the recommendation of a specialist in the field of dementia who will review the effect on behavioural symptoms regularly to balance the risk with the benefit. It is possible that pharmacists, because they have information on the prescription of all medicines, could utilise the pharmacy computer system to ensure that patients prescribed these agents receive a timely review to ensure that their need is regularly assessed.

1.2 Prescribing in other Mental Health conditions

The adverse effect of antipsychotics in the elderly patient with dementia has been discussed, but they are not the only people who are prescribed antipsychotics. Antipsychotics have widespread use in prescribing for mental health conditions in calming disturbed patients, whatever the underlying pathology (2). Indications include schizophrenia, brain damage, mania, toxic delirium, agitated depression and severe anxiety (1). All of these conditions are associated with psychosis and as such a patient's ability to distinguish their own thoughts and ideas from reality. Schizophrenia is the most common, and is characterized by abnormal social behaviour and failure to understand what is real. Common symptoms include false beliefs, unclear or confused thinking, hearing voices, reduced social engagement and emotional expression, and a lack of motivation (49, 50).

Antipsychotics are commonly prescribed in patients with schizophrenia, with the aim being to improve social and cognitive function. Lifelong treatment is often required as antipsychotic drugs can relieve the positive symptoms of thought disorders, hallucinations and delusions and can prevent relapse (27). Less effect is usually seen on the negative symptoms of apathy and social with drawl. However, the significant side effect profile is the main reason for non-adherence to therapy and subsequent relapse (1, 27). In many patients, negative symptoms persist between episodes of treated positive symptoms, but earlier treatment of psychotic illness may protect against the development of negative symptoms over time (50). Patients with acute schizophrenia generally respond better than those with chronic symptoms. Long-term treatment of a patient with a definitive diagnosis of schizophrenia is usually required after the first episode of illness in order to prevent relapses (1, 27, 50). Doses that are effective in acute episodes should generally be continued as prophylaxis (1, 27). The prescribing of agents for the management of schizophrenia should occur by a specialist and therapy reviewed regularly by a community mental health team (49).

Antipsychotics are not the only medications prescribed for patients with mental health conditions. Mood stabilisers (lithium and valproic acid) are used in the management of bipolar disorder, this is a condition in which patients fluctuate between mania (the feeling of being very high or overactive) and depression (feeling low and lethargic) (51). Valproic acid is used for the treatment and prophylaxis of manic episodes associated with bipolar disorder and it is recommended that it is started and supervised by a specialist in mental health (1). Due to its high risk of teratogenicity it should not be used in female children, women of child bearing potential or in pregnancy unless there is no suitable alternative and the benefit is considered to outweigh the risk (1, 27). Its mechanism of action is unclear in bipolar disorder, but it is thought to be due to its effect on increasing the levels of gaba-aminobutyric acid (GABA) in the central nervous system (27).

Lithium salts are used in the prophylaxis and treatment of mania, hypomania and depression in bipolar disorder, and in the prophylaxis and treatment of recurrent unipolar depression. Lithium is also used as concomitant therapy with antidepressant medication in patients who have had an incomplete response to treatment for acute bipolar depression and to augment other antidepressants in patients with treatment-resistant depression although this use is unlicensed. It is also licensed for the treatment of aggressive or self-harming behaviour (1). Its mechanism of actions is largely unknown as it is widely distributed throughout the central nervous system, however it is thought to be related to a reduction in noradrenaline and an increase in serotonin synthesis (27). The decision to give prophylactic lithium requires specialist advice, and must be based on careful consideration of the likelihood of recurrence in the individual patient, and the benefit of treatment weighed against the risks. The full prophylactic effect of lithium may not occur for six to twelve months after the initiation of therapy (1, 27). Lithium's narrow therapeutic index means it can be difficult to determine a dose that balances therapeutic and toxic effects. Patients prescribed lithium should receive regular serum level tests and should monitor thyroid and renal function for abnormalities, as it interferes with the regulation of sodium and water levels in the body, and can cause dehydration (1, 27).

1.3 Reviewing Mental Health medication

All of the medications prescribed for mental health conditions are associated with negative as well as positive therapeutic effects and as such patients prescribed these agents should have regular assessment of both the benefit and the risk (24, 49, 52).

When reviewing medication, decisions to withdraw treatment will be influenced by multiple factors (53):

- Is the drug necessary?
- What are the risks and benefits of continuing the medication?
- Concerns regarding adherence
- Type of medication
- Adverse reactions
- Inadequate supervision
- Patient choice
- End of life planning

Any decision is complicated and multifactorial and as such is subject to professional interpretation. The increasing complexity of modern medicine, the wealth of evidence available, and sometimes conflicting advice can lead to uncertainty in even the most experienced prescriber.

Tools have been developed to ensure the quality and safety of prescribing in older people and to aid decision making as these are the patients that are considered to be at the greatest risk of adverse medication consequences, although the basic principles could be applied more widely. An example of one of these tools is 'The Screening Tool of Older Persons potentially inappropriate prescriptions' (STOPP)(54). This tool highlights 336 potentially inappropriate medicines for consideration of withdraw and a recommendation on why the prescribing practice is potentially inappropriate (54). In relation to antipsychotics the recommendations are that they should be stopped in the following circumstances (54):
- Long term (>1 month) use as hypnotics due to the risk of confusion, hypotension, extrapyramidal effects and falls
- Long term (>1 month) in patients with Parkinson's disease due to worsening of extrapyramidal symptoms
- If the patient has had a fall in the last 3 months as they may cause gait dyspraxia or Parkinson's disease.

The criteria outlined in the STOPP tool aligns with other evidence, suggesting that antipsychotics should not be used to treat mild to moderate psychotic symptoms, and that when a prescription is necessary this should be at a reduced dose and reviewed regularly (38, 53-56).

1.4 Improving the care of Patients Prescribed High-Risk Medications

The Banerjee report marked the start of a dementia revolution and attracted significant media and public interest. This resulted in a major drive from the National Health Service, the government, professional bodies, charities and patient groups to improve dementia care in the UK. On 9th June 2011 the Dementia Action Alliance, made up of 50 prominent health and social care organisations, called for all the prescription of antipsychotics to be reviewed by March 2012 and alternative treatment considered as outlined in the National Dementia Strategy (19, 42). The aim was to reduce morbidity and mortality in this patient population by setting clear, realistic, yet ambitious goals for the reduction in the use of antipsychotics (57, 58). The results of this prescribing review were published by the health and social care information centre in 2013 who concluded that the proportion of patients with dementia receiving treatment with an antipsychotic had declined from 17% in 2006 to 7% in 2011. This was a significant improvement demonstrating the positive results from the implemented policies. However, there were limitations as it only included 45.7% of general practitioners in England and only patients on the dementia register (40). There is a fear that cases may be hidden due to the under diagnosis of dementia and poor performing practices may not have been included in the study. A further concern is that there may be a sideways shift of prescribing antipsychotics in BPSD to alternative agents such as anxiolytics(6). The concerns raised regarding the management of patients with dementia was the start of a national and governmental review of mental health, and was followed in February 2014 with NICE Guidance on Psychosis and Schizophrenia in adults: treatment and management in adults. The main points were the formal acknowledgement of the side effect profile of these medicines and the need for regular and specialist review. Specific guidance on monitoring was provided to enable adverse effects like weight gain, cardiovascular effects and parkinsonian tremors to be recognised quickly so that therapy could be reviewed and changed as appropriate (49). This coincided with the NHS England call for improved medication safety in metal health announced in May 2014. The NHS England's National Clinical Director for Mental Health said: "We must make sure we tackle the higher levels of mortality and reduced life expectancy in patients with mental illness and we are committed to pushing mental health to the top of the NHS agenda."(59)

1.4.1 Psychiatric Liaison in the Acute Hospital: RAID

People with long-term physical illness are more likely to have a mental illness than a healthy member of the population, and as such the prevalence of mental health conditions within acute hospitals is high. The 2005 'Who Cares Wins' report by the Royal College of Psychiatrists states that a typical 500 bed district general hospital will admit 5,000 older people each year and 3,000 will suffer a mental disorder. On average older people will occupy 330 of the 500 beds at any one

time and 220 of these patients will have a mental disorder. This means that the acute hospital will have at least four times as many people with a mental disorder on its wards as the older people's mental health service has on theirs. Three disorders; depression, dementia and delirium will account for 80% of this mental disorder co-morbidity (14). Effective psychiatric liaison services within the acute hospital can therefore improve patient care (Figure 4)(14)

The Benefits of Liaison Psychiatry
Improve physical and mental health outcomes
Decrease length of stay
Reduce readmissions
Reduce healthcare costs for patients with unexplained symptoms
Reduce psychological distress

Figure 4. The benefits of Liaison Psychiatry (10)

The Rapid Assessment, Interface and Discharge (RAID) team is a liaison psychiatry team that was introduced at City Hospital, Birmingham in December 2009. RAID provides a rapid response, comprehensive mental health service to inpatients in an acute general hospital setting. This service is for all adults over the age of 16 using the hospital and is provided 24 hours a day, 7 days a week regardless of age, presenting complaint, time of presentation or severity of the condition. Patient access to the service is achieved by referral from health care professionals who identify patients with mental health needs. RAID responds to non-urgent referrals in a timely manner (85% of referrals seen within 24 hours), although when the service was introduced the average time lag from admission to hospital to RAID receiving a psychiatric referral from ward staff was 14.6 days, a delay which was thought to increase overall length of inpatient stay (10, 11). An independent review by the London School of Economics in 2011 reported that the introduction of RAID resulted in cost savings in the range of £3.4 -£9.5 million a year through improved diagnosis and treatment of psychiatric patients and reduced length of stay, particularly in the elderly (10). The additional cost of the RAID service in comparison to standard psychiatric services was estimated to be around £0.8million a year, however the review found incremental benefits in terms of reduced bed use to the value of £3.55million a year which implies a benefit to cost ratio of more than 4:1(10). This positive evidence supported the expansion of the RAID service across the Birmingham and Solihull region in April 2012, with variations on this model of liaison psychiatry being developed across the UK.

A published audit in 2011 analysed the prescribing of antipsychotics at City Hospital for one year using computerised pharmacy dispensing records (11). This identified that of the 432 patients

prescribed an antipsychotic during the time period only a third were seen by RAID during their hospital admission. No statistically significant difference was seen between patients who were seen by RAID and those who were not were not in either age or the number of antipsychotics prescribed. The study concluded that patients who might benefit from early referral to RAID were potentially being overlooked, and that the time to psychiatric referral from admission to hospital was sometimes delayed. It was subsequently proposed that the pharmacy computer system had the potential to aid the identification of patients taking antipsychotic medication, and that this information could be used to improve patient's access to the beneficial RAID service (11).

1.4.2. Hospital Pharmacy: Patient targeting and referrals?

The pharmacy computer system holds an extensive amount of data on the use of medication within the hospital and therefore has the potential to be used contemporaneously to identify and target patients according to their prescribed medication. It is common practice in secondary care to use data from the pharmacy computer for retrospective analysis on prescribing trends and expenditure but it is not currently used prospectively to identify patients and impact on management. If a system could be developed to identify patients prescribed a specific medication it would allow pharmacists with specialist knowledge to have a wider access to patients admitted to hospital with conditions within their area of expertise according to the prescription of an identified target medication. In relation to mental health there is the potential to determine whether real-time prescribing information provided to a psychiatric liaison pharmacist could improve patient's access to RAID. Patients could be identified according to the prescription of an antipsychotic, this information could be used by a pharmacist to review the patient and potentially refer them directly to psychiatric services if any concerns regarding antipsychotics were raised following medication review. It would be a different model to that operated currently whereby patients are reviewed by a pharmacist according to geographical location rather than clinical need, but could be an alternative approach for consideration as part of the continual evolving of the hospital pharmacist.

It is standard practice in secondary care for pharmacists to perform a patient-centred medication review. The documentation of an accurate pre-admission medication history is included in this review following guidance produced by NICE in 2007 which recommended that that pharmacists are involved in medicines reconciliation as soon as possible after a patients admission to hospital to reduce patient harm from medication errors and omissions (60). Medicines reconciliation is defined as the process of identifying an accurate list of a person's current medicines and comparing them with the current prescribed list, recognising any discrepancies and documenting any changes resulting in a complete list of medicines which is accurately communicated (60).

Establishing this information requires discussion with the patient and/or carer and checking primary care records (GP or community pharmacy) or past hospital admission and discharge letters. Access to information requires the pharmacist to telephone community pharmacies or access GP records using the summary care electronic health system (SCR). The SCR is how the NHS in England records information electronically to support patient care, as it is a copy of the key information from the GP records. It provides authorised healthcare professionals faster, secure access to essential clinical information (61). Obtaining information specific to mental health is often more difficult as antipsychotics are often prescribed by the community mental health team and will not always feature on the SCR, direct contact with the mental health team is often required to obtain key information.

Once the medicines are reconciled it important that they are reviewed. This medication review is one of the key roles of the pharmacist in the hospital setting and involves 'a structured, critical examination of a person's medicines with the objective of reaching an agreement with the person about treatment, optimising the impact of medicines, minimising the number of medication-related problems and reducing waste' (62). All inpatients are reviewed by a clinical pharmacist on a daily basis (Monday to Friday), recommendations relating to therapy are discussed with the patients' parent medical teams and documented in the patients notes for action and review as necessary. If the medical or nursing team feel that a specialist teams input is required to impact on recommendations a referral is generated. A referral is traditionally performed by a senior member of the patient's parent medical team to the consultant of the required specialist team who will then review the patient as necessary. Nurse driven referrals have been introduced in recent years in certain settings such as pain or diabetes, but no literature could be found documenting a formal pharmacist led referral system to a specialist team in the UK secondary care setting. A pharmacist could provide a formal referral as an extension of the medicines reconciliation process, this would be a new role but could be an exciting opportunity as part of a more advanced or extended role. As no evidence in the literature could be found surrounding pharmacists completing a referral it would be necessary for the pharmacist to make a decision based on their clinical expertise. If information on the decisions made and reasons for referral can be categorised then a generic profile could be developed that could be used by other pharmacists and more widely.

A review of the literature has found that there are currently no reports of pharmacists in secondary care completing a referral of a patient to a specialist medical team. If this model is tested then valuable information on this new pharmacy role could be obtained. However, in addition to the completion of the referral there is also the need for the pharmacist to document

any relevant information into the patients' medical notes. How information is shared within the hospital setting has changed in the last ten years, traditionally the patients notes were 'medical notes' whereby only the medical or surgical teams looking after the patients would document any information in the records. Information from other members of the multidisciplinary team were often recorded in a completely separate section or via *ad hoc* messages attached to medication charts, this caused problems with communication and was a potential source for error or confusion. To address this, a new system was introduced in 2007 in which all members of the multidisciplinary team document directly into the 'patients' notes so that a full and complete record was maintained (63). The Royal College of Physicians provides guidance on healthcare record standards and all entries made must adhere to these recommendations (64, 65). Pharmacists are already familiar with documenting information into the medical notes as part of the standard clinical pharmacy role where pharmacotherapeutic information such as medication choice or dose adjustment in renal impairment is documented as well as recommendations following the medicines reconciliation process. As such if an entry into the medical notes were to be required as part of the proposed referral service there would not be any training issues for pharmacists as part of this new initiative.

1.4.3 Community Pharmacy: Medication Use Reviews

The medication review service (MUR) was introduced in 2005 as the first advanced service for the community pharmacist. The aims of the service according to Direction 4(2) of The Pharmaceutical Services (Advanced and Enhanced Services) Directions 2013, is: "... with the patient's agreement, to improve the patient's knowledge and use of drugs by in particular (66):

  i.   establishing the patient's actual use, understanding and experience of taking drugs;
  ii.   identifying, discussing and assisting in the resolution of poor or ineffective use of drugs by the patient;
  iii. identifying side effects and drug interactions that may affect the patient's compliance with instructions given to them by a health care professional for the taking of drugs
  iv.   Improving clinical and cost effectiveness of drugs prescribed to patients, thereby reducing the wastage of such drugs."

The service has had numerous revisions since its introduction with the main ones being around how data is collected, and how specific patient groups can be targeted. The aim is to help community pharmacy demonstrate the benefits of the service to commissioners.

Patients are targeted for an MUR according to the medication that they are prescribed, in a similar way to that has been already suggested for the antipsychotics with the prescription being the driver for the review. However, antipsychotics don't feature as part of the list of 'high-risk'

medications that is provided which recommends a review in the following target patient groups (67):

1. Patients taking any of the following high risk medicines:
   - NSAIDs
   - Anticoagulants (including low molecular weight heparin)
   - Antiplatelets
   - Diuretics

2. Patients recently discharged from hospital who have had a change in medicines during their hospital stay

3. Patients with respiratory disease taking the following medicines for asthma or COPD:
   - Adrenoreceptor agonists
   - Antimuscarinic bronchodilators
   - Theophylline
   - Compound bronchodilator preparations
   - Corticosteroids
   - Cromoglicate and related therapy, leukotriene receptor antagonists and phosphodiesterase type-4 inhibitors

Although the concerns raised surrounding the prescribing of antipsychotics are not currently addressed in the MUR system, is can be seen how the two could ultimately relate. If a pharmacy referral system is implemented in hospital, and if this results in changes to medication then the success of this review could be monitored by the community pharmacist as part of this process as the patient will fall into category 2 of the target patients due to a recent hospital stay resulting in medication changes. This could be an example of how the hospital and community pharmacist could work together to improve patient outcomes and ensure medication appropriateness. In relation to mental health this would help to address the NHS England call for better medicines management in mental illness and the government call for action in dementia. It is an exciting opportunity that could help to better establish the pharmacist as an integral and essential part of the multidisciplinary health care team providing care for patients in hospital and the community.

In summary, over the last few years the healthcare environment has seen a great deal of change. As unsustainable costs persist, the NHS is more focussed on value and how health care professionals can work together to provide the best possible outcomes for patients. This research will consider the mental health patient and how the pharmacist could be involved in a new way of working that could lead to greater and timelier access to specialist services and help to support the NHS England call for better medicines management in mental health.

1.5 Aims

- To investigate whether a pharmacist can use real-time dispensing information to identify, review and refer patients to a psychiatric liaison team.
- To establish if a new pharmacy referral system could facilitate a reduction in the time from admission to referral to the psychiatric liaison team in addition to increasing the number of patients accessing the service.
- To explore the process of referrals to a psychiatric liaison team in an acute NHS Hospital Trust.

1.6 Objectives

1) To establish if pharmacists can use real time dispensing event data to identify hospital in-patients receiving treatment for a mental illness.
2) To investigate whether pharmacists can use real time dispensing data to locate, and subsequently review patients receiving pharmacotherapeutic treatment for mental illness.
3) To develop a referral system whereby pharmacists can refer patients to a liaison psychiatric team for inpatient review.
4) To critically evaluate the impact of a pharmacist referral system on the inappropriate prescribing of antipsychotics in patients with dementia admitted to City Hospital, Birmingham.
5) To evaluate what constitutes an appropriate referral. What information is required and which health care professionals are able to provide this information.

Chapter 2:
Methodology

Patient's with dementia and other mental health conditions are at risk of premature death, longer hospital stays and experiencing adverse events if they are prescribed antipsychotic medications (17, 19, 29, 42, 58). It is crucial that such patients receive regular specialist review to optimise therapy and prevent harm (19, 38, 44, 52, 68-70). At Birmingham City Hospital the Rapid Assessment and Discharge (RAID) Team provides mental health services to patients who are admitted to the hospital and are in need of review (10). Traditionally the chances of a patient being assessed by the RAID team relied strongly on referrals done by the medical or nursing teams. The aim of this research was to establish whether the introduction of a pharmacist referral process would improve access to RAID and as such patient outcomes.

2.1 The Pharmacist 'Intelligent' referral (PIR) system

A pharmacist 'intelligent' referral (PIR) system was introduced at City Hospital, in June 2012. The aim was to alter the way in which patients could access the hospitals Rapid Assessment Interface and Discharge (RAID) team. In addition to the conventional method of referrals whereby any patients experiencing symptoms related to mental health could be referred to the RAID team by the medical or nursing staff following completion and faxing of a referral document; a pharmacist was also able to complete the referral (Figure 5).
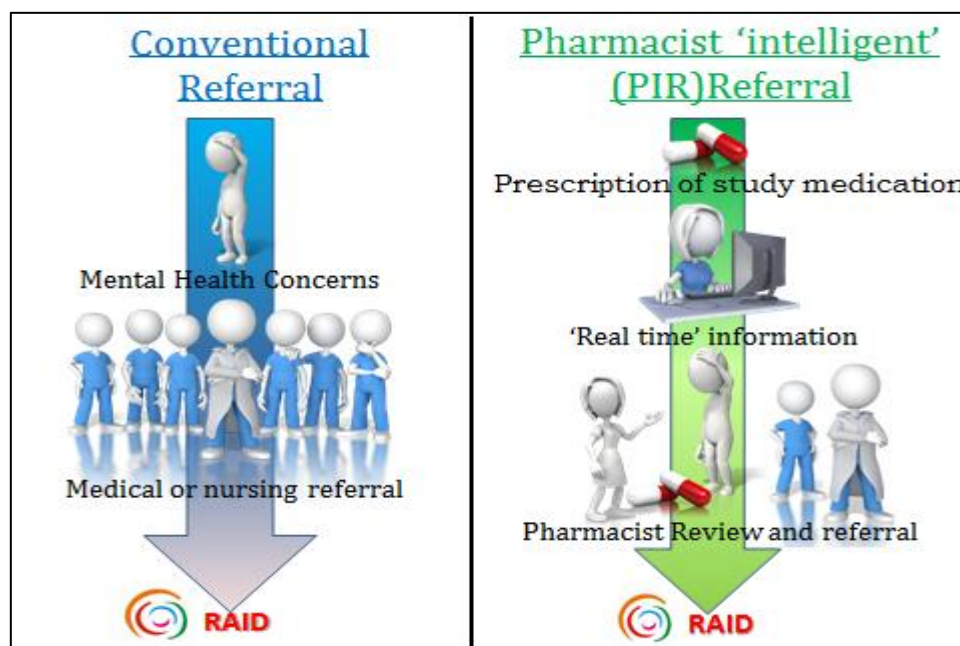
Figure 5. Conventional and Pharmacist 'intelligent' (PIR) referral process

The PIR referral service used 'real-time' dispensing information to identify patients in the hospital receiving psychiatric medication. This was achieved using an updated software package (JAC®) within the pharmacy dispensing system that allowed real time information to be retrieved and emailed to a secure NHS email account. The JAC® computer system automatically sent an email entitled 'RAID' alert (patient name, identifier, medication and location) to the designated NHS email account every time an antipsychotic, mood stabiliser or drug for dementia was dispensed in the hospitals pharmacy department. The ward based pharmacy team were also asked to page the specialist pharmacist if they encountered any patients who were self-medicating antipsychotics, as this would not be captured by the JAC® system. The need for this would be removed in hospitals which have e-prescribing, but as this was not currently implemented at City Hospital the additional step was required to help to ensure total capture of patients.

The specialist pharmacist checked the NHS email account every morning and lunchtime (Monday to Friday), and used the information to generate a list of patients to be seen that day. Any patients highlighted following a page from the ward pharmacy team were also added to the daily list. Once the list was generated the specialist pharmacist would go to the ward where each of the patients were located to review the clinical history. When in the ward environment hospital policies and procedures regarding infection control and patient confidentiality in addition to pharmacy guidelines on clinical ward services were adhered to at all times. Whilst on the ward the pharmacist completed medicines reconciliation if this had not already been done by the ward based pharmacy team. The detail surrounding the prescription of the antipsychotic, mood stabiliser or drug for dementia was established. This included:

1. Name, dose, strength and frequency of the antipsychotic, mood stabiliser or drug for dementia

2. Indication for the prescription and whether it was newly prescribed or a continuation of established treatment. If the medication was prescribed for a reason other than a mental health condition e.g.: levomepromazine in palliative care or chlorpromazine for hiccough then the patient was excluded from any further review

3. Prescribing clinician (acute medical team, RAID team or community mental health trust)

4. If a referral to the RAID team had already been generated by the medical or nursing staff – no further pharmacist input required.

5. Details of the patients community mental health team (CMHT) where applicable and when the patient was last reviewed

6. Information regarding the patient's usual mental health behaviour or symptoms so that any acute changes from baseline behaviour could be established.

7. Whether the patient's hospital admission could be related to their mental health condition or an adverse effect of any prescribed medication.

The clinical information was obtained by the specialist pharmacist using a number of different resources:

1. The patient or a relative/carer as applicable
2. The patient's medical notes from their current admission
3. The patient's GP either by a phone call or electronically accessed using Summary care records (SCR)®
4. Clinical letters giving information regarding previous admissions to the Trust, accessed electronically via the hospitals clinical data achieve (CDA ®)
5. A phone call to the patient's community psychiatric nurse (CPN) where this was provided by the patient and consent given.
6. The patient's community mental health records (RIO ®) could be accessed on request via the RAID team.

Once all of the clinical information regarding the patient's mental health history was established this was written in the patient's medical notes by the pharmacist if it was not already documented. If the pharmacist felt that psychiatric input was required, this was discussed with the patient and the medical team, consent gained, and a referral to RAID completed. Reasons for referral were expected to be:
- patient's prescribed antipsychotics for the treatment of behavioural symptoms of dementia who had not been reviewed recently by a psychiatrist to determine ongoing clinical need;
- patients experiencing adverse effects from their medication;
- patients displaying symptoms of uncontrolled mental health condition e.g.: challenging behaviour, psychosis, hallucinations;
- patient's prescribed antipsychotics, mood stabilisers or drugs for dementia who were not under current review by a community mental health team (CMHT).

The pharmacist completed the standard referral document as already in use by the medical and nursing teams (Appendix 1) when a referral was considered to be necessary. The standard from was used as:
- this would ensue that RAID received the relevant clinical information in the same format which would facilitate the processing and recording of the data;

- the form was used by RAID on a regional level and as such its use in this study would enable comparisons with services at other hospitals to be made and future recommendations to be implemented;
- it would allow future analysis on the quality of referral information received by different health care professionals to be reviewed retrospectively to assess the quality of a pharmacy written referral.

The referral document (appendix 1) provides the RAID team a basic background to the patient to facilitate prioritisation of workload and to establish the most suitable person from the team to conduct the initial assessment (psychiatric nurse, psychologist, doctor or consultant psychiatrist). Information required in the referral includes:

- patient details (name, date of birth, hospital number and location);
- reason for admission;
- physical condition and plan;
- medication;
- reason for referral to mental health;
- past psychiatric history and contact details;
- current mental state (behaviour, co-operation, speech, mood, cognition, confusion, hallucinations, delusions, paranoia or suicidal thoughts);
- any identified risks.

Upon receipt of the referral the RAID team review the referral for appropriateness. If accepted they would review the patient on the ward, this included gaining patient consent, and then conducting a psychiatric assessment.

Data receipt, collection and analysis met the Caldecott principles and was maintained securely as per hospital policy. Patient identifiable material was stored in a locked filing cabinet in the senior pharmacist office of City Hospital Pharmacy. Access to pharmacy was highly restricted due to the nature of medication and also confidential paperwork that is routinely stored within pharmacy. Restricted swipe access was required in working hours and key and alarm deactivation out of hours. Security was available 24 hours a day. Electronic data which was identifiable was maintained on a hospital desktop (located within pharmacy) which had extensive encryptions to enable computer log-in, and was backed up on a Trust approved encrypted memory stick.

2.2 Feasibility Study

2.2.1 Method

A feasibility study of the PIR process using antipsychotic medications (as listed in BNF chapter 4.2.1.) was conducted from June to August 2012. This aimed to gain a basic understanding on the newly implemented PIR process to see if it could be translated into daily practice. During review of the patient on the ward the specialist pharmacist collected the following data on a custom designed paper data collection tool (appendix 2): Data collection and analysis focussed on the key clinical information and decision processes required to drive a referral by a pharmacist:

- antipsychotic prescription details (name, form, strength, route of administration, dose);
- whether the patient had already been referred to RAID;
- the indication for the antipsychotic;
- details of the patients CMHT;
- if a referral to RAID was generated. When a referral was made:
  - whether it was accepted by the RAID team;
  - what the reason for referral was;
  - the time lapse from the patient's admission to hospital to referral to the RAID team;
  - the amount and method of communication that was required between the pharmacist and the RAID team.

The paper data collection tool was stored securely in a designated filing cabinet located within the pharmacy department to ensure patient confidentiality. Each patient was given a unique identification number, this number was used to file the data collection tool in sequential order. Where a referral was indicated a copy of the completed referral documentation was filed with the data collection tool. Data was entered into a custom designed electronic database in Microsoft Excel 2010 (Appendix 4) following patient review using the unique identification number. This ensured that the data was captured and entered electronically in a time efficient process for analysis. Data was analysed using Microsoft Excel 2010. Data collection and analysis met the Caldecott principles and was maintained securely as per hospital policy.

2.2.2 Results

In the 10 week time period, 140 individual alerts for the prescription of an antipsychotic drug (median =3/day) were received. One hundred and fifteen (82%) were from the pharmacy dispensing computer system, and 25 (18%) from the pharmacy ward team. Fifty seven (41%) alerts for levomepromazine in palliative care were excluded leaving 83 alerts in 58 individual

patients. Fifty one (89%) patients were reviewed, of which 16 (28%) were subsequently referred to RAID by the pharmacist. RAID had commenced the antipsychotic in 6 (20%) patients and 8 (27%) were referred by ward staff prior to the pharmacist's review. A variety of reasons for referral was found (Figure 6) in a diverse range of mental health conditions. Comments from RAID were positive (despite the increased workload) who not only accepted 100% of the referrals but also referred three patients to the Specialist pharmacist for advice for on-going pharmaceutical care.

Reasons for Pharmacist 'intelligent' referral to RAID Team
Indication for antipsychotic medicine unknown
Admission related to potential adverse effect of antipsychotic e.g.: fall, confusion, stroke
Patient experiencing an adverse reaction e.g.: dystonia
Patient with a dementia diagnosis prescribed an antipsychotic without evidence of a recent (<12 weeks) specialist mental health review
Inadequate treatment plan detailed

Figure 6. Reasons for Pharmacist referral to RAID team identified in the feasibility study.

Time from admission to hospital to PIR was a median of 4 days, demonstrating the potential of the computer system to be used in real time and the capacity of the specialist pharmacist to review and refer. RAID have the capability to receive referrals 24 hours a day, 7 days a week but an obvious limitation is that the same was not true for the specialist pharmacist. The number of patients seen by RAID was increased, but 48% (n=28) were not referred for psychiatric assessment, despite review. The main reason for this was that it was not clinically indicated (n=23); reasons for this decision included:

- antipsychotic medication appropriate (dose, choice and indication) with evidence of recent specialist mental health input and an unrelated hospital admission (n=12);
- patient documented by the medical team to be dying and on the hospitals 'End of life' care pathway (n=4);
- antipsychotic prescribed for an alternative indication e.g.: chlorpromazine for hiccough (n=7).

Six patients (10%) had their antipsychotic initiated by the RAID team during their hospital admission for which referral was not required. Five patients were alerted to the Specialist pharmacist from their discharge prescription due to admission prior to the new service and could not be reviewed.

2.2.3 Discussion and Conclusions

The key finding from the feasibility study was that the PIR could be done in an efficient and effective manner to improve patient access to the RAID team. Thirty (52%) patients prescribed antipsychotics were seen by RAID, this represented an 18% absolute increase from that seen in the previously published audit (11). The varied nature of the referrals demonstrated the ability of the specialist pharmacist to generate an 'intelligent' referral initiated by a computer, but driven by a comprehensive strategy of information gathering and sharing. This was also seen in the referrals with a suggested action discussed with the RAID team as part of personal referral or on-going discussions in the weekly meetings. This contrasts to the standard referral pathway whereby a faxed document is received in the RAID office.

The feasibility study highlighted the potential new role of the pharmacist and attracted interest from other health care professionals. This resulted in the specialist pharmacist being an invited speaker at an NHS innovations event, posters and talks at conferences and a publication in 'Clinical Pharmacist' with the Specialist pharmacist as the primary author (8). The concept was also highlighted in an article co-authored by the Specialist pharmacist in Ageing Health which discussed if the problem of antipsychotic prescribing in dementia was being solved (6).This facilitated the progression of the study and highlighted the need for more research into the role of the pharmacist as a referral provider and the real time use of the pharmacy computer system to identify patients according to prescribed medication.

To establish if this novel idea could be embedded into every day clinical pharmacy practice, further research into the following four key areas were identified, as the success seen in the pilot study was demonstrated with a small number of patients:

1. The ability of a pharmacist to use electronic information to identify, locate and subsequently review a patient prescribed medicines for mental health and the timescales involved.
2. The key information sources used to gain a full psychiatric history.
3. The clinical information that is required to complete a psychiatric referral.
4. The ability of a pharmacist to complete referral documentation.

Following the results of the feasibility study further research into the identified themes was approved by SWBH NHS Trust Clinical Effectiveness department who advised contact with the National Research Ethics Committee (NRES) to establish if full research ethics would be needed. NRES confirmed that full ethics approval would not be required as the research involved investigation of a newly implemented service for patient benefit. Ethics approval was also gained from Aston University Life and Health Sciences Research Committee.

Chapter 3:
An alternative approach to Clinical Pharmacy Services

3.1 Introduction

As clinical pharmacy develops pharmacists are becoming more specialised (71, 72). The prevailing model in the UK is that specialist pharmacists have their own caseload, working with particular clinics or wards according to geographical location (72-74). The feasibility study highlighted on a small scale how the newly developed pharmacist intelligent referral (PIR) process allowed a specialist pharmacist to review patients admitted to the hospital taking antipsychotic medications. This chapter aims to explore this further by undertaking a full study of the PIR process, investigating an alternative model of hospital pharmacy to establish if clinical pharmacy services could be targeted according to patient need rather than by physical ward location.

The prescribing of antipsychotics in dementia was the initial drive for this research and was focussed on in the feasibility study, however it was decided to be all inclusive as the risk of potential harm is associated with the drug itself and not just the indication. It was therefore decided that all patients prescribed antipsychotics, mood stabilisers and drugs for dementia should be reviewed to ensure the risk is appropriate against the benefits and to ensure all patients prescribed medications for mental health conditions had inpatient access to psychiatric services. The review of all mental health prescriptions was later recommended by NICE, with the introduction of stricter prescribing guidance on the use of antipsychotics in schizophrenia in 2014, in addition to those already in place for dementia (21, 49, 52).

3.2 Objectives

1. To determine the frequency of prescribing for antipsychotic medications within City Hospital, Birmingham.
2. To establish whether pharmacists can use real time dispensing event data to identify hospital in-patients receiving treatment for a mental illness.
3. To investigate whether pharmacists can use real time dispensing data to locate, and subsequently review patients receiving pharmacotherapeutic treatment for mental illness.

3.3 Method

Patients were identified and reviewed according to the PIR process described in Chapter 2 (Pharmacist Intelligent Referral System). This identified all patients within the hospital prescribed one of the study medications (antipsychotics, mood stabilisers and drugs for dementia as identified in BNF chapter 4.2). Prescriptions for levomepromazine were excluded as this was only prescribed for palliative care indications as per the hospitals end of life policy.

The Pharmacy Referral 'Data Collection Tool' (Appendix 3) was completed by the specialist pharmacist. This collected information on the type, name, strength and dose of the study medications that the patient was prescribed to determine prescribing event data and allow comparison to previously published prescribing data within the hospital. The indication for the prescription was also recorded to allow analysis on the reasons for the prescription within the hospitals patient population. The patient time course was also captured on this form to establish if the PIR referral lead to more timely access to the RAID team in comparison to the conventional referral system, and the time delay seen in each part of the PIR process:

- the time the patient was **admitted** to hospital;
- the time the alert was **sent** to the specialist pharmacist (this was the time the email was sent to the specialist pharmacist using the electronic system or the time the specialist pharmacist was paged by a pharmacy team member);
- the time the alert was **received** by the specialist pharmacist;
- the time the specialist pharmacist was able to **review** (and if appropriate refer) the patient in the clinical environment.

A unique identification number was given to each patient, this number was used to enable data sheets and information to be categorised and stored securely within the hospital pharmacy department. Data collection and analysis met the Caldecott principles and was maintained securely as per hospital policy. The paper data collection tool was stored securely in a designated filing cabinet located within the pharmacy department to ensure patient confidentiality. The unique identification number was used to file the data collection tool in sequential order. Data was entered into a custom designed electronic database in Microsoft Excel 2010 (Appendix 4) following patient review using the unique identification number. This ensured that the data was captured and entered electronically in a time efficient process for analysis. Data was analysed using Microsoft Excel 2010.

Retrospective prescribing data for antipsychotic medications within the hospital was obtained from the dispensing system JAC for the previous 5 years to allow analysis on prescribing trends.

3.4 Results

During the study period (17/09/2012 – 28/10/2013) the specialist pharmacist received alerts regarding 793 prescriptions for antipsychotics, mood stabilisers or dementia drugs (study medications). The 793 prescribing alerts corresponded to 688 individual alerts. Duplication of information occurred by two separate mechanisms:

1. The specialist pharmacist receiving both an email alert from the pharmacy computer system in addition to personal contact from a member of the pharmacy team

2. Two email alerts were received from the computer system when multiple strengths of the same item were dispensed by the pharmacy computer system for the same patient. An example of this would be a patient receiving 125mg quetiapine twice a day, although a single prescription this would generate two pharmacy dispensing incident alerts, one each for the 25mg and 100mg strengths of quetiapine.

The majority (630, 91%) of the alerts were generated via the automated computer email system, with the remainder (88, 9%) from members of the pharmacy team who contacted the specialist pharmacist directly.

3.4.1 Patient Population and Prescribing Trends

The alerts related to 426 hospital admissions in 385 individual patients. Just over half of the 385 patients (202, 52%) were female and 183 (48%) male (Table 2). A diverse range of ages was seen across both sexes that went from adolescence to centenarians, with an overall mean of 64 years (median = 66 years).

	No. of	Age (years)			
	patients	Mean	Median	Range	Standard Deviation
Male	183	62	62	18-112	19.8
Female	202	66	72	16-113	21.4
All Patients	385	64	66	16-113	20.7

Table 2. Demographic data on patients identified by the PIR process between 17/09/2012 – 28/10/2013

Most of the alerts related to a single hospital admission, but 24 patients had two admissions and 6 patients had more than 2 admissions during the study period (Table 3). One patient was well known to the mental health team as a frequent hospital attender, with medication alerts highlighting her 6 hospital admissions during the study period.

No. of Admissions	No. of Patients
1	355
2	24
3	3
4	0
5	2
6	1

Table 3. No. of admissions PIR identified patients had between 17/09/2012 – 28/10/2013

The majority of the alerts received related to the prescribing of an antipsychotic, which accounted for 80% of the total (Table 3). Most (n=523, 82%) of the antipsychotics prescribed were the newer second generation agents of which olanzapine, risperidone and quetiapine were the most common, accounting for 61% (n=393) of the total. Haloperidol was the most frequently prescribed first generation antipsychotic, and the 4th most prescribed agent overall (Table 4).

Medication	No. Alerts	% Alerts
Antipsychotics	**640**	**80.7%**
Amisulpiride	75	9.5%
Aripiprazole	48	6.1%
Chlorpromazine	18	2.3%
Clozapine	8	1%
Flupentixol	4	0.5%
Fluphenazine	5	0.6%
Haloperidol	65	8.2%
Olanzapine	114	14.4%
Pipothiazine	1	0.1%
Promazine	9	1.1%
Quetiapine	135	17.0%
Risperidone	144	18.2%
Trifluperazine	9	1.1%
Zuclopenthixol	5	0.6%
Mood Stabilisers	**91**	**11.5%**
Lithium	24	3.0%
Valproic Acid	67	8.4%

Medication	No. Alerts	% Alerts
Dementia Drugs	**62**	**7.8%**
Donepezil	31	3.9%
Galantamine	2	0.3%
Memantine	9	1.1%
Rivastigmine	20	2.5%

Table 4. Details on study medication generating an alert during 17/09/2012 – 28/10/2013

A reduction in the overall incidence of antipsychotic prescribing was seen in this study when compared to published data from previous studies and the computerised dispensing records of prescribing within the same hospital (Table 5) (11, 75).When prescribing data was annualised it could be seen that there had been a 23% reduction in the prescribing of antipsychotics within the hospital between 2008 and 2013. This equated to around 93 patients per year.

Time Period	No. of Prescriptions		No. of patients	
	Actual	Standardised (annual data)	Actual	Standardised (annual data)
01/11/2008 – 1/12/2009	1,078	996	432	399
01/12/2009 – 30/11/2010	1,013	1,015	407	408
10/05/2011 -27/06/2013	1,466	687	651	305
19/09/2012 -28/10/2013 (Study data)	640	578	339	306

Table 5. Prescribing trends in antipsychotics at City Hospital, between 01/11/2008 and 28/10/2013 (11, 75)

3.4.2 Prescribing Indications
A variety of indications for the study medications (antipsychotics, mood stabilisers and drugs for dementia) was found in the 385 patients. The primary indication is detailed in Table 6 as was documented in either the patients' medical notes or SWBH hospital electronic health records.

Indication	No. of patients	% Patients
Mental Health Indication		
Bipolar Disorder	37	9.6%
Delirium	6	1.6%
Dementia	109	28.3%
– Alzheimer's Disease	22	5.7%
– Parkinson's Dementia/Lewy Body	13	3.4%
– Vascular Dementia	59	15.3%
– Mixed pathology	14	3.6%
– Other dementia	1	0.3%
Depression	29	7.5%
Learning Difficulties	8	2.1%
Personality Disorder	15	3.9%
Psychosis	30	7.8%
Schizoaffective Disorder	4	1.0%
Schizophrenia	67	17.4%
Severe Anxiety	2	0.5%
Mental disturbances secondary to substance abuse	9	2.3%
Other Mental Health Indication	30	7.8%
Other		
Indication not known	25	7.0%
Use in other conditions	12	3.2%
– Hiccough	6	1.6%
– Palliative Care	6	1.6%
– Dizziness and vertigo	2	0.5%

Table 6. Primary indication for study medication generating an alert between 17/09/2012 – 28/10/2013

Schizophrenia and Dementia were the most prevalent conditions and accounted for nearly half of the total number of patients (46%). A small number of patients (n=12, 3%) were prescribed antipsychotic medications for other conditions and as such a mental health review was not required. Examples of this included the use of haloperidol in palliative care, chlorpromazine for hiccough and trifluperazine for dizziness and vertigo. In 27 patients (7%) the indication for the antipsychotic was not known, these were patients the specialist pharmacist was unable to review

in real time due to holiday, sickness, ward closure or early discharge. A retrospective review of the hospital discharge letter or electronic records did not establish the indication.

3.4.3 PIR System time course

Of the 688 prescribing alerts identified, 68 alerts (10%) were not received by the specialist pharmacist due to holiday (51, 7%) and sickness (17, 2%) and as such were not included in the further analysis. This resulted in 603 alerts in 358 patients for clinical pharmacy review by the specialist pharmacist. Of these potential patients, 81% (n=291) received a review by the specialist pharmacist in the ward environment. The most common reason for the specialist pharmacist not reviewing the patient was that they had already been discharged (n=56) or were in the process of being discharged at the time of receipt of the alert. Further review of these patients showed that 19 (32%) were admitted outside normal pharmacy working hours (after 5pm on Friday and before 9am on Monday) when only a limited clinical pharmacy service was available within the hospital. Other reasons for the specialist pharmacist not reviewing the patient included outpatient prescriptions for study medications (3 patients receiving study medications for palliative care indications) and 8 patients who were admitted to a ward that was closed due to an outbreak of norovirus and review prevented as per hospital policy.

The time calculations revealed that the specialist pharmacist was alerted to a patient a mean of 3.8 days (mean: 91 hours, SD: 216 hours, median: 32 hours) following their admission to hospital. This was calculated as the difference between the times the patient was admitted to hospital and when the alert was sent. Two patients who were admitted to hospital prior to the start of the study, information on these patients using the PIR was received 131 days and 61 days following their admission to hospital earlier in the year. These patients were removed from the time calculation data as only patients that were admitted to the hospital following the start of the study were considered to be representative of the new service. This resulted in a time delay of a mean of 3.2 days (mean: 78 hours, SD: 120hours, median: 32 hours) between a patients admission to hospital and an alert being sent to the specialist pharmacist. The large standard deviation can be explained by patients who were self-medicating and as such electronic information was not received. This improved as the process became more embedded, the ward teams realised the value of the referral process to facilitate mental health medication review and contacted the specialist pharmacist more promptly.

The second calculation was the time the specialist pharmacist received the alert as calculated as the time difference between the PIR process generating an alert (as defined as the time the automatic email alert was sent or the time a member of the pharmacy team contacted the

specialist pharmacist) and the time the specialist pharmacist viewed the alert on the computer system or answered the page. The time involved in this part of the system was found to be 1.1 days (mean: 26 hours, SD: 46 hours, median: 17 hours). Long delays were seen when the alert was sent to the pharmacist on a Friday, but the information was not received until the Monday.

The time taken from the specialist pharmacist receiving the alert to reviewing the patient in the ward environment was found to take a mean of 6 hours (SD: 35 hours, median: 2 hours). In total a lag time of 4.4 days (107 hours, SD: 110 hours) was found between a patients hospital admission to a clinical pharmacy ward review and potential referral. The range seen was wide as can be seen in chart 1 as it varied from 1 day (the shortest time was 5.5 hours) to 23 days.
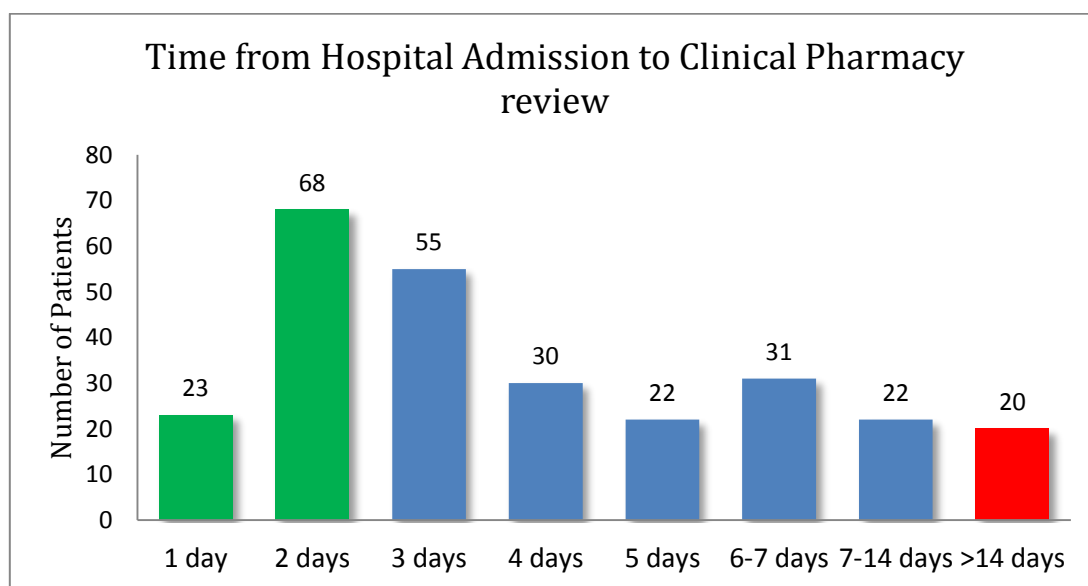
Chart 1. Time between admission to hospital to clinical pharmacy ward review for the PIR process between 17/09/2012 – 28/10/2013

3.5 Discussion

The PIR process successfully identified patients (n=385) within the hospital who were prescribed antipsychotics or mood stabilisers, and enabled a ward review by a specialist pharmacist in 81%. This was a novel use of pharmacy dispensing data which is traditionally used for retrospective analysis of prescribing trends rather than to influence patient care. The review of these patients followed a similar model to that already adopted by specialist medical teams who regularly review patients who are not located on their base ward, to ensure that these patient 'outliers' still have access to specialist medical care. A similar principle was adopted here with the specialist pharmacist seeing all of the patients on the designated dementia ward, and then using the

prescribing information from the PIR process to locate and subsequently review patients with mental health conditions in other ward areas.

The pattern of prescribing of antipsychotics was in line with expectation, the majority being for the newer atypical agents (olanzapine, risperidone and quetiapine) in a comparable proportion to that quoted by NHS England in their prescribing analysis information (76). It was however noted that there was a decline in the prescribing of antipsychotics seen in this study in comparison to previous published data from the hospital, with a 23% reduction (figure 4) seen between 2008 and 2014 (11, 75). The key factors relating to the decline in the prescribing of antipsychotics was thought to be a combination of the introduction of RAID in December 2009 and the change in guidance surrounding the use of antipsychotics in dementia following the 2009 Banerjee report (29). A selection of the older 'typical' agents were prescribed, the clinical appropriateness of these will be discussed in Chapter 4 when pharmacy referrals to a mental health team are considered in more detail.

A wide range of mental health indications requiring the prescription of an antipsychotic or mood stabiliser was seen, demonstrating the potential of medication to drive the identification of a wide variety of patients for potential referral to psychiatry. All of the patients prescribed these agents were at potential risk of harm and as such could value from specialist mental health input during their inpatient admission. If the information in tables 3 and 5 is compared, there seems to be an anomaly between indication and prescribing in the dementia patient population, with drugs specifically for dementia accounting for 7.8% of the prescriptions, despite the fact that patients with dementia accounted for 28% of the total patient population. This may suggest the over use of antipsychotics in these patients. Such a conclusion would be consistent with the known problems of excessive use of antipsychotic drugs in dementia patients as has been highlighted in the literature and discussed in chapter I (29, 40, 52, 58, 77, 78). The use of antipsychotics in dementia will be considered in chapter 5, when the prescribing patterns in dementia are analysed. The discrepancy is easy to see if the dementia prescribing is compared to patients with bipolar disorder, where the patient population and the prescribing of mood stabilisers were equivalent at around 10%.

The ability of the PIR system to generate medication alerts was found to be successful in its basic principles. As the identification process was built around a dispensing system the main limiting factor was the time between a patient's admission to hospital and the first dispensing of their medication with a mean delay of 3.2 days seen. This may at least partly be attributed to the processes involved in the generation of the alert as explained by the time between hospital

admission and the prescription of any necessary medication, and the pharmacy review of the paper medication chart. As technology within hospitals improves and processes become more streamlined and electronic there will be the opportunity to reduce the time delay that was seen here. The most obvious of these will be the wider introduction of electronic prescribing within hospitals; this was not available within the hospital in this study but implementation is planned for 2017. A study in 2013 reported that there was a 'patchy use of electronic prescribing in NHS hospitals' with a wide variety in the systems used and the areas of prescribing covered (79, 80). Of the 101 hospitals in England that took part in a survey about their current use of electronic prescribing, only one had a system that was used in all of its clinical areas, and only 12 using electronic prescribing in all of their adult medical and surgical wards (80). It is expected that the numbers will rise over the forthcoming years to align with the electronic prescribing that has been in place in GP practices for many years, with hospitals striving to achieve the aim of being entirely paperless by 2020 as recommended by the National Information Board (81). It would therefore seem an excellent time to provide evidence supporting the benefits of patient targeting according to prescribed medication, as the availability of this information should become easier and quicker with electronic prescribing. It is expected that if electronic prescribing were available as part of the PIR system the delay between admission and time to dispensing would be reduced as the information would be available much earlier in the admission clerking process. This is because it would be possible to have the generation of the prescription as the driver for the alert rather than the dispensing event data used here. In addition to reducing the time from admission to prescription data availability it would also ensure that all of the patients were captured as there would not be the need to rely on the pharmacy team to identify patients who were self-medicating their antipsychotics and as such not requiring dispensing via pharmacy.

The second time delay highlighted was that seen between the generation of the alert and its receipt by the specialist pharmacist, with a mean of 1.1 days found. The main reason for this was the availability of the specialist pharmacist, as the electronic part of the PIR system required viewing on an office based computer. An easy way of trying to reduce this delay would be the more widespread pharmacy introduction of smartphones or other handheld electronic devices which would enable the specialist pharmacist to have mobile access to emails (hence alerts) and as such be able to go from one ward location to another without returning to pharmacy to review potential email alerts. The final delay was that involved with the specialist pharmacist's availability to review the patient once the alert had been received. This was the smallest delay seen with a mean of 10 hours found. As the system relied on a single pharmacist working as a 0.5wte it was not always possible to review the patient at the time of receipt. This could be

improved by having better cover in the specialist pharmacist's absence with others in the team able to review patients according to clinical need.

Pharmacist availability could be considered a general limitation of the PIR process; this is an issue that is often raised in wider debates on access to the pharmacy team and the working week within the hospitals. The possibility of longer pharmacy opening hours is often discussed, with many of the larger trusts adopting pharmacy shift patterns to facilitate wider access to pharmaceutical care (82). Pressure from NHS managers in response to patient demand is likely to result in more hospital pharmacies adopting shift patterns to increase access to the care provided. In relation to this research, greater pharmacy staff availability would facilitate more patients being reviewed, and if combined with electronic prescribing and smart phones, targeted much earlier in their admission.

In total the PIR process had an average time delay of 4.4 days from admission to review in patients prescribed medications for mental health conditions. This compared favourably to published data which reported a mean of 14 days from hospital admission to medical referral to RAID (10, 11, 75). The PIR referral process was designed to target patients on medication for mental health conditions to improve access to liaison psychiatry service; however it is proposed that the generic principles of patient targeting according to prescribed medications could have a much wider impact in the hospital environment. The most obvious example of this is likely to be in antibiotic prescribing by facilitating the national recommendations surrounding antimicrobial stewardship (83). It is clear that the prescribing of antibiotics within secondary care is high, and much can be managed by the patients' medical or surgical teams following standardised guidance, with the ward pharmacist able to support and advise as per the traditional model of clinical pharmacy. However, an alert to a high-risk antibiotic such as daptomycin or co-trimoxazole to the antibiotic pharmacist to review the patient and liaise with microbiology as necessary would seem logical, and follows the principles of the system developed here. Antibiotic alerts have subsequently been adopted at the study hospital following the introduction of the PIR process to aid review of the use of antibiotics. A similar concept is used, with medication selected according to the principles of antibiotic stewardship to ensure appropriateness, facilitate intravenous to oral switching and to reduce the use of broad spectrum antibiotics due to their risk of *Clostridium difficile* infection.

3.6 Conclusion

Findings so far have demonstrated the feasibility of an alternative model for clinical pharmacy services, providing evidence to support the first two objectives of this research.

1. A specialist pharmacist was able to use real-time dispensing information to identify and review patients taking medications for mental health conditions.
2. The new pharmacy referral system facilitated a reduction in the time taken from the patient's admission to hospital to potential referral to the RAID team.

Pharmaceutical services were targeted according to clinical need driven by the prescription of a high-risk medication, rather than hospital geographic location. 81% of patients prescribed mental health medications were reviewed by the specialist pharmacist in a mean of 4.4 days following their admission demonstrating how a change to the patient identification process leads to more timely access to mental health services. Although, the model was demonstrated in mental health, it is felt that it could have a wider clinical use to target specialist pharmacist review according to the prescription of any high-risk medication, and has subsequently been introduced to facilitate antibiotic stewardship within the hospital.

The impact of the clinical pharmacy review undertaken in these patients will be investigated in Chapter 4 which considers the psychiatry referrals generated and the subsequent patient outcomes:

- to investigate whether a specialist pharmacist can use real-time dispensing information to identify, review and refer patients to a psychiatric liaison team;
- to establish if a new pharmacy referral system could facilitate a reduction in the time from admission to referral to the psychiatric liaison team in addition to increasing the number of patients accessing the service.

Chapter 4:
Pharmacist Referrals

4.1 Introduction

Mentally ill patients may need admission to general hospitals; however their ongoing treatment is often undertaken in institutions completely separate from the acute sector. Liaison psychiatry in an acute hospital has been shown to result in better patient outcomes and a reduction in their length of stay (10). Earlier research undertaken in the study hospital on access to the RAID team suggested that routine referrals between general medical and surgical teams and liaison psychiatry could take 14 days from hospital admission, and that only a third of patients prescribed medications for mental health considered were referred (10, 11). The research described in chapter 3 of this thesis demonstrated that the newly developed Pharmacist intelligent referral (PIR) process could identify patients taking medication for mental health in a more timely fashion. If this information is used by pharmacy to refer patients to the RAID team then more patients could have access to its proven benefits, and any patients inappropriately prescribed antipsychotics formally reviewed to prevent harm. This was a novel idea as there was no evidence in the literature to support the use of a pharmacist to generate a specialist medical referral, as traditionally referrals are only generated by the medical or nursing teams as was discussed in chapter I.

The aim of the next phase of this research was to establish if pharmacists could generate a referral to the RAID team, and to establish what the impact of this referral was. The study was planned in two phases, the first phase with the specialist pharmacist to establish the process and develop a referral pathway which would be tested with an alternative pharmacist in the second phase. This would provide evidence to establish if the PIR process could be implemented by any pharmacist following a generic set of principles. This would be an extended role of the clinical pharmacist but would be a way of achieving one of the NHS of health care professionals working together to provide the best possible outcomes for patients.

4.2 Objectives

1. To develop a referral pathway whereby pharmacists can refer patients to a liaison psychiatric team for inpatient review.

2. To establish if medication prescribed for mental health conditions can be used as a driver for referral.

4.3 Method

4.3.1 Phase I: Referrals

Patients were identified and reviewed according to the PIR process described in Chapter 2 (Pharmacist Intelligent Referral System). This identified all patients within the hospital prescribed one of the study medications (antipsychotics, mood stabilisers and drugs for dementia as identified in BNF chapter 4.2). Prescriptions for levomepromazine were excluded as this was prescribed for palliative care indications as per the hospitals end of life policy.

The Pharmacy Referral 'Data Collection Tool' (Appendix 3) was completed by the specialist pharmacist. This contained details on two of the identified key themes from the feasibility study that facilitated the referral process:

1. Clinical Information:
    - basic reason for the patients admission to hospital;
    - medication details (name, form, strength, route of administration, dose);
    - indication for medication;
    - details of the patients CMHT;

2. Referral Information:
    - if a referral was required, and if this had been done by the medical or nursing teams;
    - if a referral was made by the specialist pharmacist, what the reasons for this were. Reasons for referral following the feasibility study were expected to be:
        – the indication for the antipsychotic was unknown as documented in the medical notes and could not be clarified from the patient or GP surgery;
        – the hospital admission could potentially be due to an adverse effect of the antipsychotic e.g.: confusion/falls;
        – the patient was displaying symptoms associated with an adverse effect e.g.: Parkinson's type symptom;
        – a dementia patient was prescribed an antipsychotic;
        – there was inadequate information on suitable follow-up or recent antipsychotic review;
        – specialist mental health input was requested by the parent medical team;
        – patients who the Specialist pharmacists professional pharmacy judgement felt required an antipsychotic medication review.

If a referral was indicated based on the above criteria, consent was obtained from the medical team, an entry made in the medical notes and a referral generated. This was completed using the standard liaison psychiatry referral form (appendix 1). The original was filed into the patient's medical notes and a copy taken to give or fax to the RAID team to drive the review. A final copy was filed in pharmacy with the data collection tool for data analysis.

The number needed to refer (NNR) was retrospectively calculated to quantify the likelihood of a prescription for one of the study medications leading to a referral, and as such is a modified version of the number needed to treat (NNT). NNT is a clinical study statistic that is used to give a quantifiable measure of the impact of a medicine or therapy by estimating the number of patients that need to be treated in order to have an impact on one patient. The calculation of NNR here aimed to quantify how the pharmacist time spent identifying and conducting the review related to the positive outcomes associated with a referral.

Analysis of the referral decisions and the NNR would facilitate the generation of a generic pharmacy referral pathway that would be agreed with the psychiatric consultant and implemented within the hospital. The success of this new pathway could be investigated in phase II of this research when it was tested with an alternative pharmacist.

4.3.2 Phase II: A Pharmacy Referral Pathway

Patients were identified and reviewed according to the PIR process described in Chapter 2 (Pharmacist Intelligent Referral System) and phase I of this research. This identified all patients within the hospital prescribed one of the study medications (antipsychotics, mood stabilisers and drugs for dementia as identified in BNF chapter 4.2). Prescriptions for levomepromazine were excluded as this was prescribed for palliative care indications in accordance with the hospital's end of life policy.

In addition to the specialist pharmacist receiving email alerts and pages regarding the prescription of a study medication, these were also received by a band 7 (b7) pharmacist (with no prior experience in mental health) who was able to receive and act on the referrals (wte=0.2). The b7 pharmacist followed a pathway developed in this research to facilitate the referral decision making process. (Figure 7 and appendix 5). Demographic data on each of the patients reviewed by the b7 pharmacist was recorded on a custom datasheet (Appendix 6) to allow for

review of the protocol and the decisions made, this was an updated version of the datasheet used in phase I.

1. Clinical Information:
   - basic reason for the patients admission to hospital;
   - medication details (name, form, strength, route of administration, dose);
   - indication for medication;
   - details of the patients CMHT.
2. Information sources used to gain the clinical information
3. Referral Information:
   - if a referral was required or not;
   - details of the decision. Reasons for non-referral were included:
     - evidence found to clarify that the patient was under regular and active follow-up by a CMHT; the patient was stable and their admission was not related to either a mental health issue or medication; all clinical information in the patients notes already or clarified and documented by the b7 pharmacist;
     - the patient had already been referred to RAID by the medical or nursing teams.

Referral decisions were quantified for completeness to include full justification of why a referral was made, or if it was not considered necessary, what the reason for this was. This was expected to follow the guidance that was provided in the referral pathway. Feedback was obtained from the pharmacist on the referral process and the usefulness of the pathway in decision making. The hospital notes of all of the referred patients were reviewed by the specialist pharmacist to allow for assessment of choice made.

A unique identification number was given to every patient in phase I and II of this research, this number enabled information to be categorised and stored securely within the hospital pharmacy department. The data was collected in real time on the paper data collection tool as described, and was entered into a custom designed electronic database in Microsoft Excel 2010® (Appendix 4). Data collection and analysis met the Caldecott principles and was maintained securely as per hospital policy. Outcome data regarding inpatient mental health input and medication changes following referral was collected on each of the referred patients from three data sets:

1. Inpatient follow-up and review by the specialist pharmacist
2. Review of the patients hospital discharge letter (TTO). This was the letter that was generated by the medical team upon hospital discharge for the patients GP
3. Review of the Birmingham and Solihull Mental Health electronic patient records (RiO®) accessed via RAID.

Guidance on Pharmacist Review of Medication for Mental Health Conditions and referral to RAID

Patient Prescribed medication for mental health condition eg: antipsychotic or mood stabiliser

Medication history for mental health conditions confirmed and documented in the medical notes (if not completed already). Where possible include information on usual CMHT, CPN, diagnosis and information on recent review and planned follow-up (see information on sources)

Pharmacist completes a clinical medication review and assesses the patient for the need to refer to RAID

RAID Referral required?

YES → NO →

Reasons for RAID referral
- ✓ Evidence of challenging behavior or mental health issues requiring further support
- ✓ Admission related to adverse effect of medication (Box 1)
- ✓ Potential adverse reaction (Box 1)
- ✓ Dementia Patient without evidence of need (Box 2)
- ✓ Inadequate information on review or follow-up
- ✓ Request of medical or nursing team
- ✓ Pharmacist recommends a psychiatric review

Reasons for NOT referring to RAID
- ✓ Not needed – evidence of CMHT support, patient stable and admission not related to MH issues or medication. Information either in the notes already or clarified and documented by pharmacist.
- ✓ Patient already referred to RAID

Pharmacist discusses the recommendation of a RAID referral with the doctors/nurses/patient

Box 1: Adverse Effects of Antipsychotics
- ☐ Parkinsonism
- ☐ Falls
- ☐ Stroke/TIA
- ☐ Sedation/Confusion
- ☐ Cardiac arrhythmias
- ☐ Postural Hypotension
- ☐ Neuroleptic malignant syndrome (hyperthermia, fluctuating level of consciousness, muscle rigidity, tachycardia, sweating, labile BP and urinary incontinence)

Referral agreed?

YES → NO →

Discussions are documented in the medical notes and the RAID referral completed. This is faxed to RAID as standard process or given in person if discussion needed

If agreement to referral not obtained, the pharmacists recommendations are documented in the patients notes.

Box 2: Dementia
Antipsychotic drugs are known to be harmful and can have severe side effects. They should not be used routinely for dementia related psychosis and or behavioural disturbances (the only exception is risperidone which has a limited short-term indication for Alzheimer's). A person prescribed these drugs should be monitored for side effects and progression of symptoms. The elderly are at the highest risk of side effects and there is a small increased risk of death when used to treat dementia in this patient population due to cardiovascular and cerebrovascular risk.

All patients prescribed **antipsychotics for dementia** should receive an **inpatient RAID referral UNLESS** it can be confirmed that they are under **regular review** and follow-up by a community mental health team **AND** their admission is not related to a potential adverse effect of an antipsychotic.

Figure 7. Referral pathway developed following the results from the PIR process between 17/09/2012 – 28/10/2013 for use by the band 7 pharmacist in the second phase of this research.

4.4 Results

4.4.1 Phase I: Referrals

4.4.1.1 Reasons for referral

During the time frame 17/09/2012 to 28/10/2013, a total of 291 patients were reviewed by the specialist pharmacist following identification using the PIR process (Chart 2). The biggest challenged encountered was the availability of mental health information in the medical notes. Details on whether the patient was known to psychiatric services and information regarding baseline mental health was necessary to facilitate the identification of new symptoms and to establish when patients prescribed antipsychotics were last reviewed to ensure national recommendations were being followed. This information was not available in the medical notes. Clarification of the community mental health history using the RIO® computer system (accessed via one of the psychiatric nurses in the RAID team) was often required before any decision could be made. All new information was documented in the medical notes by the pharmacist so that it was readily available to all members of the multidisciplinary team involved in the patients hospital care.
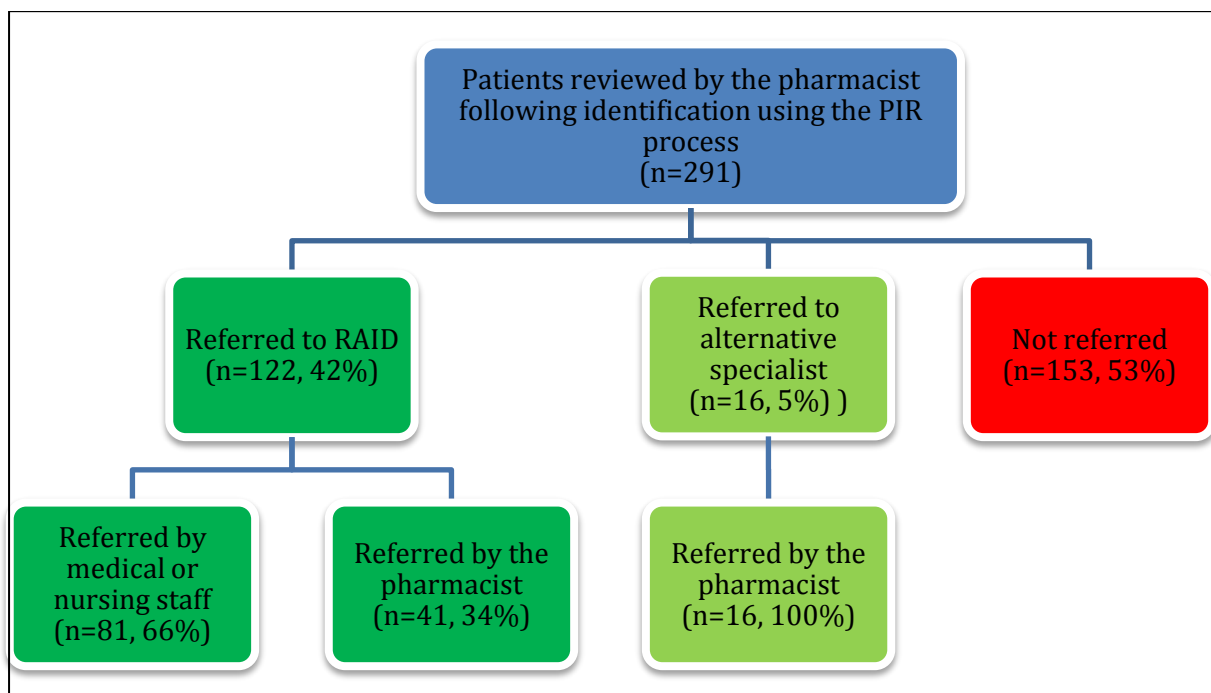
Chart 2. Referral decisions made by members of the multidisciplinary team between 17/09/2012 and 28/10/2013

The data in chart 2 highlights how a total of 122 patients (42%) were referred to the RAID team, of which just over a third (n=41, 34%) were made by the pharmacist. In addition to referrals to the RAID team, referrals to other appropriate practitioners were made; these included the patient's usual community mental health team (CMHT) (n=14) and the hospitals Parkinson's disease consultant (n=2) as was clinically appropriate. All of these referrals to alternative teams were made by the specialist pharmacist. This resulted in a total of 138 (47%) of patients receiving expert care during their admission. In the remaining patients (n=153, 58%) a decision was made by the specialist pharmacist not to refer the patient for mental health input, reasons for non-referral were found to be:

1. A referral was not needed (n=78, 27%). The patient was under a mental health team who prescribed the study medication, they were under active review and the admission was not related to either an adverse effect of the medication and no mental health concerns were noted by either the patient or the medical team. A psychiatric plan was documented in the medical notes.

2. A referral was not considered to be clinically appropriate (n=8, 3%). The patient was prescribed a study medication but was currently physically unwell and receiving end of life care. A mental health review was not considered to be appropriate.

3. The specialist pharmacist discussed the patient with the RAID (n=61, 21%) team or their CMHT (n=6, 2%). This was done to clarify their mental health history and current treatment plan as the information was not available in the patient's hospital admission notes. Updated clinical information was documented by the specialist pharmacist to ensure that the patient's community mental health treatment plan could continue during the hospital admission; thus avoiding a referral to the RAID team.

As the study progressed, referrals became a 2-way process with RAID referring patients (6, 4%) to the specialist pharmacist for advice and support when they were newly initiating medication.

The reasons for the different members of the multidisciplinary team making a referral is summarised in chart 3. For the medical and nursing staff the largest number of referrals were to made to obtain advice on behaviour and symptom management (n=52, 65%), more than half of which (28, 54%) were newly started on the study medication by RAID during the current hospital admission. These patients had been referred to RAID by medical or nursing staff for advice on the management of new symptoms or a new diagnosis. The second most common reason for medical referral (n= 11, 14%) was that the patient had been admitted with an overdose; a situation that generated an automatic referral to the RAID team according to the hospitals policy

on managing such patients. A total of seven patients (9%) were referred for advice on management due to a possible adverse effect of antipsychotics. These included three patients with new onset cardiovascular disease, three patients with confusion and one patient taking clozapine who suffered a reduced neutrophil count. A total of six patients (7%) were referred by the medical team in order to obtain additional information on the patient's diagnosis, medication or baseline behaviour so as to aid their diagnosis of an acute condition. The "other reasons" category shown in chart 3 included referral because of safeguarding concerns, capacity assessments and follow-up of patients transferred from a mental health bed into the acute general hospital.

Reasons for referral to RAID or other specialist made by different members of the multidisciplinary team

	Pharmacist	Doctor or Nurse	Total
Referral Related to Medication	37	7	44
Referral NOT related to medication	20	74	94
Total	57	81	138
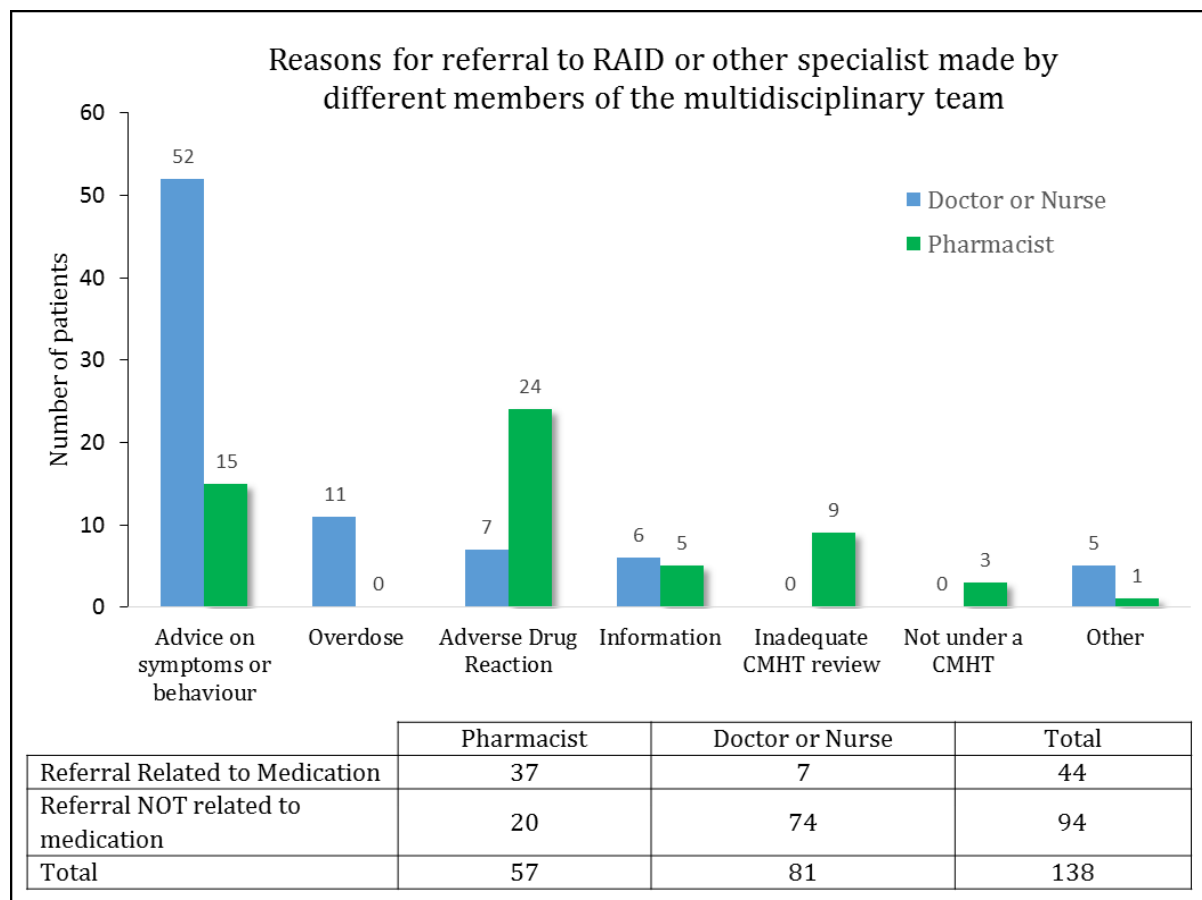
Chart 3. Reasons for referral to the RAID or other specialist team made by different members of the multidisciplinary team between 17/09/2012 and 28/10/2013

In comparison to the medical and nursing team, chart 3 highlights how most (n=37, 65%) of the specialist pharmacist referrals (n=57) centred on medication appropriateness and safety. Nearly half (24, 42%) were due to the patients admission potentially being related to an adverse effect (ADR) of their medication. The most common ADRs identified were falls in the elderly (n=8, 33%) and cardiovascular effects (n=7, 29%). Confusion or daytime drowsiness (n=4, 17%) and extrapyramidal side effects (n=2, 8%) were also identified as well as deranged blood results (n=2,

8%), a stroke (n=1, 4%) and potential neuroleptic malignant syndrome (n=1, 4%). To ensure medication appropriateness it is important that patients are reviewed regularly, inadequate follow-up, such as no recent or planned community mental health review, was a reason for pharmacy referral in nine patients (16%), with 4 of these being dementia patients who had not been reviewed in the last 12 weeks as is recommended by NICE. Like the medical and nursing staff, the pharmacist also made referrals based on symptoms (15, 26%) following a review of the patient's medical notes and a discussion with staff. Other reasons (n= 9, 16%) for pharmacy referral included patients who were not under a CMHT (n=3, 5%), where the specialist pharmacist felt there was an inadequate treatment plan detailed (n=5, 9%) or following liaison with the medical staff who had concerns regarding capacity (n=1, 2%).

If the types of referrals made by the different specialists are categorised more generally into those which were related to medication and those which were not, a comparison can be made between the reasons for the different health care professionals making a referral (chart 3). Most of the pharmacist referrals (n=37, 65%) were related to medication, whereas most of the referrals made by the medical or nursing teams were not (n=74, 79%). A Chi squared test of comparison between the two groups gives an X^2 result of 48.8 and a p value of <0.0001 confirming the statistical significance between the two groups and thus a difference in the reasons for referral made.

4.4.1.2 Medication as a driver for referral

Atypical antipsychotic prescriptions lead to the most referrals; they were also the most frequently prescribed of the study medicines (Table 7). The typical antipsychotics, although much less frequently prescribed, resulted in a quarter of the referrals, and drugs for dementia lead to the smallest number of referrals. The likelihood of a prescription for the medication leading to a referral was quantified as the number needed to refer (NNR), this was calculated as the number prescriptions needed to be reviewed by a pharmacist to generate one referral (table 7).

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Study Medication Class	Referrals n= 138	Prescriptions n = 793	Number needed to refer (NNR)
Atypical Antipsychotics	69 % (n=95)	66% (n=524)	5.5
Typical Antipsychotics	23% (n=32)	14% (n=116)	3.6
Drugs for Dementia	1% (n=1)	8% (n=62)	62
Mood stabilisers	7% (n=10)	11% (n=91)	9.1

Table 7. Classes of medication leading to a referral and number needed to refer (NNR) for medicines identified using the PIR process between 17/09/2012 and 28/10/2013

The NNR was the greatest for the drugs for dementia, and highlighted how one referral was made every 62 prescriptions, this was in contrast to the typical antipsychotics where a referral was made every 3.6 prescription reviews.

4.4.1.3 Outcomes of Referrals to RAID by the Specialist Pharmacist

A total of 57 patients were referred by the specialist pharmacist, of which 41 were to the RAID team in 39 patients (two patients were admitted twice during the study period and had a referral generated against each admission). The specialist pharmacist was able to complete the RAID referral documentation (appendix 1) successfully as all were accepted. The referrals resulted in a total of 122 ward based reviews by the RAID team, 26 (67%) patients were reviewed by the psychiatric consultant with the remaining being reviewed by another team member following discussion of the case in the daily multidisciplinary meeting. In total 27 patients (47%) had a full psychiatric assessment completed and documented as part of the review process.

Fifteen patients were referred over concerns regarding an adverse effect of medication. Following RAID review, 47% (n=7) had their antipsychotic stopped and alternative medication and management strategies suggested. Two patients had their dose reduced to facilitate reduction of side effects. Five patients continued with their antipsychotic following a risk and benefit assessment and the final patient died during their admission, this was an elderly lady with vascular dementia. In total 60% (n=9) of patients who were suffering an adverse effect of their medication had the medication stopped or modified following review. All patients referred due to symptomatic behaviour had a de-escalation and crisis strategy plan generated to assist ward staff with patient management as well as regular psychiatric reviews to monitor progress and provide further support as needed. Six of these patients also had their antipsychotic stopped following implementation of this advice due to the improvement seen in behavioural symptoms.

Following hospital discharge, the letters (TTO's) of the patients referred by the pharmacist (n=41) that were sent to the GP were reviewed to assess the information that was sent to primary care to aid in the ongoing management of the patient. Only a third (n=19) of the TTO's stated that the patient had received an inpatient psychiatric review, although a separate discharge letter from the RAID team was sent in 63% (n=26) of the referred patients. It is important to note that in 50% (n=13) of these patients the RAID letter may have been a surprise to the GP as there was no information on the TTO that a psychiatric assessment had been sought during the admission. A total of 7 patients (17%) patients did not have either a letter from RAID or information on the TTO surrounding the inpatient mental health review, this would have been particularly important as 4 of these patients had their antipsychotic stopped during their admission:

1. A schizophrenic lady admitted with a non ST segment elevation myocardial infarction (NSTEMI. Olanzapine was stopped by the RAID consultant following pharmacist referral as the patient was physically very unwell but mentally stable. Prior to admission, the patient had not been reviewed in the community for over a year so the consultant advised referral to the CMHT for review following discharge. This information was not communicated to the GP (other than that the Olanzapine was not prescribed on the discharge prescription). The psychiatric consultant did do a referral to the CMHT so the patient was followed up post-discharge.

2. A dementia patient suffering from Parkinson's disease who had been started on quetiapine by her GP because of symptom of shouting and delusions. The patient was admitted to hospital with seizures, drowsiness and atrial fibrillation. Amitriptyline and quetiapine were both stopped by RAID following review. Only the details of discontinuation of amitriptyline therapy were documented in the discharge letter and this had been done by the medical team prior to RAID review.

3. In one patient a full RAID primary care mental health assessment was conducted but this was not communicated by letter to the patient's GP. This was important as the assessment had led to quetiapine switching to olanzapine due to kinesias following inpatient review and RAID liaison with the patient's usual psychiatrist.

4. A patient with previous depression was prescribed dosulepin and quetiapine which were stopped on admission by the acute medical team due to atrial fibrillation and increasing confusion. Psychiatric assessment and discussion with the patient resulted in the decision to permanently discontinue both agents with review by the GP following discharge.

The results from the study on the types of patients to refer and the NNR facilitated the generation of a referral pathway that could be followed by alternative pharmacists. It provided advice on

which types of patients to refer and why (Figure 7 and appendix 5). The pathway was developed by the specialist pharmacist, agreed with the psychiatric consultant and implemented within the hospital.

4.4.2 Phase II: A Pharmacy Referral Pathway

4.4.2.1 The Pharmacy Referral Pathway

During the study period (01/11/2013 to 01/04/2014) 54 patients were reviewed by the band 7 (b7) pharmacist following an alert to the prescription of a study medication (Chart 4) and the referral pathway (Figure 7) followed.

The band 7 pharmacist reported that the core information available to a hospital pharmacist did not often provide the information that was needed to make the required decisions on the referral pathway. The clerking notes were commonly found to be lacking in basic information such as medication history; this could be established by the b7 pharmacist who had access to GP records via SCR ®. However, SCR® did not always include the detail on mental health medication prescribed by the mental health trust, and as such was often incomplete. Other information was harder to find, this included a definite mental health diagnosis, details on the patients mental health team and recent reviews as well as usual baseline behaviour to enable establish if a change in behaviour or symptoms was being seen. Communication with RAID was often required to facilitate access to the patient's community mental health records via the RIO® system to gain a more detailed history. Only after this information had been gained was it then possible for the b7 pharmacist to determine if a referral was necessary using the guidance provided in the flowchart (Figure 7).

A total of 14 patients (26%) were referred to RAID during the time period of which nearly all (n=12, 86%) were made by the b7 pharmacist. One patient was treatment naïve; a prescribing alert was generated when one of the study medications was newly started by the RAID team following a referral for advice on behaviour management. In addition to the referrals nearly half (n=24, 45%) of the patients had their management plan discussed with RAID by the b7 pharmacist as the information from the clerking notes and GP did not provide a clear mental health management plan to follow during the hospital admission. This resulted in 71% of patients receiving mental health input during their inpatient admission.

The Pharmacy Referral Pathway

Legend:
- Referred to RAID by b7 Pharmacist
- Referred to RAID by Medical or Nursing Team
- B7 pharmacist discussed the patient with RAID to clarify the psychiatric history and plan
- Referral not needed
- Referral not appropriate

Values shown: 12, 22%; 4%; 45%; 20%; 9%
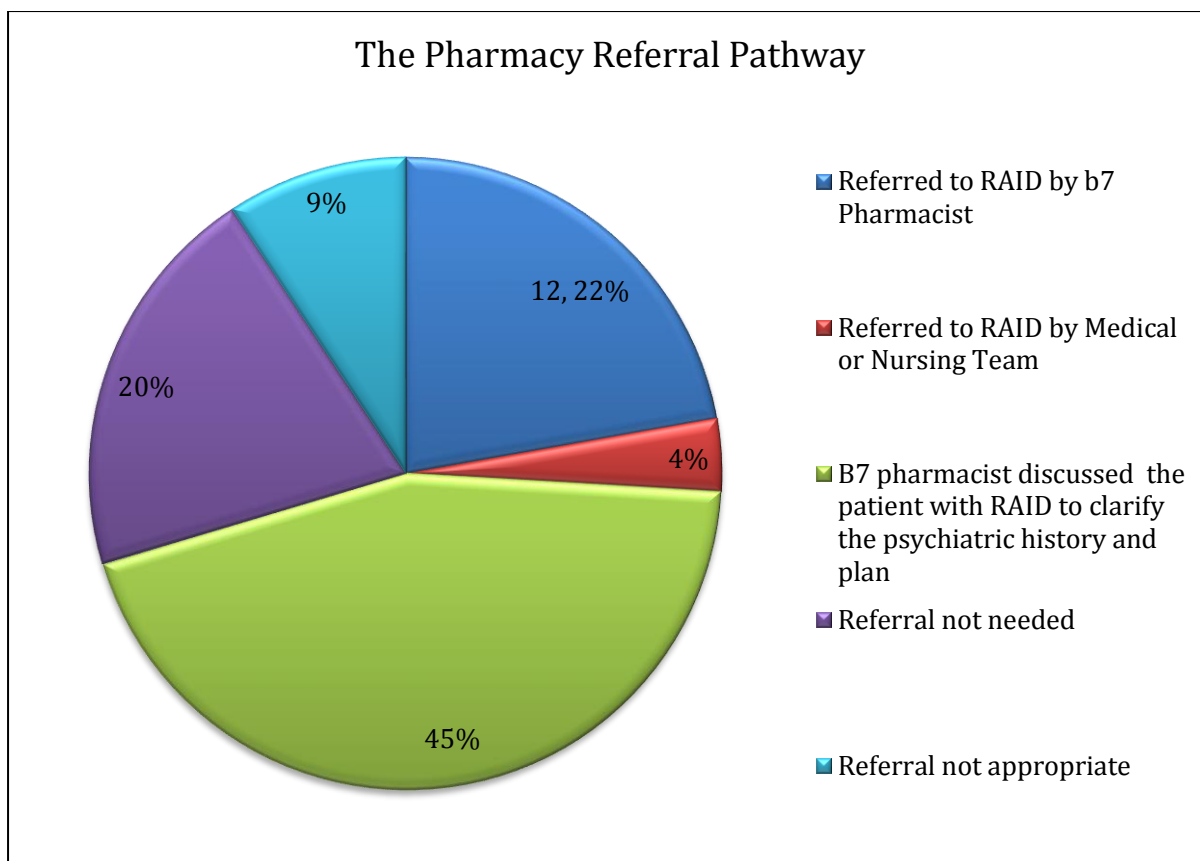
Chart 4. Decisions made by Band 7 pharmacist following the Pharmacy Referral Pathway between 01/11/2013 and 01/04/2014

Reasons for non-referral were as expected as the band 7 pharmacist followed the referral pathway (Figure 7):

1. A referral was not needed (n=11, 20%).
2. A referral was not appropriate (n=5, 9%).
3. The b7 pharmacist discussed the patient with the RAID or their CMHT (n=24, 44%).

4.4.2.2 Referrals made following the Pharmacist Referral Pathway

The b7 pharmacist was able to complete the referral documentation appropriately, as all were accepted by RAID. She initially reported to feel apprehensive about completing a referral as this was a new role and she had no experience in either mental health or referrals and as such a second opinion from the specialist pharmacist was sought for the first few patients. Confidence improved with practice and she quickly became familiar with the documentation and the team, making the decisions easier and the process more efficient. All decisions made were retrospectively reviewed by the specialist pharmacist who agreed with the choices made.

Reasons for the b7 pharmacist making a referral were as expected following those outlined in the pathway (see Figure 7, methods). Adverse drug reactions (n=6, 50%) were the most common

reason for referral, followed by patients who were not receiving adequate follow-up (n=5, 33%). Two patients (17%) were referred due to new onset of symptoms. This is compared with the reasons for pharmacist referral in phase I in table 8.

Reason for pharmacist referral	Specialist Pharmacist (n=57)	Band 7 Pharmacist (n=12)	Total (n=69)
ADR	24 (42%)	6 (50%)	30 (43%)
Inadequate follow-up	9 (16%)	4 (33%)	13 (19%)
Patient symptoms	15 (26%)	2 (17%)	17 (25%)
Other	9 (16%)	0	9 (13%)

Table 8. Reasons for pharmacist referrals in Phase I (17/09/2012-28/10/2013) and II (01/11/2013-01/04/2014)

4.4.2.3 Patient Outcomes following the pharmacy referral pathway

Twelve patients were referred to RAID for review by the band 7 pharmacist, of which six were referred due to concerns over an ADR. Following review by RAID the causative antipsychotic was stopped in one patient and reviewed in a further 2, the three remaining patients died during their hospital admission. Four patients were referred due to concerns regarding community follow-up and support (n=4) and symptoms of altered mental state or disturbed behaviour (n=2). Two of the patients referred over concerns regarding follow-up had no mental health diagnosis on their admission or GP notes (prescribed aripiprazole and pimozide respectively). Both patients had their antipsychotics stopped following mental health assessment, one died in hospital from urinary sepsis (the reason for admission) but the other had extensive inpatient behaviour management from RAID in discussion with the family (who were supportive of stopping the antipsychotic) and follow-up arranged post discharge. RAID arranged support from the CMHT following discharge in all 6 patients. Two patients were referred due to symptomatic behaviour. The first was a 65 year old female prescribed lithium for bipolar disorder having visual hallucinations, her lithium was found to be sub-therapeutic due to non-compliance with medication. RAID discussed the importance of medication compliance and arranged follow-up in the community. The other patient was a 74 year old male prescribed risperidone for schizophrenia, he had not been reviewed for 2 years and the ward nurses reported he was agitated and aggressive on the ward. RAID provided behaviour management advice and support whilst he was an inpatient, his aggression usually responded well to risperidone but his concurrent medical condition (epistaxis) was felt to be a factor in his worsening behaviour.

Communication with primary care on discharge continued to be a cause for concern as was observed in phase I. In total, 8 of the referred patients (4 patients died) who were discharged back into the community only one had both a RAID letter and details of the RAID review documented on the discharge paper work. Two patients just had a RAID letter and two just had details of the RAID review on the discharge letter. Three patients had neither a RAID letter nor details of the review on their discharge letter.

4.4.3 Total number of Referrals

During the time frame (17/09/2012-28/10/2013 and 01/11/2013-01/04/2014) a total of 345 patients were reviewed by the pharmacists, and 152 (44%) referrals made. This represents an 11% increase in the number of patients seen by psychiatry following the implementation of the pharmacist referral pathway (11). Nearly half of the referrals 69 (45%) were generated by a pharmacist (Table 9).

Study	Number of patients	Total number of referred patients	Patients referred by a pharmacist	Patients discussed with RAID by a pharmacist	Total patients receiving inpatient mental health input
I	291	138 (47%)	57 (20%)	67 (23%)	205 (70%)
II	54	14 (26%)	12 (22%)	24 (45%)	38 (70%)
Total	345	152 (44%)	69 (20%)	91 (26%)	243 (70%)

Table 9. Specialist mental health input seen following pharmacist review in Phase I (17/09/2012-28/10/2013) and Phase II (01/11/2013-01/04/2014)

In addition to the referrals, table 9 highlights how there were a total of 91 (26%) patients who, although not referred, had mental health input during their admission. These patients had their management plan informally discussed with RAID and documented in the notes by the pharmacists. This was not expected when the study was designed as it was anticipated that the decision by the pharmacist would be limited to one of refer or not. However, due to the pharmacist's regular interaction with the RAID team, and their attendance in the weekly multidisciplinary meeting and the information gathering required to make a referral decision it was often possible to address any issues and document a plan in the medical notes following a more informal discussion.

4.5 Discussion

The newly implemented PIR process resulted in increased patient access to the RAID team with both the specialist and the b7 pharmacist being successful in generating referrals. The initial drive was a computer generated alert to the prescription of one of the study medicines, but pharmaceutical knowledge was required to review the patient and make decisions on whether further psychiatric input was required.

When reviewing the patients on the ward, both of the pharmacists found that it was often difficult to make an informed referral decision due to limited information surrounding the patient's mental health condition being documented in the patients' medical notes. Reasons for this included the patients' inability to provide the detail as well as the information not being readily available from the GP surgery or electronic GP records that hospital pharmacists have access too. To complete the referral documentation effectively it was necessary to establish the indication for the medication and the details of their specialist mental health team (if they had one). Additional clinical information on their usual baseline behaviour was desirable to help to determine if a change had occurred, as this was likely to be a reason for referral. In relation to dementia, information on recent review was required to establish when the antipsychotic was prescribed and if the risk and the benefit had been reviewed in accordance with the NICE guidelines (52). To establish the missing information the pharmacists often needed to seek information from the liaison psychiatry team who could access the electronic mental health records (RiO®) for patients under the care of the local teams (Birmingham and Solihull Mental Health Trust, BSMHT). In addition to providing the pharmacists with information that would aid the referral decision, it also provided valuable clinical information that was subsequently documented in the patients' medical notes to aid continuity of care during the inpatient admission. This data gathering resulted in a significant number of patients not requiring a formal referral to be made to the RAID team as the pharmacists were able to document a mental health care plan in the medical notes for implementation during the hospital admission (Table 9). This was unexpected in the initial study design and will be explored in more detail in chapter 5.

The results from phase I confirmed the most likely reasons for referral, and facilitated the development of a pharmacy referral pathway 'flow chart' to be followed by the b7 pharmacist in phase II (Figure 7). These were:

1. Evidence of challenging behaviour or mental health symptoms requiring support and specialist input.
2. Patients admission potentially related to an adverse effect of one of the study medications

3. The prescription of an antipsychotic to a patient with dementia who did not have a clear indication for need.
4. Inadequate information on review by a community mental health team or recent follow-up
5. A mental health review was required as requested by the medical or nursing team or by the pharmacist according to professional judgement.

The b7 pharmacist was able to follow the pathway developed in this study flow-chart and made referrals accordingly. As a less experienced pharmacist she did not make any referrals that fell outside of the remit of the pathway.

The initial drive for this research centred on dementia patients and medication review as directed by the Banerjee report (29). However, all patients prescribed antipsychotics may be at risk and as such all were included in the study (1, 4, 38, 49, 52, 62). It was discovered very early on in phase I that this was the correct decision as was evidenced by a diverse range of clinical conditions that led the specialist pharmacist to generate a referral. This pattern of referral was continued in phase II by the b7 pharmacist who also referred patients with a variety of mental health conditions.

Referrals made by the pharmacists were different than those generated by medical and nursing staff whose focus was on symptoms and behaviour (Chart 2 and 3). Pharmacy referrals focussed on medication safety, highlighting patients who were suffering from adverse effects of medication, had an inadequate medication plan or had dementia and had not had their medication reviewed by a specialist in the previous 12 weeks in accordance with national recommendations. Potential adverse drug reactions were found to be the reason for 43% of all of the referrals made by the pharmacists, and were more commonly seen with the antipsychotics in comparison to the other medicines included in this study. It is well recognised that the side effect profile of the typical antipsychotics is less favourable than the newer agents, but that all antipsychotics have an extensive list of possible side effects that are to be monitored for (1, 84-88).

The atypical group of antipsychotics were implicated in most of the referrals. This was not unexpected as they were also the most frequently prescribed antipsychotics. It should, however, be noted that although the typical antipsychotics were much less frequently prescribed, they still accounted for a quarter of the referrals. The number needed to refer (NNR) calculated in table 8 helped to quantify this further as allowed for a comparison between prescription and referral rate. The NNR was the lowest for the typical antipsychotics at 3.6, highlighting how a referral was

made every 3.6 prescriptions; the NNR increased to 5.5 for the atypical antipsychotics. These differences align with information in the literature regarding side effect profile, as typical antipsychotics are more likely to be associated with adverse effects, something that was found to be a driving factor for referrals (1, 36, 38, 58). Of the adverse effects noted, falls were the most common. Although medication is not the only reason for the patient falling, a referral was generated if there was not an obvious organic precipitating factor, or there was a clear relationship between onset of medication and falls history. The complexity of these referrals demonstrate that although there are specific factors that can drive a referral, it is also essential that the complete history is reviewed and a clinical decision made. Cardiovascular effects were the second most common adverse effect accounting for pharmacist referrals and ranged from ventricular tachycardia and QT prolongation in a patient taking quetiapine to worsening heart failure in a patient recently started on risperidone as a trial for challenging behaviour. These two examples highlight the complex nature of referrals and how a comprehensive clinical thought process was required to establish cause and effect. It should also be noted at this point that although the ADR was the primary reason for the referral there was also other causes of concern in many of these patients. As many of the pharmacists referrals were generated by suspected adverse drug reactions (ADRs), this will be explored in more detail in chapter 7.

Drugs prescribed specifically for the treatment of dementia did not lead to many referrals, and had a NNR of 62. This can be explained by the appropriateness of prescribing, as according to NICE recommendations, the prescription of a drug specifically for dementia can only be initiated by a psychiatrist (21). On patient review it was found that patients admitted to hospital who had been prescribed a medication for dementia were already under close and active follow-up by a CMHT and did not often require referral (21, 43, 44).

The specialist pharmacist felt competent in her ability to adequately complete the referral documentation, this was confirmed by RAID who accepted 100% of the referrals. The b7 pharmacist was more apprehensive initially as making decisions and completing the referral was a new role, so support was sought from the specialist pharmacist for the first few patients. Confidence improved with time but this highlights how, if pharmacist referrals are to become more widespread, additional training will be required initially. Additional information on the quality of the specialist pharmacists referrals has subsequently been obtained in a published review of all referrals received by the RAID team (89). In this research, all the referrals received by RAID in a one month time period (01/08/2013-31/08/2013) were reviewed. During the study period ninety-six referrals were made from wards. The study found that although there was evidence of quality referrals seen, in many cases there was a deficiency of information recorded.

In particular, information surrounding medication, assessment of confusion and mental state was often limited making prioritisation of review and assignment of workload difficult. However, to support the PIR process being investigated here, the study found that "the most comprehensive referrals were from the pharmacist attached to the RAID team". (87)

Referrals generated by the pharmacists in this research helped to prevent patient harm. In total 69% of patients who were referred following a concern surrounding an adverse effect of medication had the offending treatment discontinued and alternative non-pharmacotherapeutic strategies started, or the dose reduced following a benefit vs harm assessment. De-escalation and crisis strategies to facilitate ward staff with patient management were always provided by RAID and following employment of this advice, six patients referred with behavioural issues had their antipsychotic discontinued. Conducting a review of medication in the elderly (>65 years) has been suggested in the literature as part of the STOPP criteria for medication appropriateness (54, 56). This is a tool that was developed by researchers in Belfast to help clinicians review the appropriateness of medication in the elderly to ensure the potential benefit from prescribing the drug outweighs any potential risk. In relation to antipsychotics the tool recommends review in the >65 years following a prescription of > 1month. However, in one study where the criteria was applied, the medical and surgical teams were often reluctant to stop specialist medication due to concerns about their ability to appropriately assess the risk and benefit (56). By referring patients directly to a psychiatrist, as was done in this research, the psychiatrist could formally assess the patient's mental status and establish whether there was a clinical need and so overcome the previously identified barrier. Performing medication reviews as was done with the mental health medication in this research, helps to support the recently introduced (2015) guidance by NICE on 'Medicines Optimisation – the safe and effective use of medicines to enable the best possible outcomes' (62). This new guidance looks at medication usage and safety and highlights how prescribing is on the increase, with the average number of prescription items per year for any one person in England increasing from 13 in 2003 to 19 in 2013. The NICE recommendations follow on from a report produced by Duerden, Avery and Payne in 2013: 'Polypharmacy and medicines optimisation-making it safe and sound' (73). The report discusses how polypharmacy was something to avoid if possible: that it may have a positive (appropriate) or negative (problematic) potential and as such reducing the number of medicines a person is taking may not be the only factor to consider when reviewing medication. The recommendations are that every time a medication is prescribed it should be ensured that the intended benefit of the medicines is being realised and that inadvertent harm has not been caused. The involvement of the appropriate medical team in a patient's care as demonstrated in this research with the acute and

psychiatric teams working together should ensure medication appropriateness as well as reducing the barriers between physical and mental health.

Incomplete discharge documentation regarding the psychiatric review following a referral was seen in both studies. This was of concern as it is imperative that when patients are transferring between care sectors the documentation is detailed and complete so that any changes to medication can be actioned in the community, and in the case of mental health behavioural management strategies are implemented (60). Further research into this is recommended.

4.6 Conclusion

In total 69 patients were referred to a mental health team by either the specialist pharmacist or the b7 pharmacist demonstrating the potential for this service and how the new PIR service has helped to improve patient access to mental health services. All patients reviewed by the pharmacists had their mental health medication reviewed for benefit vs risk and as such the NHS England call for better medicines management in mental illness and the government call for action in dementia was actioned (57, 59).

The pharmacists were able to identify which of the patients prescribed medications for mental health conditions would benefit from liaison psychiatry input. There was not one differential that lead to an automatic referral, however common issues were identified. Following identification, both pharmacists were able to complete the referral documentation with the required information to ensure the referral was accepted. No information was previously available on the ability of a pharmacist to formally refer patients to specialist teams using concerns over medication regimens as a driver for review. Although generalisability and reproducibility cannot be evidenced from studies involving only 2 pharmacists it is the start of an exciting venture into the advancing role of the pharmacist and how we can find an alternative role that will take pharmacy forward in the changing NHS. This would be an extended role of the clinical pharmacist but could be a way of evolving to support one of the NHS aims of health care professionals working together to provide the best possible outcomes for patients.

Access to information was found to be a problem, with both pharmacists often having to discuss the patient's case with the RAID team to facilitate a referral decision. This was because information regarding the patient's medication, diagnosis, follow-up and usual behaviour was not often available in the medical notes or via the electronic GP or hospital records. With advancing technology and computer system availability it seems a surprise that clinicians working in the NHS do not have access to all of the information required to successfully treat their patient's.

Concern regarding patient information continued on discharge with incomplete information often being sent to the GP. This must improve to ensure a smooth transition between secondary and primary care to prevent patient harm and reduce readmissions.

Chapter 5:
Information gathering
and Clinical Pharmacy Interventions

5.1 Introduction

Access to clinical information regarding current mental health diagnosis and management was an issue raised by both pharmacists in chapter 4 of this research. The pharmacists often needed to seek information from the RAID team to enable a decision to be made on whether a referral was needed as a review of the medical notes, hospital and GP records did not give them all the information they desired. This information gathering and the subsequent clinical decisions resulted in the pharmacists making 69 referrals from 345 identified patients. However, a further 91 patients had a mental health information and plan documented in the patients notes following the pharmacists liaison with psychiatry to facilitate the patients ongoing management during their hospital admission. As this additional clinical input was an unexpected in the initial study design it is desired to establish what this involved and why problems with access to information were encountered.

5.2 Objectives

- To determine the information sources used by the pharmacists to inform their referral decisions and how they can be accessed.
- To establish the type of information that was documented by the pharmacists into the patient's medical notes.
- To investigate any subsequent clinical pharmacy interventions following information gathering and documentation.

5.3 Method

All of the patients prescribed a study medication (antipsychotic, mood stabiliser or drug for dementia) during phase I and II of this research (17/09/2012 - 28/10/2013 and 01/11/2013 01/04/2014) who had their condition informally discussed with the RAID team and information documented in the medical notes by one of the pharmacists were included in this study.

To establish the reasons for the pharmacy documentation and any subsequent clinical interventions, patient information was reviewed on each of the patients from three data sets:

1. Records of inpatient reviews and data gathering done by the pharmacists (appendix 3 and 6) as part of this research.
2. Review of the SWBH discharge letter (TTO). This was the letter that was generated by the medical team upon hospital discharge for the patients GP.
3. Review of the Birmingham and Solihull Mental Health electronic patient records (RiO®) accessed via RAID.

The clinical data on all of the included patients was reviewed to establish what information was clarified by the pharmacist, the sources used to gain the information, and the reason it was not already available in the medical notes. Data was recorded and analysed in Microsoft Excel and included:

- Patient details: Age, sex
- Medication details: Name, strength, form, dose
- Reason for hospital admission and basic medical plan
- Mental health information: diagnosis and usual baseline behaviour
- Community mental health support: details of CMHT and follow-up plans

Details of any clinical pharmacy interventions as well as what additional information was recorded into the medical notes by the pharmacist was established to allow analysis of the value of the pharmacy input.

Data collection and analysis met the Caldecott principles and was maintained securely in accordance with hospital policy.

5.4 Results

A total of 345 patients were reviewed by a pharmacist during the study period (17/09/2012-28/10/2013 and 01/11/2013-01/04/2014), of which a quarter (n=91, 26%) had information documented into the medical notes by the pharmacists following discussion with RAID, but no referral was made.

5.4.1 Information gathering

The clinical information, and the justification for its need, that was documented by the pharmacists was found to be:

1. The name and contact details of the patient's community mental health team. This was required to establish whether the patient was under active review from a specialist in the community as is recommended in the NICE guidelines for dementia, schizophrenia and psychosis. (43, 49, 52)

2. The date when the last community mental health review occurred. This was required to determine whether the patient had recent follow-up to determine if their monitoring was in line with national recommendations (44, 49)

3. Indication for mental health medication prescription to establish clinical need and appropriateness.

4. Clinical information on usual baseline mental health status for example behaviour and symptoms. This allowed for identification of changes in behaviour from normal that might indicate the need for mental health review. This information was of particular importance for patients suffering from co-existing infection and concurrent delirium when there was likely to be a cross-over of symptoms.

5. Name, dose and formulation of any medication prescribed to ensure treatment could continue as was recommended by the specialists.

Obtaining this information was found to be challenging, as no single source was identified that provided all of this information (see table 10). There was also no single person who had access to all of the relevant sources (Table 11). The RAID team were able to electronically access patients' community mental health records using the RiO ® system if the patient was already engaged in community mental health services, this was not available to the acute medical team or the pharmacists managing the patients' hospital admission but contained valuable information on mental health diagnosis, reviews and plans for follow-up. The pharmacists were the only health care professionals who had access to the GP records (summary care records, SCR ®) which was where information on current prescribed medication could be found. This hospital clinical data archive (CDA ®) did often contain useful information, and was helpful if the patient had a recent admission to the hospital trust, but was heavily reliant on the individual doctor who completed the letter and generally didn't contain much information regarding mental health if this was not the primary reason for the admission.

Clinical Information Required	Hospital Medical notes	Hospital clinical data achieve (CDA®)	GP electronic records (Summary Care Records®)(61)	Community Mental Health Records (RiO®)
Mental Health Support Information				
Name of community psychiatric team (Consultant and CPN)	No	No	No	Yes
Contact details of community psychiatric team	No	No	No	Yes
Date of last psychiatric review	No	Possible if reviewed by RAID on a previous admission	No	Yes
Indication for mental health medication	Yes, but only if patient able to give accurate history	Possible if detailed history taken and documented in previous admission	No	Yes
Clinical information on usual baseline mental health status e.g.: symptoms and behavior	Only from patient as able at clerking.	Possible if information on behavior was documented on a previous admission	No	Yes
Current mental and physical health				
Clinical information on current mental health	Yes	No	No	No
Clinical information on current physical health	Yes	No	No	No
Medication Details				
Name, dose and formulation of prescribed medication	Yes, but only if patient able to recall accurately or has own supply present on admission	Yes if details found on previous admission and this was recent.	Only if prescribed by the GP and not the CMHT	Yes

Table 10. Sources and availability of clinical information needed to make a mental health referral decision identified in this research.

Health care professional access to information source	Hospital Medical notes	Hospital clinical data achieve (CDA)	GP electronic records (Summary Care Records®)	Community Mental Health Records (RiO®)
Medical Team	Yes	Yes	No	No
Nursing Staff	Yes	No	No	No
Pharmacists	Yes	Yes	Yes	No
RAID	Yes	Yes	No	Yes

Table 11. Details of the healthcare professionals that had access to the information sources identified that were required to make a referral decision.

The data in table 11 highlights how pharmacists and RAID had the widest access to information. By combining resources, a complete set of data was available and this enabled already planned mental health care plans to be continued whilst the patient was in hospital. As RAID liaised with the community mental health team this communication enabled them to be aware of the patient's hospital admission so that they could follow-up as appropriate after discharge.

All of the patients (n=91, 100%) who were informally discussed had the following information documented by the pharmacist following liaison with RAID as it was not available in the patients current hospital admission notes:

1. Details of the patients usual community mental health team: who their team was, details of the patients key worker and a contact telephone number

2. Information on recent review by the psychiatric team and plans for follow-up. This was found to be of particular importance for the patients with dementia who were prescribed antipsychotics to establish if they were being reviewed every 12 weeks as is recommended by the NICE dementia guidance as patients not adhering to this recommendation would require a RAID referral (52).

3. Information on the patient's usual baseline behaviour and cognitive function to enable identification of any changes in mental state.

In addition, 48% of patients (n=44) had such limited documentation that there was no diagnosis to justify the prescribing of any mental health medication, or the diagnosis stated in the medical notes was incomplete. A further 21% (n=19) patients had incomplete information documented regarding the mental health medication itself; examples of these are shown in figures 8 and 9 which show the entries made by the pharmacists into the patient's medical notes. These examples

highlight the information sources used to obtain the missing information as well as document a clear recommendations for the medical teams to action.

DATE	CLINICAL NOTES (each entry must be signed)
Date Time	Pharmacy

Re: Risperidone and confusion surrounding his dose (BD or OD?)

History confirmed with RAID and also information from …..care home. John has Lewy body dementia and lives in a specialist care home for dementia patients with challenging behaviour. He is known to be physically aggressive, have suicidal ideation and also persistent paranoia.

Risperidone dose confirmed with RAID and care home as 500mcg nocte. He is currently prescribed this BD, although I note that he has not received any medication for 2/7 and is awaiting SALT assessment. If an NG tube is passed I recommend Risperidone Liquid 500mcg NOCTE.

John is open to the CMHT (Consultant……) and was last seen by his CPN (Jane………, Tel: xxx xxxx) 2/52 ago who advised Risperidone to continue. This had previously been stopped but John's wife reported an increase in paranoia symptoms on discontinuation.

Recommend Risperidone 500mcg NOCTE as per CMHT. Refer to RAID if there are any problems associated with challenging behaviour following this being started. Previous RAID full MH assessment filed in the notes for your reference.

Julie Brooks
Pharmacist (bleep)

Figure 8. Example of an entry in the medical notes made by the specialist pharmacist.

DATE	CLINICAL NOTES (each entry must be signed)
Date Time	Pharmacy

Olive is known to XXXX Older Adults CMHT. She has a diagnosis of dementia and was last seen by Dr XXX (consultant psychiatrist) in August 2013. At this appointment her risperidone was reduced from 500micrograms OD to 250micrograms OD. Risperidone is prescribed to control auditory hallucinations associated with her dementia. She is also currently taking sertraline 100mg od for depression and anxiety disorder.

From her records it appears that Olive's risperidone and sertraline were accidently stopped during an admission to another hospital in december 2013. They were restarted by her GP in January following discharge and an increase in symptoms.

Review of Olive's drug chart highlights how only the sertraline is currently prescribed. I have discussed her case with RAID who recommend that her risperidone continues as recommended at a dose of 250micrograms daily until her planned follow-up appointment.

Suggest prescribe the risperidone as NOCTE as it can cause drowsiness, and sleep disturbances are noted in the clerking.

Kate Holland
Pharmacist (bleep)

Figure 9. Example of an entry in the medical notes made by the band 7 pharmacist.

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5.4.2 Clinical Pharmacy Interventions

In addition to the informal discussion providing information, there were also forty (43%) examples of how the information gathered was used by the pharmacists clinically to impact on patient care.

The most significant identifiable clinical pharmacy intervention surrounded the use of antipsychotics in patients with dementia. Early on in the research a patient with dementia was prescribed haloperidol for delirium (no doses had been given to the patient), this was changed to lorazepam following discussion between the pharmacist and the RAID consultant, and prompted a review of the hospitals prescribing policy for delirium. Only one further case of inappropriate prescribing of haloperidol for delirium was found after implementation of the new policy, this was stopped following discussion with the medical team and referral to the new policy. In total 7 patients had their antipsychotic stopped following a clinical pharmacy intervention in which the pharmacist liaised with RAID consultant and actioned the agreed plan with the medical team, details of which are shown in table 12. All of these interventions were made by the specialist pharmacist as in similar circumstances the band 7 pharmacist referred to RAID as per the subsequently agreed Pharmacy Referral Pathway.

Patient no.	Details of pharmacist's interventions on stopping antipsychotic medications in patients with dementia
16	93 year old lady with admitted following a fall, prescribed amisulpiride 25mg OD. No formal dementia diagnosis, confirmed with RAID that she was known to the CMHT in 2005 but no diagnosis was made and no follow-up planned. Discussed with RAID and medical team who agreed no clinical need and risk high due to fall and concurrent drowsiness. Medical team stopped amisulpiride and agreed to refer to RAID if any behavioural issues following its discontinuation (there weren't).
41	75 year old male with vascular dementia admitted from nursing home with rigidity. Prescribed quetiapine and had had RAID review previously who recommended stopping the quetiapine, this had not been actioned by his GP. Discussed with RAID consultant and medical team, quetiapine stopped and community follow-up booked. Medical team to refer to RAID for inpatient review if any behavioural issues requiring more urgent review. No referral was needed.

Patient no.	Details of pharmacist's interventions on stopping antipsychotic medications in patients with dementia
82	92 year old lady with delirium prescribed haloperidol prn. When she was reviewed her on the ward by the pharmacist she was settled. The pharmacist recommended that the haloperidol be stopped and that lorazepam be prescribed prn for agitation as recommended in the rapid tranquilisation policy which was written by RAID and pharmacy. Medical team to refer to RAID if any further management issues. No referral was needed.
92	85 year old male with vascular dementia who was well known to both RAID and CMHT. Admitted to hospital with a fall and prescribed risperidone. Had been recently seen by the CMHT who had recommended the GP reduce the risperidone from 1mg NOCTE to 0.5mg NOCTE for 4 weeks and then stop, they will then review. This had not been actioned by the GP so was actioned by the pharmacist following discussion with RAID and the medical team. Medical team to refer to RAID for inpatient review if any behavioural issues requiring more urgent review following risperidone reduction. No referral was needed.
156	85 year old lady admitted to hospital with a stroke prescribed risperidone. Review of community mental health records revealed that she was seen by her consultant in 2011 who recommended the GP stop the risperidone as she was asymptomatic and discharged her from psychiatric follow-up. This had never been actioned so was discussed with medical team who stopped the risperidone. Medical team to refer to RAID for inpatient review if any behavioural issues requiring more urgent review following risperidone reduction. No referral was needed.
223	87 year old lady with vascular dementia admitted with pneumonia and confusion. Prescribed risperidone by the GP. RAID records revealed that this was stopped by the CMHT in November 2012 but was subsequently restarted by the GP in January 2013. The medical team were already withholding the risperidone due to the drowsiness and confusion, recommended that it was stopped permanently as per previous advice. Refer to RAID as appropriate if physical health improves and there were any behavioural issues. No referral was needed.
311	85 year old man with Alzheimer's dementia who was admitted from his nursing home unwell and drowsy and with a significant decline in renal function. Prescribed risperidone for >1 year following a review in March 2012 when it

Patient no.	Details of pharmacist's interventions on stopping antipsychotic medications in patients with dementia
	was recommended for short term use following a community psychiatric review, but no follow-up planned. Patient very unwell, discussed with the medical team and recommended stopping the risperidone and referring to RAID if his condition improved. No referral was needed.

Table 12. Patients with a dementia diagnosis who had their antipsychotic medication stopped following clinical pharmacist intervention between 17/09/2012-28/10/2013 (n=7).

The other clinical pharmacy interventions made are summarised in chart 5. The most common one (n=12, 30%) was that regarding the dose of mental health medication, as following information gathering it was found that the currently prescribed medication was not as recommended by the psychiatric team. Another medication related intervention included dose adjustments to psychiatric medication to follow that already recommended by the community mental health team (CMHT) but had not yet been actioned by the patients GP (n=6, 15%). This included recommendations to increase doses to improve symptom control as well as lower doses to reduce the incidence of side effects. Alternative dosage forms (liquid risperidone and olanzapine velotabs) to facilitate safe medication administration in a patient with a swallowing difficulty and two patients with nasogastric tubes were also made (n=3, 7.5%).
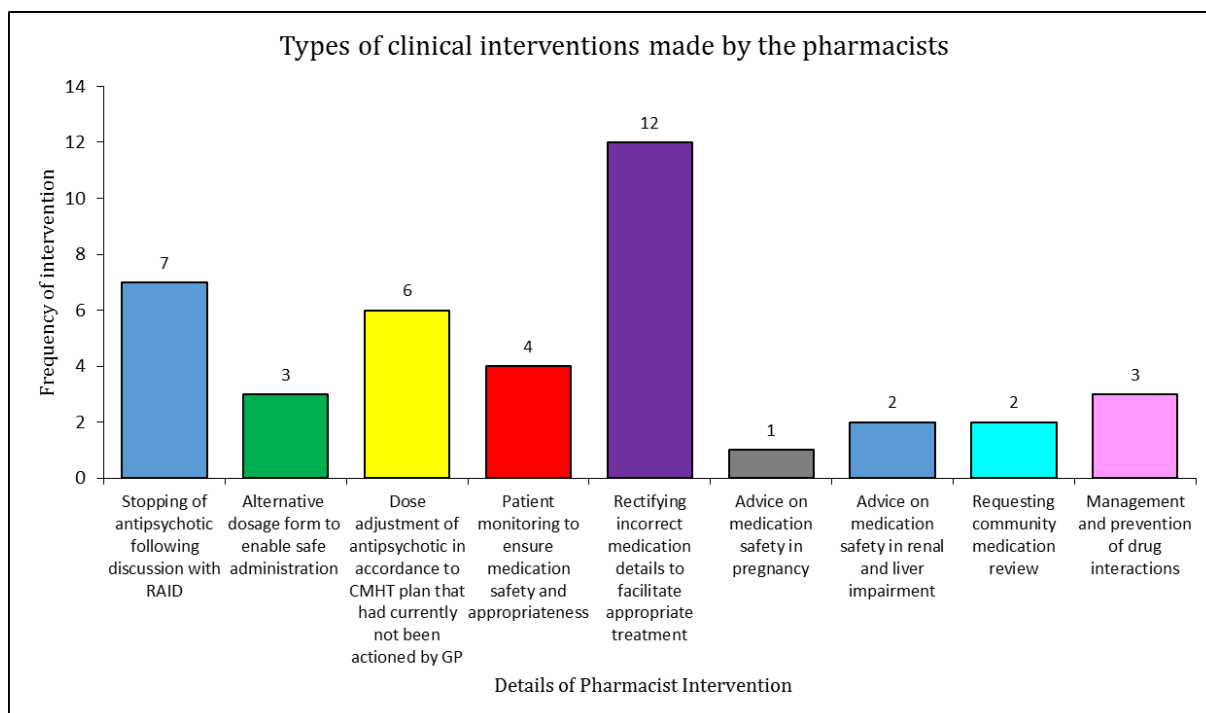
Chart 5. Types of clinical interventions made by the pharmacists

The management and prevention of drug interactions was also seen, with recommendations to avoid NSAIDs in post-operative surgical patients taking lithium (n=1) and the avoidance of clarithromycin for the treatment of pneumonia in patients taking antipsychotics (n=2). These patients were treated successfully with doxycycline following discussion with microbiology, who agreed the alternative to the hospitals standard regimen of benzylpenicillin and clarithromycin. Other medication safety interventions included ensuring appropriate therapeutic drug monitoring (n=4, 10%) in patients taking lithium and clozapine, and advice on medication safety in pregnancy (n=1, 2%) and when a change in renal of liver function occurred (n=2, 5%).

5.5 Discussion

In addition to the referrals made by the pharmacists following the newly implement PIR process, the results highlight the additional value that the pharmacists had on patient care. Two key areas were focussed on, that regarding information gathering and sharing and clinical pharmacy interventions.

Documentation of mental health information was a significant part of the pharmacists' involvement in patient care, additional information to that contained in the patient's medical notes was often needed by the pharmacists' to make a referral decision and to facilitate the continuation of an already developed plan whilst the patient was in hospital. Incomplete information was considered to be due to the variety of places in which information was stored, and the limitations on access to this information within this hospital. No single source containing the acute, chronic and psychiatric history was identified, and no single person had access to all of the places in which the information could be found. The pharmacists in this research became a link to information, by acting in a liaison role between the medical and psychiatric teams. Discussions with the RAID team enabled access to the patients' community psychiatry management plans which provided details of the patient's care team, diagnosis, medication, plans for follow-up and their usual mental status and cognitive function. This information was not available to the acute hospital medical team, but helped to ensure that psychiatric management plans were continued and changes in behaviour or cognition could be identified. By discussing the patient with the RAID team the pharmacists were able to document the community mental health information and recommendations into the patient's medical notes to ensure a continuity of care. RAID would update the electronic community mental health records (Rio®) so that the patient's community team were aware of the hospital admission and could follow-up accordingly on discharge. If any interventions were made regarding medication, this could also be communicated here to allow continuation of plans and follow-up.

One of the initial aims of this research was to prevent the inappropriate prescribing of antipsychotics in the elderly, particularly those with dementia as has been discussed extensively in the literature (1, 29, 33, 36, 37, 47, 58, 70). It was initially thought that all patients prescribed these agents would require referral to RAID, however table 14 highlights how the specialist pharmacist discussed some cases with the RAID consultant and actioned decisions regarding the antipsychotic. The specialist pharmacist, who in this capacity was working as part of the wider multidisciplinary psychiatric liaison team, always documented the advice to contact RAID if there were any negative effects experienced following discontinuation. No discussions of this type were noted by the band 7 pharmacist who in situations similar to this referred the patient to RAID as per the subsequently implemented pharmacy referral pathway (appendix 5).

Other interventions found were considered to be representative of ward based clinical pharmacy services. Recommendations were made to the medical team regarding monitoring response and appropriateness of prescribed therapy as well as the management and avoidance of drug interactions. Changes to prescriptions to ensure the patient received medication as recommended by psychiatry was common, highlighting the value of pharmacists in performing medicines optimisation in ensuring a full medication history is obtained and that any unintentional errors or omissions are rectified. In relation to mental health, unintentional errors could lead to worsening of psychiatric control if medication is missed or doses are too small, or increased side effects if prescribed doses too large.

The prescription of haloperidol for delirium was something that arose in a discussion with RAID following its prescribing in a patient early on in this research. A new hospital guideline was developed, this was a collaboration between pharmacy, the acute hospital trust, RAID and the tertiary mental health trust. It aimed to provide a more consistent approach to care and is an example of how policy was effected by this research. The guideline recommended non-pharmacological de-escalation strategies and low dose lorazepam if required, with the direction to refer directly to RAID if this was unsuccessful for further guidance on prescribing. Following implementation of this guideline in 2014 only one patient was prescribed haloperidol for this indication. This was stopped following referral to the new policy and occurred not long after its introduction and as such the medical team involved were not aware of the change.

The recommendations described in this chapter demonstrate how pharmacist discussions with the psychiatric team can result in clinical interventions that can improve patient care. Although the research done in this study is small and is only looking at mental health, it does provide case

examples to support that already in the literature on the important role of the hospital clinical pharmacist (74, 90-92).

5.6 Conclusions

No single health care practitioner was identified who had access to all of the information required to manage patients prescribed medications for mental health conditions in the acute trust, and as such incomplete information was often found. This included information on mental state, diagnosis, community psychiatrist, recent reviews, planned appointments and medication. These were considered to be essential to ensure continuation of already established care pathways as patients cross care sectors. A complete history could also facilitate the identification of any changes in symptoms or behaviour which would indicate a loss of control, as well help to highlight any possible medication related harm.

When incomplete information regarding mental health was encountered (26%, n=91) it was provided by the pharmacists following a review of the patient case, hospital and GP records and liaison with RAID, highlighting an additional value of the PIR system. If the NHS call for better medicines support in patients with mental illness is to be addressed this must change, health care professionals working with these patients must have access to their mental health history (19, 43, 44, 49).

In addition to being an information provider it was found that in 43% (n=40) of the patients discussed with RAID, the pharmacists were making further recommendations, working as part of the RAID team to impact on patient care. Dosage adjustments in renal and liver disease, therapeutic drug monitoring and the management and prevention of drug interactions were examples of some of the clinical interventions seen. This provides evidence on the contribution to care that clinical pharmacists have in the inpatient setting, and the value of pharmacists as part of the multidisciplinary team.

Chapter 6:
Dementia

6.1   Introduction

The number of patients being diagnosed with dementia is ever increasing, it was estimated in 2015 that 850,000 people were living with dementia in the UK (12). Costs are currently estimated to be £26 billion a year in the UK, highlighting the significant financial burden on the NHS from this patient population (78).

The 2009 Banerjee report made serious and damming claims about the use of antipsychotics in patients with dementia, suggesting that up to 144,000 of the 180,000 prescriptions were inappropriate and that by reducing their prescribing 1,800 deaths and 1,620 cerebrovascular events per year could be prevented (29). This report formed the basis of new guidance regarding the prescribing of antipsychotics and the recommendation that an antipsychotic should only be prescribed for a dementia patient following consideration of the causes of the disturbed behaviour and the benefits and risks of treatment (6, 13, 29, 38-44). The NICE guidelines on dementia recommend that people with dementia who develop non-cognitive symptoms that cause them significant distress or who develop behaviour that challenges should be offered an assessment at an early opportunity to establish likely factors that may generate, aggravate or improve such behaviour (52). In relation to antipsychotics, NICE recommend the identification and review of people who have dementia and who are prescribed antipsychotics, with the purpose of understanding why they have been prescribed. In consultation with the person, their family and carers, and their psychiatrist "it should be established whether the continued use of antipsychotics is appropriate; whether it is safe to begin the process of discontinuing their use; and what access to alternative interventions is available" (68).

It was hoped that the patient targeting according to prescribed medication approach being tested in this research would aid the review of antipsychotics in the vulnerable with dementia; thus facilitating the national goals of reducing the prescribing of these agents in this population.

6.2   Objectives

- To establish the frequency and nature of antipsychotic and drugs for dementia prescribing in patients with dementia admitted to City Hospital, Birmingham.

- To determine if the pharmacist intelligent referral (PIR) process developed in this research reduced the inappropriate prescribing of antipsychotic medications in patients with dementia who were admitted to City Hospital, Birmingham.
- To investigate the role of RAID in stopping the inappropriate prescribing of antipsychotics in patients with dementia admitted to City Hospital, Birmingham.

6.3 Method

All of the patients prescribed a study medication (antipsychotic, mood stabiliser or drug for dementia) during phase I of this research (17/09/2012 - 28/10/2013) with a diagnosis of dementia were included in this study. Patients with a concurrent diagnosis of dementia (vascular, mixed, Alzheimer's disease or dementia of any other type) were identified using the indication for the prescription of a study medication as the marker.

Outcome data was reviewed on each of the patients from three data sets.
1. Records of inpatient reviews and data gathering done by the pharmacist (appendix 3 and 6) as part of this research.
2. Review of the SWBH discharge letter (TTO). This was the letter that was generated by the medical team upon hospital discharge for the patients GP.
3. Review of the Birmingham and Solihull Mental Health electronic patient records (RiO®) accessed via RAID.

The clinical data on all of the included patients was reviewed. Data was recorded and analysed in Microsoft Excel and included:
- patient details: Age, sex;
- medication details: Name, strength, form, dose;
- reason for hospital admission and basic medical plan;
- type of dementia and usual baseline behaviour;
- community mental health support: details of CMHT and follow-up plans;
- if the patient was referred to RAID and the reasons for this decision;
- if the antipsychotic was stopped or continued following RAID review and the reasons for any decisions regarding medication made.

Data collection and analysis met the Caldecott principles and was maintained securely as per hospital policy.

6.4   Results

During the study period (17/09/2012 – 28/10/2013) the specialist pharmacist received information on 385 individual patients who were prescribed one or more of the study medications (antipsychotics, mood stabilisers or drugs for dementia). A total of 109 patients had a diagnosis of dementia, representing 28% of the total population. A cross section of types of dementia prescribed these agents was seen in this study, with some patients diagnosed as suffering from dementia of a mixed origin (usually Alzheimer's disease and vascular). The other type of dementia recorded related to that associated with the human immunodeficiency virus (HIV) (Chart 6).
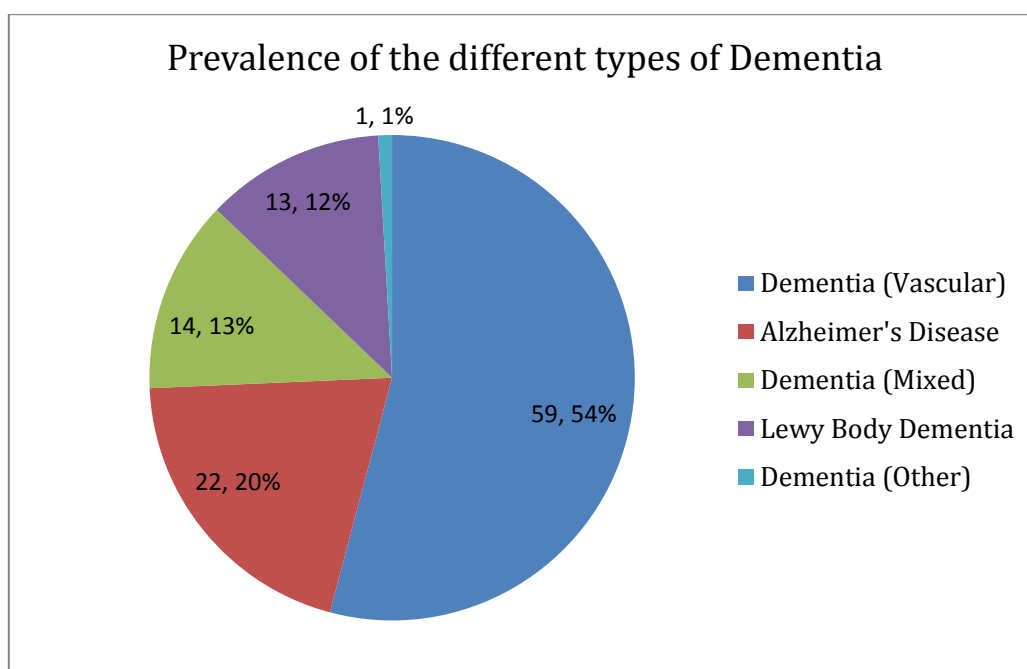
Chart 6. Prevalence of the different types of dementia seen in patients prescribed study medication between 17/09/2012-28/10/2013

6.4.1 Prescribing Trends

A total of 123 study medications (88 antipsychotics and 35 drugs for dementia) were prescribed for the 109 patients, with 14 patients receiving multiple therapies. A total of 83 patients (76%) were on an antipsychotic, of whom 8 (7%) were also taking an AChE Inhibitor. Four (4%) patients were prescribed two antipsychotics and 2 patients (2%) two AChE inhibitors. Risperidone, the only licensed antipsychotic for dementia, was being taken by 32 patients, accounting for 39% of the antipsychotic prescribing. Quetiapine (n=19, 23%) and amisulpiride (n=17, 20%) were the next most commonly prescribed agents (Chart 7). Of the first generation (typical) antipsychotics, haloperidol (n=8, 10%) was the most common, but in total typical agents accounted for 15%

(n=13) of the antipsychotic prescribing. Donepezil (n=17) and galantamine (n=11) were the most commonly prescribed AChEs.
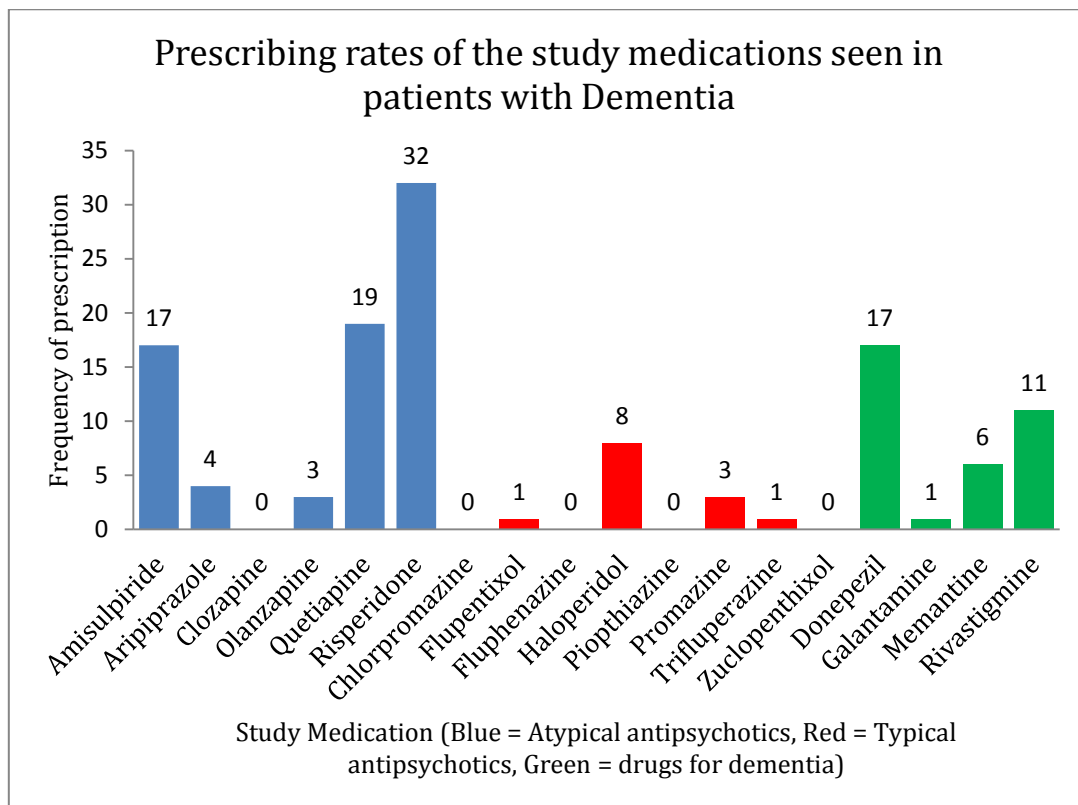
Chart 7. Prescribing rates of the study medications seen in patients with dementia identified using the PIR process between 17/09/2012-28/10/2013

A total of 59 patients were diagnosed with vascular dementia, of which 54 (92%) were receiving an antipsychotic. Seven patients (12%) were prescribed an AChE, in 2 patients this was in conjunction with an antipsychotic. A number of antipsychotics were identified, with risperidone being the most common (Table 13). Two patients were prescribed a combination of antipsychotics and 7 patients were noted to be on the first general antipsychotic haloperidol.

Antipsychotic	No. of patients	% patients with Vascular Dementia
Amisulpiride	12	20%
Aripiprazole	2	4%
Flupentixol	1	2%
Haloperidol	7	12%
Olanzapine	1	2%
Risperidone	**24**	**41%**
Trifluperazine	1	2%

Table 13. Prescribing of antipsychotics in patients with vascular dementia identified by the PIR process between 17/09/2012-28/10/2013

22 patients had a diagnosis of Alzheimer's disease, the majority of which (n=17, 77%) were receiving treatment with an AChE inhibitor. When an AChE inhibitor was prescribed, donepezil was the most common (65%, n=11). Eight patients (36%) were prescribed an antipsychotic, of which only two were receiving the licensed agent. Quetiapine (n=3), aripiprazole (n=1) and amisulpiride (n=2) were the other antipsychotics noted to be prescribed.

Fourteen patients had a diagnosis of dementia of a mixed pathology (most commonly vascular dementia and Alzheimer's disease). The majority (n=12, 86%) were prescribed an antipsychotic, with a variety of choices being used. Risperidone (n=3), amisulpiride (n=3), quetiapine (n=2), promazine (n=2), olanzapine (n=1) and haloperidol (n=1) were the agents seen. Four patients (29%) were receiving AChE inhibitors, with donepezil (n=2), memantine (n=1) and rivastigmine (n=1) all being prescribed. One patient was noted to be on a combination of both donepezil and memantine. Of the patients on AChE inhibitors one was also on an antipsychotic (rivastigmine and promazine).

Thirteen patients had a diagnosis of dementia related to Parkinson's disease (Lewy body dementia), of which 9 (69%) were prescribed an antipsychotic. Quetiapine was the most common choice (n=6) but other agents prescribed were risperidone (n=2) olanzapine (n=1) and aripiprazole (n=1). One patient was prescribed a combination regimen. Six patients (46%) were prescribed AChEI's with 100% being for rivastigmine as the only licensed choice for this indication; two of these patients were also prescribed quetiapine for BPSD.

One patient had dementia related to HIV. He was prescribed haloperidol and had already been urgently referred to RAID following a violent incident on the ward.

6.4.2 Referrals

Of the 109 patients, the pharmacist was able to review 83 (76%). Reasons for non-review included patients who were:

- admitted when the specialist pharmacist was on holiday (n=7, 6%);
- admitted when the specialist pharmacist was not at work due to illness (n=5, 5%);
- located on a ward that was closed due to norovirus (n=3, 3%);
- discharged when the pharmacist viewed the electronic medication alert (n=11, 10%).

Of these 26 patients who were not reviewed, 22 (85%) were prescribed an antipsychotic.

Of the 83 patients seen, 93% (n=77) were being prescribed antipsychotics in the community prior to their hospital admission, 6 patients (7%) had the study medication newly initiated by RAID during their hospital admission, of which only one received an antipsychotic. In total 77% (n=64) had input from a specialist team during their admission, most of which was actioned by the pharmacist (Table 14). A total of 19 patients (23%) did not receive any inpatient mental health support following the review by the pharmacist. In 15 patients this was because it was not considered to be necessary (medication and follow-up appropriate, unrelated hospital admission and symptoms stable). The other 4 patients were found to be receiving end of life care and were being managed appropriately according to the relevant pathway.

No. of patients	% of patients reviewed by the pharmacist (n=83)	Specialist team input during the patients inpatient admission
25	30%	Patients **informally discussed** by the pharmacist with the hospitals liaison psychiatry team (RAID). Documentation made by the pharmacist into the patient's medical notes clarifying details of the patient's diagnosis, medication, behaviour and usual psychiatric team or other information as relevant. Any medication related concerns dealt with by the pharmacist.
15	18%	Patient **referred** to RAID by the specialist pharmacist
8	10%	Patient **referred** to RAID by the medical or nursing staff
6	7%	Patient **referred** to their usual community mental health team by the pharmacist
6	7%	Patient **newly initiated** on the medication during this hospital admission by the RAID team following a referral for new symptoms
3	4%	**Referred** to alternative person e.g.: Parkinson's consultant or GP by the pharmacist
1	1%	**Referred** to the pharmacist by the RAID team

Table 14. Referral outcomes of patients with a diagnosis of dementia that were seen by the pharmacist following identification using the PIR process between 17/09/2012-28/10/2013.

The data in table 14 shows that 25 (30%) patients had their care discussed informally with the RAID team by the pharmacist. A discussion between the pharmacist and the RAID team was required as the medical notes did not contain the patient's mental health history as has already been discussed in chapter 5. This was required to make a decision on whether a referral would be needed or not and aimed to ensure that a complete record of information was recorded into the medical notes. Information that was documented generally included, details of the dementia diagnosis (including type of dementia), the community mental health team that the patient was currently under, usual behaviour, and plans for review and follow-up. The specialist pharmacist was also able to action clinical recommendations in these patients following discussion with the psychiatric consultant as has been discussed in chapter 5. Five (25%) of these patients had their antipsychotic stopped following this informal review.

Six patients were newly started on the study medication during their admission following a referral by the medical team to aid in diagnosis or management of new symptoms. In five of these patients the newly initiated medication was rivastigmine to aid with symptoms of dementia related to Parkinson's (n=5) or Alzheimer's disease (n=1). This was started as part of a shared care arrangement between the Parkinson's or geriatric consultant and the psychiatry team. All patients were referred to the community mental health team (CMHT) on discharge to ensure that the effects of the rivastigmine were monitored and that it was only continued if benefit was seen. The final patient was started on quetiapine by RAID; this was a patient who was admitted to hospital following a fall. The patient was reviewed as he was being very aggressive on the ward, RAID advised quetiapine 25mg PRN (maximum OD). If used for more than every 3 days, the quetiapine could be restarted regularly but because of an acknowledged increased risk of falls and stroke, restarting should only occur if the suggested de-escalation strategies failed to work. Quetiapine was chosen as this patient had been prescribed this drug previously with good clinical effect.

One patient was referred to the pharmacist by the RAID team in the weekly multidisciplinary meeting. This was to aid in the clarification of the prescription of risperidone by the GP as the patient had been referred to RAID by the ward due to challenging behaviour and the ward were unsure whether the patient had been prescribed an antipsychotic, and as such had prescribed risperidone. The pharmacist discussed the risperidone with the GP who advised that he had given a single prescription to the family previously due to similar symptoms, but the family had not requested any further supplies as it didn't help with his symptoms. Following RAID review prn lorazepam was recommended instead of risperidone to aid with the management of acute symptoms, but was rarely required.

6.4.2.1 RAID Referrals

A total of 23 patients (18%) were referred to the psychiatric liaison team (RAID), of which 15 (65%) were made by the specialist pharmacist. Reasons for referral were varied and included concerns over adverse reactions, inadequate information on review or follow-up and symptoms requiring medication review and adjustment. The outcome of the referral in these patients is shown in table 15.

The data in table 15 shows how 9 patients were referred as a consequence of suffering an adverse drug reaction (ADR) of their medication. RAID stopped the antipsychotic completely in four patients and reduced the dose in a further two patients. Of the patients who continued treatment following the review this was for the following reasons:

1. Risperidone was continued in patient 61 following a full mental health assessment and a discussion of the risks with the benefits with the family who considered that the patient's quality of life had been much improved since starting on risperidone and were aware of the risks of continuing treatment.
2. RAID restarted the risperidone in patient 315 once neuroleptic malignant syndrome had been ruled out. This patient had particularly troublesome behavioural symptoms which were well managed on risperidone.
3. Two patients (17, and 186) died during their hospital admission, they was an elderly lady who was admitted following a fall in her nursing home and an elderly male admitted with a chest infection.

Inadequate community review was the reason for referral by the pharmacist of 3 patients. Following RAID review two of these patients were transferred to an inpatient mental health bed for ongoing management, the other was referred to a community mental health team to ensure adequate follow-up post hospital discharge.

Challenging behaviour was the reason for 6 of the pharmacist's and 4 of the medical team's referrals. RAID provided advice and support on managing the symptoms holistically with de-escalation strategies being recommended in all. Of the ten patients who received this advice one patient had his antipsychotic stopped and two had their doses reduced.

One patient with Alzheimer's disease was referred to RAID by the medical team to aid with a capacity assessment; they were not on an antipsychotic (donepezil monotherapy).

Patient No.	Reason for Referral	Antipsychotic prescribed	Outcome of Liaison psychiatry (RAID) review	Antipsychotic Outcome
Patients with Dementia who were referred to RAID by the pharmacist				
61	Adverse effect (cardiovascular)	Risperidone	Discussed with daughter who felt the patient's behaviour and misrecognition was much improved on risperidone. Aware of risk and continue due to patient benefit.	Continued
273	Adverse effect (cardiovascular)	Quetiapine	Quetiapine stopped due to significant heart disease and no MH symptoms.	**Stopped**
106	Adverse effect (confusion)	Risperidone	Risperidone stopped following consultant review. Patient calm and pleasant so risperidone not indicated.	**Stopped**
17	Adverse effect (falls)	Risperidone	Stopped by RAID on review, but patient died during their admission.	**Stopped** – but patient died
191	Adverse effect (falls)	Trifluperazine	Significant medication review with dosulepin and carbamazepine stopped by RAID. Trifluperazine reduced from BD to OD following discussion with usual consultant. Many previous antipsychotics tried previously without success. Usual CMHT will continue to review.	**Dose Reduced.**
315	Adverse effect (NMS)	Risperidone	Neuroleptic malignant syndrome ruled out and patient restarted on risperidone due to evidence of benefit and following liaison with usual team who will review following discharge.	Restarted
96	Inadequate community review	Amisulpiride	Discussed care with daughter who reported the patient was drowsy and not agitated. Had been on Amisulpiride for many years and was not under CMHT. Amisulpiride reduced for 2 weeks then stopped. Discussed with GP who will refer to CMHT if symptomatic.	**Stopped**

Patient No.	Reason for Referral	Antipsychotic prescribed	Outcome of Liaison psychiatry (RAID) review	Antipsychotic Outcome
157	Inadequate community review	Risperidone	Seen by RAID with plans to review again but patient subsequently died.	N/A
180	Inadequate community review	Haloperidol	Patient being violent on the ward. Recently moved to the area and transferred to Sandwell mental health bed. Seen by RAID to aid with violent behaviour whilst an inpatient at City.	Continued
116	Behaviour	Risperidone	Presented with worsening of behaviour symptoms in the context of her dementia and poor compliance with medication. Risperidone continued and liaison with CMHT to increase package of care in the community and have help with medication administration.	Continued
224	Behaviour	Amisulpiride	Patient with vascular dementia from alternative CMHT, awaiting admission to inpatient mental health bed due to increasing aggression and violent behaviour. Admitted to hospital with urinary tract infection and kidney failure, referred to RAID to aid with behaviour management on the ward whilst being treated with antibiotics before admission to MH hospital	Continued
240	Behaviour	Quetiapine	Posed a risk of harm to self and others due to aggression and violent behaviour. RAID advised one to one special and how to de-escalate as well as discussed with usual psychiatrist baseline and medication plans	Continued

Patient No.	Reason for Referral	Antipsychotic prescribed	Outcome of Liaison psychiatry (RAID) review	Antipsychotic Outcome
268	Behaviour	Amisulpiride	A lot of involvement from many members of the team to discuss management and liaise with community as well as advice on how to manage on the ward. Medication reviewed and rationalised with citalopram and Amisulpiride both being reduced.	**Dose Reduced**
308	Behaviour	Haloperidol	No evidence of psychosis seen, clearly confused and not orientated in time or place. Haloperidol stopped and prn lorazepam recommended as needed. Advised not to be prescribed antipsychotics due to risk of stroke.	**Stopped**
337	Behaviour	Quetiapine	Seen by RAID due to aggression and suicidal thoughts, with plans to review again but patient subsequently died.	N/A
Patients with Dementia who were referred to RAID by the medical or nursing team				
271	Adverse effect and Behaviour	Amisulpiride	Admitted with confusion secondary to dementia worsening or UTI and AKI. Known behavioural symptoms as aggressive on ward with NOCTE hallucinations	Amisulpiride **stopped** and PRN risperidone started
186	Adverse effect and Behaviour	Risperidone	On risperidone due to sexually explicit symptoms, on a gradually reducing dose. Admitted with confusion, delirium on the background of dementia or chest infection. Recently had his risperidone dose reduced	N/A as Patient deceased
51	Adverse effect and Behaviour	Risperidone	Referred by medical team as high cardiovascular risk profile and drowsiness. Was reviewed by RAID and risperidone discontinued	**Stopped**
201	Other	Donepezil	Team referred as required help with a capacity assessment.	N/A

Patient No.	Reason for Referral	Antipsychotic prescribed	Outcome of Liaison psychiatry (RAID) review	Antipsychotic Outcome
41	Behaviour	Quetiapine	Known to have Alzheimer's disease, presented with worsening confusion, very aggressive and agitated on the ward. Quetiapine dose reduced to prevent daytime drowsiness	**Dose Reduced**
162	Behaviour	Donepezil	Referred following a fall, noted to be low in mood according to nephew so ward requested RAID review. RAID happy for her to be discharged and liaised with CMHT to ensure adequate support continued in the community.	N/A
12	Behaviour	Haloperidol	Dementia related to HIV. Urgent referral from ward due to violent incident, his usual medication was not prescribed at this point. Review by RAID and restarted on usual haloperidol and diazepam	Continued
269	Behaviour	Haloperidol	Prescribed PRN to aid with symptoms and as part of the end of life care pathway as palliative cancer patient.	Continued

Table 15. Antipsychotic prescribing outcome of dementia patients referred to RAID between 17/09/2012 and 28/10/2013 as identified using the PIR process (n=23).

6.4.2.2 Patients referred to the Community Mental Health Team (CMHT)

The pharmacist made a decision to refer six patients (Table 16) to their usual CMHT for review, in the main this was because of a concern surrounding an ADR to their prescribed medication. All patients were discussed with the CMHT by telephone and a plan made for formal review following hospital discharge. The telephone discussion resulted in two patients having their antipsychotic dose reduce and one stopped, the others would have therapy reviewed in the community once their physical health had improved.

6.4.2.3 Patients referred to alternative specialists

In three patients the pharmacist made the decision not to refer to a mental health team, but to discuss the patients care with an alternative clinician. In two cases this was a general practitioner (GP) and in one, the hospitals Parkinson's disease consultant (Table 17).

Patient No.	Reason for referral	Antipsychotic medication	Outcome of review by CMHT	Antipsychotic outcome
170	Adverse effect (stroke)	Risperidone	Admitted with a stroke. Prescribed risperidone which had been increased recently by her psychiatrist due to distressing psychotic symptoms. Discussed with stroke team and usual psychiatrist who would review the need for risperidone on discharge when physical health had improved.	Continued subject to ongoing review in the community.
280	Adverse effect (falls)	Risperidone	Admitted with a fall, had been seen recently by usual psychiatrist who recommended reducing the risperidone but this hadn't been actioned at the residential home. Was only in hospital overnight so actioned dose reduction and advised CMHT of admission to hospital and miscommunication surrounding the dose reduction.	**Dose Reduced**
285	Adverse effect (falls)	Risperidone	Admitted with a fall, had been reviewed recently by her usual psychiatrist who recommended that due to her history of falls to reduce the risperidone and then stop it in 6/52 time, but she was still on the low dose. The pharmacist called her psychiatrist who was happy for the risperidone to be stopped which was actioned with the medical team.	**Stopped**
295	Adverse effect (falls)	Amisulpiride	Admitted with a fall and generally unwell. Discussed with her usual psychiatrist who recommended reducing the Amisulpiride from twice daily to night time only and that he will follow this up in the community.	**Dose Reduced**

Patient No.	Reason for referral	Antipsychotic medication	Outcome of review by CMHT	Antipsychotic outcome
213	Dementia without review	Amisulpiride	Previously known to the CMHT but discharged and remained on amisulpiride. Discussed with nursing home and CMHT who requested that the nursing home contact them when she is discharged from hospital and they will review.	Continued subject to ongoing review in the community.
379	Other	Risperidone	CMHT had previously stopped the risperidone due to no evidence of psychosis but this had been restarted by the GP due to issues with challenging behaviour. Discussed with the psychiatrist and medical team as patient was admitted with scabies and the change in behaviour was most likely to be due to the associated itching and poor skin condition. Advised a dermatology review to treat skin and then usual psychiatrist will review the risperidone on discharge to trial stopping again.	Continued subject to ongoing review in the community.

Table 16. Antipsychotic prescribing outcome of dementia patients referred to the patients CMHT between 17/09/2012 and 28/10/2013 as identified using the PIR process (n=6)

Patient No.	Reason for Referral	Antipsychotic	Outcome of Referral	Antipsychotic Outcome
37	Adverse effect (confusion)	Quetiapine	Advanced Parkinson's disease with worsening cognitive state. Admitted to hospital with confusion and off-legs. Treated for UTI and quetiapine dose reduced and follow-up planned for 6/52 time with Parkinson's disease consultant.	**Dose Reduced**
44	Adverse effect (falls)	Amisulpiride	Patient known to RAID in 2009 with a diagnosis of mild dementia with psychotic symptoms but discharged in 2010 as asymptomatic. Discussed with GP why still on amisulpiride 12.5mg due to admission of confusion and falls. Was part of a weaning dose but not been reviewed since June 2012 has also been queried by QE due to admission there with confusion and falls. GP happy to stop, RAID to review if acute issues and GP will refer to CMHT if any ongoing issues following discharge.	**Stopped**
99	Adverse effect (confusion)	Amisulpiride	Alzheimer's disease patient confused and poorly compliant with medication. Was open to CMHT in 2008 but discharged and remained on antipsychotic. Would have referred to RAID but it was over Christmas so she was discharged quickly, discussed with GP who would review and refer to CMHT. Re-admitted following Christmas so I referred her to RAID who stopped the Amisulpiride as no indication of need.	**Stopped**

Table 17. Antipsychotic prescribing outcome of dementia patients referred to an alternative clinician between 17/09/2012 and 28/10/2013 as identified using the PIR process (n=3)

6.4.3 Stopping Antipsychotics

A total of 83 patients (76%) with dementia were identified as being prescribed antipsychotics, of which 78 (94%) were reviewed by the specialist pharmacist. A total of 64 patients (77%) received specialist input during their hospital admission. All but one patient was on the antipsychotic prior to their hospital admission, in 8 patients the prescription was in conjunction with an AChE inhibitor. In total 11 patients who were referred to a specialist team had their antipsychotic stopped during their hospital admission (Tables 15, 16 and 17). However, antipsychotics were also stopped (n=7) in the cohort of patients who were managed more informally by the pharmacist who discussed the patients management with both the liaison psychiatry and medical teams (Table 18) as discussed in chapter 5. In these 7 patients the specialist pharmacist made a clinical and following a discussion with the RAID consultant the antipsychotic was stopped and follow-up in the community arranged. This resulted in a total of 18 dementia patients (29%) having their antipsychotic stopped and a further 5 (8%) having their dose reduced following specialist input.

Patient no.	Details of pharmacist's informal discussion with RAID to stop antipsychotic medications in patients with dementia
16	93 year old lady with admitted following a fall, prescribed Amisulpiride 25mg OD. No formal dementia diagnosis, confirmed with RAID that she was known to the CMHT in 2005 but no diagnosis was made and no follow-up planned. Discussed with RAID and medical team who agreed no clinical need and risk high due to fall and concurrent drowsiness. Medical team stopped amisulpiride and agreed to refer to RAID if any behavioural issues following its discontinuation.
41	75 year old male with vascular dementia admitted from nursing home with rigidity. Prescribed quetiapine and had had RAID review previously who recommended stopping the quetiapine, this had not been actioned by his GP. Discussed with RAID consultant and medical team, quetiapine stopped and community follow-up booked. Medical team to refer to RAID for inpatient review if any behavioural issues requiring more urgent review.
82	92 year old lady with delirium prescribed haloperidol prn. When she was reviewed her on the ward by the pharmacist she was settled. The pharmacist recommended that the haloperidol be stopped and that lorazepam be prescribed prn for agitation as recommended in the rapid tranquilisation policy

Patient no.	Details of pharmacist's informal discussion with RAID to stop antipsychotic medications in patients with dementia
	which was written by RAID and pharmacy. Medical team to refer to RAID if any further management issues.
92	85 year old male with vascular dementia who was well known to both RAID and CMHT. Admitted to hospital with a fall and prescribed risperidone. Had been recently seen by the CMHT who had recommended the GP reduce the risperidone from 1mg NOCTE to 0.5mg NOCTE for 4 weeks and then stop, they will then review. This had not been actioned by the GP so was actioned by the pharmacist following discussion with RAID and the medical team. Medical team to refer to RAID for inpatient review if any behavioural issues requiring more urgent review following risperidone reduction.
156	85 year old lady admitted to hospital with a stroke prescribed risperidone. Review of community mental health records revealed that she was seen by her consultant in 2011 who recommended the GP stop the risperidone as she was asymptomatic and discharged her from psychiatric follow-up. This had never been actioned so was discussed with medical team who stopped the risperidone.
223	87 year old lady with vascular dementia admitted with pneumonia and confusion. Prescribed risperidone by the GP. RAID records revealed that this was stopped by the CMHT in November 2012 but was subsequently restarted by the GP in January 2013. The medical team were already withholding the risperidone due to the drowsiness and confusion, recommended that it was stopped permanently as per previous advice. Refer to RAID as appropriate if physical health improves and there were any behavioural issues.
311	85 year old man with Alzheimer's dementia who was admitted from his nursing home unwell and drowsy and with a significant decline in renal function. Prescribed risperidone for >1 year following a review in March 2012 when it was recommended for short term use following a community psychiatric review, but no follow-up planned. Patient very unwell, discussed with the medical team and recommended stopping the risperidone and referring to RAID if his condition improved.

Table 18. Clinical interventions made by the specialist pharmacist that resulted in stopping antipsychotics in patients with dementia between 17/09/2012 and 28/10/2013 (n=7).

6.4.4 Drugs for Dementia

The prescribing of AChE inhibitors and NMDA receptor antagonists in this study accounted for around a third (28%, n=35) of the study medications prescribed (35/123). This prescribing occurred in a total of 34 patients as one patient was prescribed a combination of donepezil and memantine. Donepezil (n=17) and rivastigmine (n=11) were the most commonly prescribed. Most of the prescribing occurred in patients with Alzheimer's disease (Table 19), as an AChE inhibitor was prescribed in 77% (n=17) of these patients. Only 12% (n=7) of patients with vascular dementia were prescribed one. A total of 7 patients (6%) were prescribed both an AChE in conjunction with an antipsychotic.

Type of dementia	Total number of patients	Patients prescribed an AChE inhibitor or NMDA receptor antagonist	Patients prescribed an AChE Inhibitor/NMDA antagonist in conjunction with and antipsychotic
Vascular	59	7 (12%)	2 (4%)
Alzheimer's Disease	22	17 (77%)	2 (9%)
Mixed	14	4 (29%)	1 (7%)
Lewy Body	13	6 (46%)	2 (15%)
Other	1	0 (0%)	0 (0%)
TOTAL	109	34 (32%)	7 (6%)

Table 19. Prescribing of AChE Inhibitors or NMDA receptor antagonist in patients with dementia as identified by the PIR process between 17/09/2012-28/10/2013

The prescribing of an AChE/NMDA antagonist led to a referral in only 2 patients. Both of these referrals were generated by the medical team who required help with a capacity assessment in one patient and were concerned about concurrent depression in the other. The specialist pharmacist did not make any referrals in this patient population. Five patients were newly started on rivastigmine by the RAID team following a referral to aid management of behaviour.

6.5 Discussion

The cross section of patients with dementia seen in this research was different to the national averages estimated in the literature (17-19). Alzheimer's disease is quoted as the most prevalent type of dementia, accounting for 50-60% of the dementia diagnoses, (16) but was only seen in

20% of the patients in this research. Mixed dementia was common here, and was defined as patients with dementia of a vascular and Alzheimer's element, so if this is considered the total Alzheimer's population here was 33%. As an acute general hospital with cerebrovascular and cardiovascular specialisms it is likely that a large proportion of patients had established atherosclerotic disease and as such the relative proportion of vascular disease was greater. It is also important to remember that the population was identified according to the prescription of either an AChE Inhibitor/NMDA receptor antagonist or an antipsychotic and not on the diagnosis, and as such is not representative of the total population of patients with dementia in the hospital. The balance between the types of dementia seen helps to account for the different medications prescribed within this group as only 28% of patients here were prescribed a drug for dementia, with the remaining being prescribed an antipsychotic.

6.5.1 Drugs for Dementia

Currently, AChE inhibitors/NMDA receptor antagonists are only licensed for use in Alzheimer's disease (donepezil, galantamine and memantine), with rivastigmine having additional licensed use in Parkinson's disease. If the prescribing of these agents is matched against licensed indications it can be seen that of the 35 patients prescribed them, 27 (77%) were being treated in accordance with the NICE recommendations and licensing (1, 21). A total of 49 patients had a diagnosis of Alzheimer's disease making them potentially eligible for treatment with AChE Inhibitors/NMDA receptor antagonists, but only 27 were prescribed them (55%). This is likely to be due to the fact that the patients were in the acute hospital setting with concurrent physical health concerns making it inappropriate to carry out the cognitive testing at baseline as is required when treatment is initiated with these agents. Treatment initiation was managed in 5 patients by the RAID team during their admission who started rivastigmine, in 4 patients this was for dementia related to Parkinson's disease.

Off license use of AChE inhibitors was seen in 7 patients for which these agents had been prescribed to treat vascular dementia. AChE inhibitors and NDMA receptor antagonists are both currently recommended treatment options in the UK by the National Institute for Clinical Excellence (NICE) for the management of Alzheimer's dementia (21). Research into the effectiveness of these agents in other types of dementia is on-going (22), but as Alzheimer's disease is specifically associated with neurotransmitter depletion the current view is that these agents will be most beneficial in this type of dementia. However, a meta-analysis published in the lancet in 2007 investigated the use of these agents in other types of dementia, and reviewed the trial evidence on the efficacy and safety of the AChE and NMDA receptor in patients with vascular

dementia. The study concluded that 'Cholinesterase inhibitors and memantine produce small benefits in cognition of uncertain clinical significance in patients with mild to moderate vascular dementia. Data are insufficient to support widespread use of these drugs in vascular dementia. Individual patient analyses are needed to identify subgroups of patients with vascular dementia who might benefit' (93). As the prescribing of these agents in all of the patients seen here was directed by a specialist with appropriate review occurring it can be considered that the use was appropriate. This is particularly the case given that the licensed options for vascular dementia currently consists of short term use of risperidone for behavioural symptoms only, which severely limits the pharmacological management of these patients.

One patient was prescribed dual therapy with both an AChE inhibitor (donepezil) and an NMDA receptor antagonist (memantine) to aid in the management of mixed dementia, which was a seemingly unconventional combination. A retrospective literature review of this did find some evidence to support the use of this combination in practice. A review by Riordan in 2011 reported that the 'addition of memantine to donepezil in patients with moderate-to-severe Alzheimer's disease provides a statistically significant improvement in several outcome measures, however, the clinical relevance of this benefit remains unclear' (94). Clearly, more research of this combination of agents is needed, although it is likely that this use is trialled by some clinicians in practice as alternative options are so limited.

In this research, drugs prescribed for dementia specifically did not lead to many referrals as has already been quantified in chapter 4 with them having a number needed to refer (NNR) of 62 (chapter 4, table 7). This was surprising as the initial hypothesis for the pharmacist referral system was to target specialist care to this patient population. However, NICE recommendation is that the prescription of a drug specifically for dementia can only be initiated by a psychiatrist and the finding in this study was that patients admitted to hospital prescribed one of these agents were already under close and active follow-up by a CMHT was consistent with this recommendation (21, 44, 52). As such these patients did not require an automatic referral.

6.5.2 Antipsychotics in Dementia

A major objective of this research was to investigate the use of antipsychotics in dementia and determine the impact of the RAID team on reviewing and potentially stopping these agents in dementia patients if their use was found to be inappropriate.

A total of 109 patients with dementia were identified here, with 76% (n=83) being prescribed an antipsychotic. Of the antipsychotics prescribed 38% (n=32) were for risperidone, which is currently the only one with UK licensing for this indication, highlighting the large off-license prescribing of these medications in this patient population; something that clinicians are forced into due to the limited pharmacotherapeutic prescribing options in this patient population.

A total of 64 patients (77%) had input from a specialist team during their admission, most of which was generated by the pharmacist and all but 2 were for patients prescribed antipsychotics. Reasons for specialist input included concerns over adverse drug reactions (ADRs), inadequate information on recent review and follow-up and patient behaviour. Adverse drug reactions were seen in 16 patients, with cardiovascular and cerebrovascular effects as well as confusion and falls being the ones identified here. These concerns align with those seen in the literature, and were the main reason for the initial call for the review of the prescribing of these medications in the dementia patient by Banerjee and co-workers (29). Large scale meta-analyses of clinical trials have consistently demonstrated a 1.5–1.7 times increased risk of mortality with their use in dementia (85, 88). Atypical antipsychotics have also been linked to a 2–3 fold higher risk of cerebrovascular events (absolute risk of approximately 1%)(88). The 2012 American Geriatric Society Beers consensus criteria for safe medication use in the elderly recommended the avoidance of antipsychotics to treat the behavioral symptoms of dementia due to the increased mortality and cerebrovascular risk "unless non-pharmacological options have failed and the patient is threat to self or others"(55). Other tools have been developed to assess the need for medications and to facilitate review such as the Medication Appropriateness Index (MAI) and the Screening Tool of Older Persons' Potentially Inappropriate Prescriptions (STOPP), but their formal use in every day practice has been limited (54, 56). The recommendations made in all of these guidelines align with the UK NICE guidelines, which was updated in January 2015. This advises 'against the use of any antipsychotics for non-cognitive symptoms or challenging behaviour of dementia unless the person is severely distressed or there is an immediate risk of harm to them or others' (52). Any use of antipsychotics should include a full discussion with the person and carers about the possible benefits and risks of treatment. In the May 2012 edition of Drug Safety Update, the MHRA advised that no antipsychotic (with the exception of risperidone in some circumstances) is licensed in the UK for treating behavioural and psychological symptoms of dementia. It did recognise how antipsychotics are often prescribed off-label for this purpose, a practice that was seen in this research.

A total of 78 patients with dementia prescribed antipsychotics were reviewed by the pharmacist, with 64 (82%) having input from the psychiatric liaison team, highlighting how the PIR service

facilitated access to this service. A total of 23 patients (36%) had their medication adjusted, with 18 patients (24%) having their antipsychotics stopped and an additional 5 (8%) their dose reduced. The included patients who were referred for advice on behavioural management and those who had not had a recent review in addition to patients experience adverse consequences of their medication. These figures highlight the advantages of the referral system, and show how improving access can have a positive effect on patients. The referral ensured that medication is reviewed according to national recommendations, and that a decision that balances the patients physical and mental health needs is made. It is important to note that the decision was not always straightforward and that differences in approach occurred, in some cases the psychiatric team were willing to stop the medication abruptly whereas in other a tapered dose reduction was trialled to establish the impact of stopping on patient symptoms. In general a step-wise approach to medication review was taken with suggestions being made by the pharmacist in discussion with the psychiatric team or as part of the referral document.

1. **Manage the patient or families expectations.** It is important to discuss any decision on stopping medication with the patient or family member as appropriate. This will help to ensure a suitable balance between management of any possible adverse physical health consequences of the medication with the effect that this will have on symptoms. An example of this balance was seen in patient 61 (Table 17) who was an 81 year old male admitted to hospital with worsening heart failure and chest pain, risperidone had been recently started by his community psychiatrist to aid with behaviour. A long discussion occurred between the consultant psychiatrist and the daughter and a decision made to continue the risperidone. The daughter felt that her father's behaviour and misrecognition was much improved since the risperidone was started, she was aware of the risks but due to the improvements in his quality of life requested that it be continued until it was reviewed as planned in the community in a month's time.

2. **Recognise when to stop.** In some situations it was important to stop the antipsychotics abruptly due to serious adverse drug reactions, lack of efficacy or change in treatment aims. Patient 273 (Table 17) was a 73 year old female admitted to hospital with confusion, drowsiness and new onset AF following initiation of quetiapine by her GP to aid with the symptoms of dementia related to her Parkinson's disease. Review by the consultant psychiatrist and discussion with the medical consultant established that she had significant heart disease and was not currently displaying any behavioural symptoms or psychosis. The quetiapine was stopped and a referral made to the Parkinson's consultant to review her levodopa in case this was aggravating her symptoms and to advice on how treatment should proceed. As the quetiapine had been started by the general practitioner

and not a specialist it was felt important to ensure adequate follow-up was arranged to aid with symptom management once her physical health improved.

3. **Prioritise medications to stop.** When multiple medications are implicated in causing adverse consequences review should ensure that a decision is made to consider each prescription individually and stop the most likely causative agent first. In relation to mental health this relates to the need to ensure that all of the medication a patient is prescribed is reviewed for potential adverse consequences if this is suspected and that a joint decision is made with the medical team. If a patient is admitted to hospital following a fall this may be attributable to syncope resulting from an antipsychotic but may also result from other co-prescribed medication causing hypotension, drowsiness and confusion and as such a full medicines review needs to occur where all of the potential causes are considered and balanced against other symptoms.

4. **Wean patient.** In some situations it is not appropriate to stop medication abruptly as this may cause a rebound in symptoms and loss of control which needs to be balanced against the need to stop the medication. This is highlighted in patient 295 (Table 18) who was an 85 year old female admitted to hospital following a fall, it was felt that drowsiness from her amisulpiride prescription had contributed to her fall. Discussion with her usual psychiatrist resulted in a recommendation to reduce the prescription from twice daily to night-time only to balance the daytime drowsiness with the management of her occasional psychotic symptoms. He would review the impact of this dose reduction at her next community appointment.

5. **Monitor the impact.** If medication has been stopped or reduced it is important that adequate follow-up is arranged to monitor the impact of this change on the patient in the longer term. This is of particular importance in the dementia patient who is admitted to hospital as it is likely that poor physical health was the priority when any decisions to stop medication was made. The multidisciplinary approach seen here ensures that this occurs as in addition to reviewing patients during their hospital admission the RAID team and pharmacy also ensured that appropriate follow-up was organised in the community to facilitate ongoing management. This is of particular importance here as if antipsychotics are prescribed or continued in patients with dementia NICE recommends that their use is reviewed every 6 weeks.

Effective medicines management facilitated by the PIR service helped to ensure that patients prescribed antipsychotics in dementia were reviewed as per national recommendations and that treatment was only continued when there was an appropriate balance between physical and mental health.

6.6 Conclusion

In this study a total of 32 referrals to a specialist team (RAID, CMHT or GP) were generated following the prescription of one of the study medications in patients with dementia, of which 24 (75%) were generated by the pharmacist. An additional 7 patients had input from the RAID team via the pharmacist who liaised with them directly, actioned any issues identified and prevented a referral. This highlights how the newly implement PIR service helped to target dementia patients prescribed antipsychotics to facilitate specialist review. Following psychiatric review and pharmacist input 23 patients (72%) had had their antipsychotic stopped or adjusted and a holistic care plan generated, highlighting the value of this newly implemented service in achieving the recommendations regarding review and appropriateness in the literature (38, 52, 58, 88, 95).

With the implementation of electronic prescribing likely to become more widespread there is the opportunity to facilitate patient review according to prescription generation. In relation to dementia this could facilitate the identification and as such subsequent specialist review of patients prescribed antipsychotics as has now been more formally recommended in the NICE update in January 2015 (52). Pharmacists could be pivotal in taking this idea forward by ensuring prescribing information is reviewed in real time and a referral is generated when indicated.

Chapter 7:
Adverse Drug Reactions (ADRs) to Antipsychotics

7.1 Introduction

An adverse drug reaction (ADR) is defined by the World Health Organisation (WHO) as 'a response to a drug which is noxious and unintended, and which occurs at doses normally used in man for the prophylaxis, diagnosis, or therapy of disease, or for the modifications of physiological function' and can be an important cause of patient morbidity and mortality (84, 96). ADRs are often implicated in hospital admissions with studies suggesting that they account for 1 in 16 hospital admissions, and for 4% of bed capacity, and as such are a significant burden on Health Services (NHS) (84, 97). The scale of the problem was highlighted by Lazarou et al in 1994 when it was established that over 100,000 hospital admissions were associated with fatal ADRs (86). In addition to their potential to cause and lengthen hospital stay, they adversely affect patients' quality of life and can cause a loss of confidence in the pharmacological management of their conditions. As ADRs can mimic disease, misdiagnoses may be made resulting in unnecessary investigations and treatments (84).

The adverse effects of the 'typical' antipsychotics were noted in the 1950's when these agents were first introduced. Common ones noted were tremor, abnormal movements and excess sedation. This led to the development of the 'atypical' antipsychotics in the 1990's. Side effects are still common, and are a significant factor in patient non-adherence, examples include cardiovascular effects (tachycardia, arrhythmias, hypotension, Q-T prolongation), drowsiness, extrapyramidal symptoms, hyperglycaemia, increased prolactin levels (except aripiprazole), interference with temperature regulation, neuroleptic malignant syndrome and weight gain (1, 4). Many of these side effects could lead to a hospital admission and as such regular review is recommended (49). A scoring system for the likelihood of ADRs was suggested by C A Naranjo and colleagues in 1981 to enable the reviewer to calculate the likelihood of the adverse effect being due to a particular drug rather than as a result of other factors (98). Although, completion of the questionnaire is not part of routine clinical practice, it formalises many of the factors that a clinician would consider in identifying an ADR and as such is a useful algorithm to compare incident data. The greater the score awarded the more likely the effect is to be an ADR.

Adverse drug reactions (ADRs) from antipsychotic medications were identified in chapter 4 as a reason for referrals in the PIR process developed in this research. Specialist advice was required to manage both the reaction and make a decision on how care should proceed. In some cases, it was considered to be possible to attribute a patient's admission to hospital to a direct effect of their medication, highlighting the importance of the need for regular review and awareness of the possible adverse consequences that prescriptions for these medications can generate. This chapter reports on the incidence of ADRs associated with antipsychotic medication found in this research, and their association with the patient's admission to the hospital.

7.2 Objectives

1. To determine the incidence of antipsychotic ADRs and their contribution to hospital admissions at City Hospital, Birmingham.
2. To investigate the association of ADRs with the different types of antipsychotic.
3. To assess the impact of a pharmacy referral system on the identification and management of antipsychotic ADRs.
4. To determine the antipsychotic outcome following ADR identification and subsequent psychiatry review.

7.3 Method

The 45 patients found in phase I and II who were considered to be experiencing an adverse drug reaction to their antipsychotic medication were identified retrospectively from the pharmacist data collection sheets (Appendix 2, 3 and 4). The implicated drugs and the frequency of ADRs was then compared to prescribing within the hospital to determine the likelihood of each individual antipsychotic being associated with an ADR. This allowed calculation of the number needed to harm (NNH). NNH is an epidemiological measure that indicates how many patients need to be exposed to a risk factor to cause harm in one patient, and as such is the inverse of the attributable risk. In this study it was the total number of patients admitted to the hospital prescribed an antipsychotic in order to identify one who was suffering an ADR.

Information regarding the medication, the reaction, and outcomes on all patients was collated from the previous studies data. The Naranjo algorithm was calculated for all patients retrospectively to enable quantification on the likelihood of the identified reaction being an ADR (Figure 10). The scores awarded were reviewed independently by a pharmacist and an academic (Professor Brian Hebron, Aston University and SWBH NHS Trust) experienced in ADR reporting.

The Naranjo Algorithm for identifying an ADR					
	Question	Yes	No	Don't know	Score
1	Are there previous conclusive reports on this reaction?	+1	0	0	
2	Did the adverse events appear after the suspected drug was given?	+2	-1	0	
3	Did the adverse reaction improve when the drug was discontinued or a specific antagonist was given?	+1	0	0	
4	Did the adverse reaction appear when the drug was re-administered?	+2	-1	0	
5	Are there alternative causes that could have caused the reaction?	-1	+2	0	
6	Did the reaction reappear when a placebo was given?	-1	+1	0	
7	Was the drug detected in any body fluid in toxic concentrations?	+1	0	0	
8	Was the reaction more severe when the dose was increased or less severe when the dose was decreased?	+1	0	0	
9	Did the patient have a similar reaction to the same or similar drugs in any previous exposure?	+1	0	0	
10	Was the adverse event confirmed by any objective evidence?	+1	0	0	
≥ 9 = definite ADR 5-8 = probable ADR 1-4 = possible ADR 0 = doubtful ADR					

Figure 10. The Naranjo Algorithm for identifying an ADR (98)

The results of the Naranjo score were matched with the decisions made regarding the continuation of the antipsychotic to establish whether any link could be made between the scoring system and how care should proceed.

7.4 Results

During the study period (17/09/2012 to 11/03/2014), 387 patients who were admitted to hospital taking antipsychotic medicines were identified. A total of 418 antipsychotic prescriptions were generated as 361 patients (93%) were prescribed one antipsychotic, 21

patients (5%) were prescribed two antipsychotics and 5 patients (1%) were prescribed three antipsychotics. A range of antipsychotics were prescribed with the most common being risperidone (n=100, 24%). Forty five patients were found to be experiencing ADRs represented 12% of the total patient population prescribed antipsychotic medications within the hospital. Most of the ADRs (n=39, 87%) were identified by the study pharmacists.

Just over half (n=24, 53%) of the patients identified with ADRs were those which were prescribed their antipsychotic to treat the symptoms of dementia. If this is correlated with the proportion of patients found to be suffering with dementia in the same patient population (n=126/387) then there is a statistically significant association (X^2 = 7.7, p=0.0056) between dementia and the risk of an ADR in comparison to other mental health conditions.

7.4.1 Antipsychotic medications implicated in ADRs

In total 49 prescriptions were implicated as four patients were prescribed two antipsychotic medications concurrently. When the antipsychotic associated with the ADR was matched to its total prescribing over the same time period it was possible to calculate the number needed to harm (NNH). As a total of 49 reactions were identified out of 418 prescriptions, this gave a NNH of 9; so for every 9 patients admitted to the hospital prescribed an antipsychotic, one was identified to be experiencing an ADR. This was also calculated for each of the individual drugs to allow quantification of risk further, with the lowest numbers being associated with the greatest risk (Table 20).

Antipsychotic	Total prescribed	No. ADRs	NNH
Clozapine	8	3	3
Risperidone	100	19	5
Amisulpiride	41	7	6
Chlorpromazine	11	2	6
Trifluperazine	7	1	7
Quetiapine	87	9	10
Aripiprazole	29	2	15
Olanzapine	64	4	16
Haloperidol	50	2	25

Table 20. Number needed to harm (NNH) for patients admitted to City Hospital prescribed antipsychotics between 17/09/2012 - 11/03/2014

Table 20 demonstrates that clozapine was the drug most likely to cause patient harm in this study, with 3 ADRs being identified in the 8 patients taking this agent giving it an NNH of 3; haloperidol was the least likely with a NNH of 25. Risperidone as the most commonly prescribed antipsychotic was the second highest in the risk rating with an NNH of 5. A NNH could not be calculated for flupentixol, flupenazine, pimozide, pipothiazine, promazine, sulpiride and zuclopenthixol as they were not associated with any adverse effects during this study.

7.4.2 Types of ADR

A variety of ADRs were identified which could have resulted in the patients admission to hospital, with cardiovascular effects (n = 12, 27%) and falls (n = 11, 24%) being the most common. Calculation of the Naranjo score confirmed a probable ADR as defined as a score of > 5 in 20 patients (44%), with an ADR being possible in the remaining 56%. A mean score of 4.7 (range: 2-10) was recorded across the cohort.

A total of 12 cardiovascular ADRs were identified in 12 patients (Table 21) and these resulted in 5 antipsychotics being stopped by the psychiatric team. Risperidone (n=5, 42%) and quetiapine (n=4, 33%) were the most commonly identified causative agents. Adverse effects noted included those associated with worsening of heart failure to electrical changes (confirmed by electrocardiogram) and associated chest pain. The Naranjo scores awarded varied to that associated with a definite ADR (10) to a possible ADR (3).

	Antipsychotic	Indication	Clinical Details of ADR	Naranjo Score	Antipsychotic prescription outcome
1	Quetiapine	Schizophrenia	QT Prolongation	10	Reduced.
2	Risperidone	Dementia (vascular)	Recently started, admitted with worsening heart failure and drowsiness.	8	Reduced
3	Quetiapine	Depression with psychosis	VT Arrest and QT Prolongation	7	**Stopped**
4	Quetiapine	Dementia (Parkinson's)	Recently started, admitted with new onset AF, confusion and drowsiness	7	**Stopped**
5	Olanzapine	Schizophrenia	Acute Coronary syndrome	4	**Stopped.**
6	Haloperidol	Personality Disorder	Chest pain and palpitations	4	Continued
7	Risperidone	Dementia (mixed)	Recently started, admitted with worsening heart failure and chest pain.	3	Continued
8	Quetiapine	Personality Disorder	Multiple admissions with chest pain and heart failure	3	Continued
9	Risperidone	Schizoaffective disorder	Worsening heart failure	3	Continued
10	Olanzapine	Affective psychosis	Worsening heart failure and new onset AF	3	**Stopped**
11	Risperidone	Dementia (vascular)	Recently started, admitted with chest pain	2	Continued
12	Risperidone and chlorpromazine	Schizophrenia	NSTEMI	3	Both **stopped** initially, then risperidone only continued

Table 21. Cardiovascular ADRs and medication outcomes associated with antipsychotic prescribing at City Hospital 17/09/2012 to 11/03/2014 (n=12)

Falls (n=11, 24%) and confusion and drowsiness (n= 9, 20%) were the next most commonly identified ADRs as is shown in tables 22 and 23. Most (n=9, 75%) of the patients admitted following a fall had a diagnosis of dementia, and all but 2 patients had their antipsychotic stopped or the dose reduced. Similarly, all of the patients with confusion or drowsiness had their antipsychotic stopped or the dose reduced following psychiatric review, most (n=6, 67%) were prescribed the antipsychotic to manage the behavioural symptoms of dementia.

Three patients experienced extrapyramidal side effects from their antipsychotic, with the dose being reduced in two patients to manage symptoms (Table 24). The other patient had his quetiapine stopped, this was due to a combination of both tardive dyskinesia and acute coronary syndrome.

Two patients suffered a stroke and one an ischaemic attack demonstrating the real risk that antipsychotic medications have on increasing a patients risk of cerebrovascular disease; although as there can be other causes in an elderly person the Naranjo scores awarded were low (3) in all of these patients (Table 25).

A variety of other adverse effects were also noted as is shown in table 26, most of which were associated with altered blood tests.

	Antipsychotic	Indication	Clinical Details of ADR	Naranjo Score	Antipsychotic prescription outcome
13	Risperidone	Psychosis	Multiple admissions with falls, to try reduced dose then stop	9	**Stopped**
14	Amisulpiride	Dementia (vascular)	Long history of falls leading to hospital admissions	6	**Stopped**
15	Risperidone	Dementia (vascular)	Second admission with a fall, on reducing dose of risperidone	5	Reduced
16	Risperidone	Dementia (vascular)	Admitted with a fall, no challenging behavior displayed	5	**Stopped**
17	Aripiprazole	Bipolar	Admitted with a fall, family report worsening confusion	4	Continued
18	Amisulpiride	Non documented	Admitted following a fall, all medication causing drowsiness stopped	3	**Stopped**
19	Trifluperazine	Dementia (vascular)	Admitted following a fall, on multiple medicines. All rationalised	3	Reduced
20	Risperidone	Dementia (vascular)	Admitted following a fall. Dose not reduced as per CMHT advice	3	Reduced
21	Amisulpiride	Dementia (vascular)	Admitted following a fall. Home report loss of tone and poor co-ordination	2	Patient died
22	Amisulpiride	Dementia (Alzheimer's)	Admitted following a fall. Ongoing confusion on the ward	2	Reduced
23	Quetiapine	Dementia (vascular)	Admitted following a fall, transferred to intermediate care for rehab	2	Continued

Table 22. Patients admitted following a fall that were taking an antipsychotic on admission to City Hospital between 17/09/2012 – 11/03/2014 (n=11)

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	Antipsychotic	Indication	Clinical Details of ADR	Naranjo Score	Antipsychotic prescription outcome
24	Risperidone	Schizophrenia	On large dose of risperidone, difficult to rouse on ward and care home	8	Reduced
25	Quetiapine	Dementia (Parkinson's)	Confusion and off-legs, also treated for UTI	5	Reduced
26	Risperidone	Dementia (vascular)	Confusion and worsening kidney function	5	Reduced
27	Olanzapine + Haloperidol	Schizophrenia	Admitted with confusion and drowsiness	5	Reduced
28	Amisulpiride	Dementia (Alzheimer's)	General deterioration in physical health and worsening confusion	4	**Stopped**
29	Risperidone	Dementia (vascular)	General deterioration in physical health and worsening confusion	4	**Stopped**
30	Risperidone	Dementia (vascular)	Admitted with confusion, treated for pneumonia	4	**Stopped**
31	Risperidone	Dementia (Alzheimer's)	Confusion and worsening kidney function	4	**Stopped**
32	Olanzapine	Affective psychosis	2 week history of confusion, also treated for a UTI.	3	**Stopped**

Table 23. Patients admitted to hospital with symptoms of confusion or drowsiness that were taking an antipsychotic on admission to City Hospital between 17/09/2012 – 11/03/2014 (n=9).

	Antipsychotic	Indication	Clinical Details of ADR	Naranjo Score	Antipsychotic prescription outcome
33	Amisulpiride	Schizoaffective disorder	Extrapyramidal side effects an resting tremor leading to fall and admission	8	Reduced
34	Quetiapine	Schizophrenia	Tardive dyskinesia acute coronary syndrome requiring intervention	7	**Stopped**
35	Quetiapine	Dementia (vascular)	Rigidity and daytime drowsiness	6	Reduced

Table 24. Patients admitted to hospital with extrapyramidal symptoms that were taking an antipsychotic on admission to City Hospital between 17/09/2012 – 11/03/2014 (n=3).

	Antipsychotic	Indication	Clinical Details of ADR	Naranjo Score	Antipsychotic prescription outcome
36	Risperidone	Dementia (vascular)	Stroke	3	**Stopped**
37	Risperidone	Dementia (alcohol)	Stroke	3	Patient died
38	Risperidone	Dementia (mixed)	Admitted with a transient ischaemic attack, dose recently increased	3	Reduced

Table 25. Patients admitted to hospital with cerebrovascular effects that were taking an antipsychotic on admission to City Hospital between 17/09/2012 – 11/03/2014 (n=3)

	Antipsychotic	Indication	Clinical Details of ADR	Naranjo Score	Antipsychotic prescription outcome
39	Clozapine and aripiprazole	Bipolar	Deranged liver function tests	7	**Stopped**
40	Quetiapine	Dementia (vascular)	Deranged liver function tests	3	Patient died
41	Risperidone	Dementia (vascular)	?neuroleptic malignant syndrome	2	Continued – NMS ruled out
42	Clozapine and amisulpiride	Schizophrenia	neuroleptic malignant syndrome	8	Patient died
43	Chlorpromazine and antidepressants	Anxiety	Low Sodium (Na=116)	2	Continued – sodium returned to normal
44	Risperidone and antidepressants	Asperger's and anxiety	Nausea and vomiting	5	Antipsychotic continued but antidepressant stopped
45	Clozapine	Bipolar	Reduced neutrophils	7	**Stopped**

Table 26. Other adverse effects experienced by patients that were taking an antipsychotic on admission to City Hospital between 17/09/2012 – 11/03/2014 (n=7).

Of the 45 ADRs found the majority were identified by a pharmacist (n=39, 87%), and included a number of different types; these are summarised in table 27. If the ADRs found by the different health care professionals are compared then it is possible to see if there is any difference between the two groups. A chi squared test gives a result of X^2 =4.65 with 5 degrees of freedom and a p value of 0.46, this indicates that there is no significant difference between the two groups in the types of ADRs identified, although with the small number for the medical team it is difficult to make any real comparisons.

Type of ADR	Identified by Dr	Identified by Pharmacist	Total
Cardiovascular	3	9	12
Falls	0	11	11
Confusion or Drowsiness	2	7	9
Extrapyramidal Effects	0	3	3
Cerebrovascular	0	3	3
Other	1	6	7
TOTAL	6	39	45

Table 27. Summary of the types of ADRs found and the health care professional who identified them.

7.4.3 Antipsychotic outcome following psychiatry review

Thirteen (29%) patients had the dose of their antipsychotic reduced and a further 18 (40%) had treatment discontinued following a mental health assessment. Four patients (9%) died during their hospital admission. In total, 69% (n=31) of patient's medication was adjusted following review which considered the patients mental and physical health needs. The antipsychotic outcome is compared to the Naranjo score on the likelihood of the identified reaction being an ADR in chart 8. Chart 8 shows how of the 19 patients defined by Naranjo as being an ADR (score of >5), 17 (89%) had the antipsychotic stopped or the dose reduced. When the ADR was less clear (score of 1-4) the medication outcomes were more varied.
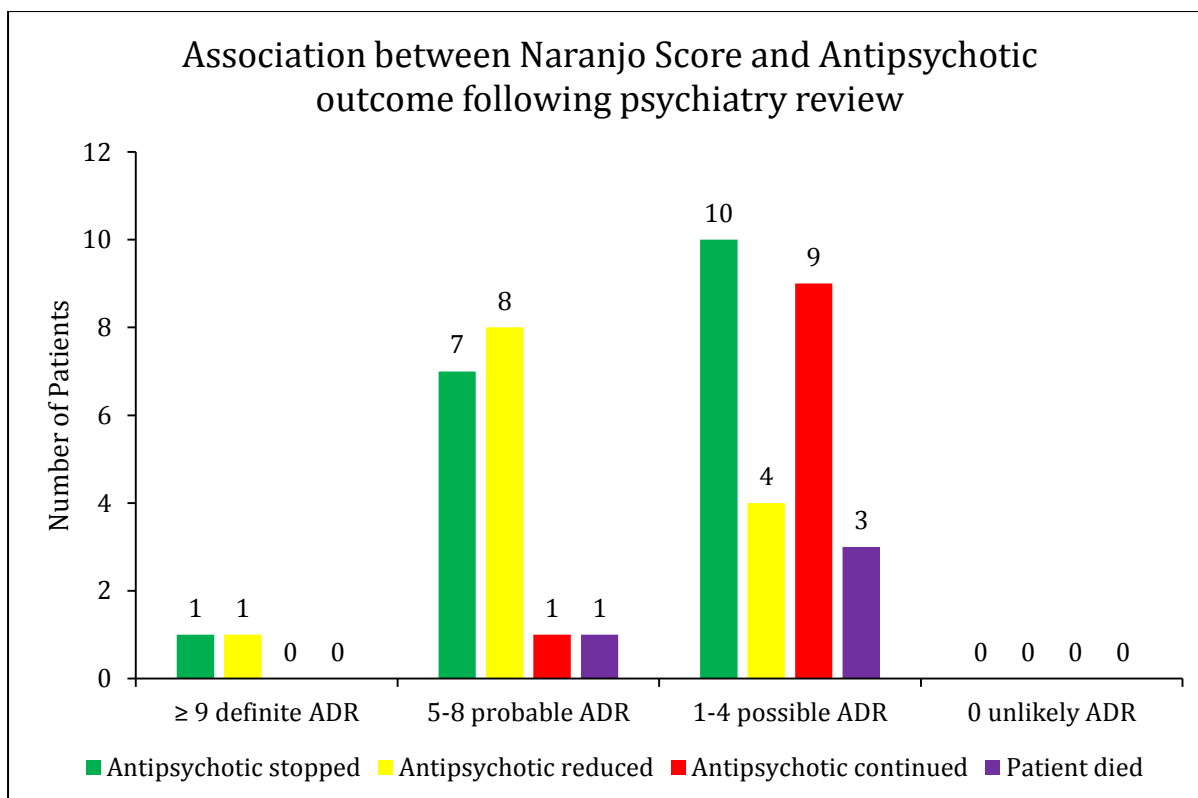
Chart 8. Association between Naranjo score and antipsychotic outcome following psychiatry review.

If the likelihood of an ADR according to Naranjo is compared to a negative medication outcome (antipsychotic stopped or dose reduced) then it is possible to see if there is any association between the Naranjo score and clinical outcome, this is shown in table 28.

Likelihood of ADR	Antipsychotic stopped or dose reduced	Antipsychotic continued	TOTAL
Definite (Naranjo ≥9)	2	0	2
Probable (Naranjo 5-8)	15	1	16
Possible (Naranjo 1-4)	14	9	23
TOTAL	31	10	41

Table 28. Comparison between likelihood of ADR according to Naranjo and negative medication outcome.

When a Chi squared test is reported on the data in table 28 a X^2 result of 6.2 with 2 degrees of freedom and a p value of 0.045 is found, confirming a statistical association between the Naranjo score and the antipsychotic outcome. The 4 patients who died were removed from this calculation as it was considered difficult to report an exact medication outcome.

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7.5 Discussion

The adverse consequences of antipsychotic medications and their association with 45 patient admissions to the hospital confirms the real potential that these medications have for causing patient harm; with dementia patients seemingly to be the most at risk. This was quantified by a number needed to harm (NNH) of 9 for the antipsychotics, highlighting how 1 in 9 patients admitted to the hospital prescribed one of these agents were experiencing an adverse effect. NNH is a commonly used term in clinical literature that is used to assess the level of risk associated with a particular treatment or intervention, however there are problems with its quantification statistically. The main ones being the lack of reliable confidence intervals and the difficulties in excluding the possibility of no difference between treatment groups. Numbers generated cannot be used to determine what is considered to be an acceptable level of risk or not, however the generally recognised interpretation of results is that the higher the number the better. This however must always be balanced with the level of benefit that the patient may also be experiencing. In relation to this research, the referral system was developed to facilitate a joint decision between the medical and the psychiatric teams to balance the mental health benefits with any identified physical harm. When individual drugs NNH was calculated clozapine was found to be the antipsychotic most associated with ADRs with an NNH of 3, this was followed by risperidone (NNH = 5). This was not unexpected as clozapine is known to be associated with adverse effects which is why its use is restricted to patients disease whose disease is non responsive to other agents, with strict monitoring required before each prescription is dispensed (1). Interestingly haloperidol was the antipsychotic found to have the lowest risk in this study, this was not expected as a first generation antipsychotic (1, 84).

Cardiovascular ADRs were found to be the most common, they were also the easiest to identify as they were often associated with specific measurable clinical outcomes. Examples in this research were QT prolongation seen on ECG with quetiapine in patients 1 and 3 and atrial fibrillation in patient 4. Others ADRs are not be so obvious and may be masked or complicated by many other patient factors. A fall in an elderly patient may be attributable to syncope resulting from an antipsychotic but may also result from the medication causing hypotension, drowsiness and confusion. A coincidental infection leading to delirium can further complicate this already difficult situation. Eleven patients in this study were admitted with a fall who were taking antipsychotic medications and although there could be additional factors leading to the fall, changes to the patients medication was made by the RAID team in all but two cases. Similar challenges were seen with confusion and drowsiness as a potential ADR, again as a multiple other factors can be implicated. However in this study all nine of these patients had their antipsychotic either stopped or reduced following RAID review.

The pharmacists identified the majority (n=39, 87%) of the ADRs, which demonstrates the value of the pharmacy referral (PIR) system in assessing and ensuring antipsychotic prescribing appropriateness and safety. Medication review is a key role for the pharmacist who follows the good practice guide for health care professionals in regards to medicines optimisation, and as such the PIR system was just an extension of this core clinical pharmacy role (62). One of the principles of medicines optimisation is to 'ensure medicine use is as safe as is possible' and as such identification of potential ADRs would feature as part of this review (62, 73). Patients in this study were identified according to the prescription of an antipsychotic, but the clinical pharmacy review that followed was one of the usual pharmacy processes. What made the PIR process different from traditional ward based clinical services was how the patients were identified as well as the pharmacists being able to action a psychiatric referral themselves rather than making a recommendation to the medical team. This improved both the access to psychiatric services and the time in which it takes to generate a referral as has already been discussed in chapter 3. Following the identification of the ADR and the generation of a referral, a decision was then made by the psychiatric team on whether to continue the medication. The decision to change or stop antipsychotic medication required a balance between the severity of the ADR and its physical implications and the patient's current mental health status and the associated risk of loss of control of psychotic symptoms.

Evidence in the literature suggests that use of the Naranjo score helps to reduce the variability between clinicians when rating the probability of an event being caused by an ADR (37, 96, 97, 99). It was used here to confirm that all of the identified reactions could be an ADR associated with the prescription of an antipsychotic and to assign a quantifiable value to its likelihood. Perhaps of more importance, however, is how the patients care should proceed and how the risk of the ADR is to be balanced against the risk associated with a change in mental health medication. This is where the practical value of the Naranjo classification is less clear as the medication related outcomes in terms of the decision to stop or continue the medication did not always relate to the score. This is because the purpose of the score is to look at the association of a clinical problem with drug therapy and not the seriousness of the problem. This can be seen in this research as one of the patients (patient 1) that was given the greatest Naranjo score (9) did not have the offending medication stopped. However, when the overall trend between Naranjo score and medication outcome is compared (chart 7) it can be seen that there was an association between the score and medication outcome. For the patients where the ADR was most likely (score of >5 suggesting a definite or probably ADR, n=19) the offending medication was stopped or adjusted in 89% (n=17) of cases. The medication outcomes when the ADR was only considered

to be possible (score of <5, n=26) was more variable with 38% (n=10) having their antipsychotic stopped, 15% (n=4) reduced and 35% (n=9) had their treatment continued. These results show that the decisions made at the time regarding medication do relate to our retrospective Naranjo scores, with the majority of the more definite ADRs leading to medication changes. This was confirmed with a comparison between Naranjo score and negative medication outcome (stopping or dose reduction) giving a statistically significant difference (p=0.045).

7.5 Conclusions

An admission-related potential ADR was identified in 12% of the patients prescribed antipsychotic medicines (NNH = 9) who were admitted to an acute general hospital, confirming the patient harm that can occur with the prescription of these agents that is discussed in the literature (1, 2, 4, 29, 85, 88).

The Naranjo scoring algorithm can facilitate the identification of an ADR, but the resulting values doesn't give the clinician guidance on the action to take, and as such specialist mental health input was required here. However, the patients with the highest Naranjo score indicating a more definite ADR were the ones most likely to have their antipsychotic stopped or its dose reduced.

The newly implemented pharmacist referral system identified the majority (n=39, 87%) of the ADRs, confirming the value of the system in identifying patients experiencing adverse effects from their medication and facilitating specialist review. Following psychiatric review, 69% of patient's medication was adjusted highlighting the value of liaison psychiatry services in conducting a review and adjusting therapy to prevent further harm.

Chapter 8:
Communication between Healthcare Practitioners

8.1 Introduction

Communication between members of the multidisciplinary team accounts for the major flow of information in the health care setting, with evidence suggesting that errors in this communication can lead to patient morbidity and mortality (100). Challenges surrounding communication on hospital admission have been highlighted in the present research (chapter 5), with no health care professional having access to the three clinical data sources (GP, community mental health and hospital records) sources necessary to provide a comprehensive mental health history when a patient was admitted to hospital. This resulted in the pharmacists involved in this research being granted an honorary contract with the tertiary mental health trust to enable them to have access to the electronic community mental health records (Rio®) and as such they were the only health care professionals with access to the three clinical data sources.

Communication between clinicians continues throughout the patients' hospital journey and their return into primary care, it is a highly complex but important function in the delivery of safe and effective health care. Oral methods such as face to face or telephone contact are often considered the mainstay of communication, but are generally not recorded. It is essential that information is documented to allow for a complete and accurate clinical record that can be accessed and reviewed by all clinicians involved in the patients' care. The medical notes are currently the mainstay of documented information in the hospital environment, upon discharge a letter summarising treatment, investigations, medication and plan is then sent to the patient's general practitioner (GP) to ensure a smooth transition of care into the community.

The medical notes are a collection of information on a patient that includes any relevant history as well as information regarding the present complaint and plan as well as any investigations or results. They are a legal document that should include all contributions made by the multidisciplinary team involved in a patients care from admission to discharge (101). Pharmacists regularly review the medical notes and read entries made by other health care professionals to enable informed management decisions on pharmaceutical patient care (92). However, there is evidence from the literature that pharmacists may be reluctant to make entries

themselves, with one study reporting that 74% of pharmacists in a large teaching hospital admitted to not writing in the medical notes for a variety of differing reasons (91). One of the thoughts behind the fear of writing in the notes was found to be a fear of criticism for doctors or worries around litigation. A new pharmacy referral service in mental health has been implemented in this research, with one of the key steps being pharmacy documentation in the medical notes of any interventions, recommendations or referrals made. It was considered important to independently assess the quality and value of these entries to provide evidence to support both the new role of the pharmacist as a referral provider as well as the ability of pharmacists to provide effective communication in the medical notes. Review of the discharge summaries would also establish if pharmacy input is being effectively communicated to the GP, as earlier studies in this research highlighted that information is often missing and as such is a potential source of patient harm.

8.2 Objectives

1. To independently review, for quality and impact, the entries made by pharmacy in the medical notes of patients with mental health conditions and the appropriateness of any referrals made.
2. To determine the sources of information used to evidence the entries made by pharmacy
3. To evaluate the quality and accuracy of the information sent to the GP for patients' referred to the RAID team following pharmacy review.

8.3 Method

An independent, retrospective, qualitative analysis of the entries in the medical notes made by pharmacists in patients prescribed medications for mental health conditions was conducted by two doctors (Specialist Registrar level) experienced in both acute medicine and psychiatry (Dr Alexandra Ademolu and Dr Manraj Bhamra).

Patients who had had an entry made into the medical notes by one of the pharmacy team following identification and review using the PIR referral process were included. The entries were reviewed for the quality and detail of the clinical information provided by pharmacy and the impact that this would have both medical decisions and patient outcomes. The information source(s) used to evidence the entry was also identified from the pharmacy data collection tool (appendix 6), Outcome data was obtained from the hospital discharge summary and electronic mental health records (Rio®). The outcomes measured were:

1. The type of information that the pharmacists were documenting in the medical notes and its perceived usefulness by the reviewing doctors
2. When a referral was made:
   - the reason for a referral;
   - if the referral was considered by the reviewers to be appropriate;
   - if the patient was reviewed by the hospitals psychiatric team (RAID);
   - if details of the RAID review were sent to the patients GP following discharge.

The research project was approved by SWBH NHS Trust Clinical Effectiveness department. Data collection and analysis kept to the Caldecott principles and was maintained securely in accordance with hospital policy.

8.4 Results

During the study period (01/04/2014 – 30/04/2015) 244 patients were identified by pharmacy as being prescribed psychotropic agents, of these, 173 (71%) were reviewed by a pharmacist. An entry in the medical notes made by a pharmacist was found in 41% (n=71) of patients; 43 patients (60%) had entries made by a Senior Pharmacist, 24 (34%) by a band 7 pharmacist and 4 (6%) by other pharmacists. Nineteen (27%) of these patients were referred to the hospital Liaison Psychiatry team following a pharmacy review for specialist advice and support.

8.4.1 Pharmacist documentation in the medical notes

Pharmacy entries in medical notes were made following reference to at least two clinical sources. Four key reference sources were identified:
1. Rio ®. an electronic patient record system (EPR) used by the local mental health Trust to support Mental Health & Learning Disabilities services
2. Summary Care Records (SCR). An NHS electronic database designed to support patient care as it is a copy of the key information from the GP records.
3. Clinical Data Archive (CDA). Electronic records which hold information on previous hospital admission or clinic appointments in the Trust
4. Pharmacy Computer system (JAC ®). Dispensing event data on prescriptions issued or the current and any previous hospital admissions.

The reviewing doctors found that input provided by pharmacy (having referred to the sources as listed above) "provided a supportive role for the medical team to facilitate them in the better

management of psychiatric patient in the acute medical setting". Information documented by pharmacy commonly included diagnosis, current medication regimen, named psychiatric team/consultant and details as to their last review/follow up and description of the patients mental health status when this information had not already been determined by the clerking medical doctor. This allowed for the medical team "to manage the patient more holistically as a complete mental health history was provided, changes from baseline behaviour could be identified quickly and appropriately managed". This was considered to be of particular importance when a concurrent infection was present as "it aided the medical team in distinguishing between delirium associated with infection and usual mental health behaviour". In addition to documenting missing information from the patient's history, pharmacy input "helped alert medical staff to potential serious contraindications and serious prescription errors as well as offering potential management strategies".

Examples of good practice by pharmacy that were highlighted by the reviewing doctors included a case of an 83 year old male with dementia who had been admitted on a high dose of amisulpride. It transpired that his current dose had not been reviewed in 4 years and his admission was thought to be secondary to a fall as a consequence of excessive drowsiness. The second case was of a young male who had missed 3 days of clozapine as its prescription was not identified in the drug history during his initial clerking. The omission was identified by a pharmacist who documented the details of the prescription and a summary of the patient's mental health in the medical notes. The seriousness of the omission was discussed with the medical team and an urgent psychiatric referral completed by the pharmacist. The pharmacist and the psychiatric team then worked together to quickly titrate the patient's clozapine to his usual dose whilst monitoring behaviour. The clozapine patient monitoring service and the patient's community mental health team were informed of his hospital admission and the missed medication doses.

There were a few occasions where not all the information at the disposal of the pharmacist was relayed in the medical notes. It "was not entirely clear as to why this is and is assumed that they were simply transcribing omissions". For example, there was a case where a pharmacist had made a note of a Psychiatrist details (name/work contact number) in the pharmacy notes but this was not documented in the medical notes.

8.4.2 Pharmacist Referrals and Discharge Documentation

All 19 referrals to RAID made by the pharmacists were deemed appropriate by the reviewing doctors. All were in line with the pharmacist referral pathway:

- Unknown indication for antipsychotic medication

- Reason for admission was potentially related to an adverse effect e.g. fall, confusion or stroke
- Patient was experiencing an adverse drug reaction e.g. dystonia
- The patient had a diagnosis of dementia and was prescribed antipsychotics without evidence of a recent (<12 weeks) specialist mental health review
- Inadequately detailed treatment plan or review

In total, 17 of the 19 patients referred were seen by RAID and the reason for referral actioned; one patient was managed by the patient's hospital medical team with advice from the pharmacist without the need for RAID involvement, and one patient was not seen by RAID due to an early discharge.

Review of the discharge summaries revealed that only 10 (59%) of the 17 reviewed by RAID mentioned liaison psychiatry involvement, including details of the review. Documentation of the psychiatric input on the discharge letter was considered to be good in these 10 cases with details of the review, any medication changes and plans for follow-up stated clearly for the GP. Seven (41%) discharge summaries failed to mention any involvement from RAID. This was particularly significant in the case of one patient referred to RAID for a medication review following pharmacy review. This patient was admitted to hospital with a myocardial infarction and was taking trazadone and risperidone prior to admission. The indication for these medications was unclear, with particular concern given their caution in cardiovascular disease, and the patient was not known to a community mental health team. RAID review identified a previous history of depression but no current evidence of depression or psychosis. The medical team were advised to stop both trazadone and risperidone, and if low mood persisted post cardiac intervention, to consider sertraline given the lower likelihood of cardiotoxicity. RAID input and the recommended medication changes and future advice were not documented in the discharge summary, potentially adversely affecting patient care. Other examples of discharge summaries which did not mention psychiatric involvement included a patient on multiple antipsychotics not under a community mental health team who was referred to a community team, and a case of a patient who missed an urgent community mental health appointment. Whilst failure to document these reviews would be unlikely to directly contribute to any adverse events, it enforces a gap in communication between secondary care and the patient's GP and mental health team.

8.5 Discussion

Information sharing is key to the delivery of holistic, co-ordinated and full care of the individual patient (102). This is of particular importance in psychiatry as evidence suggests that physical

and mental health are inextricably linked, with poor mental health being associated with an increased risk of cardiovascular disease, cancer and diabetes (8, 9, 89, 103). In addition to the risk associated with the medical condition itself, psychotropic medications have been implicated in adverse drug reactions which can include cardiovascular and cerebrovascular effects, and in rare instances sudden death (1, 4, 36, 84). These appear to be more pronounced in the elderly (1, 38). The professional actions of pharmacists are intended to ensure the safe and effective use of medications to reduce unnecessary medication risk, with a key principle of pharmaceutical care being that that the pharmacist accepts responsibility for patient outcomes (71, 91). Integrating pharmaceutical care into a patients overall health plan requires effective and efficient communication to other health care professionals (104). As an integral member of the multidisciplinary team, pharmacists working in secondary care must document the care provided into a patient's medical notes. This is essential to ensure continuity of care and demonstrates both the accountability of the pharmacist, and the value of the pharmacists input on patient care (104). This research found that pharmacists of all levels were documenting clinical information into their patient's medical notes so that a complete record of information was available. This documentation was found to "assist the medical team in making holistic and informed clinical decisions as the entries were found to contain valuable information and clinical recommendations". This was felt by the reviewing doctors to "reduce the need for psychiatry referrals as pharmacy were able to source and share relevant information appropriately with the medical team". When a referral was made by a pharmacist, this was considered to be clinically appropriate by the reviewing doctors. This information sharing and referral process was considered to "facilitate the safer management of psychiatric patients" and provides evidence to support the value of the pharmacist as part of the multidisciplinary team.

Pharmacy routinely gathered information from 3 or more sources before collating them, and documenting the missing information in the notes for the medical teams. No single source contained all the relevant information needed for the medical team to manage the patient effectively as has been discussed in chapter 5; likewise, no single healthcare practitioner had access to all sources of information as has already been discussed in chapter 5 (Table 11 and 12). Practically, this meant that admitting doctors clerking psychiatric patients on a medical ward have restricted access to health records which in theory could compromise patient care and outcome. Currently, the only way to narrow this gap is to have ongoing pharmacy input to provide relevant psychiatric information in all medical admissions. To improve this there needs to be a common electronic access point which pools information from all specialties which is easily accessible to the clerking doctor initiating management plans. The wider implications include safer clinical practices and more efficient use of RAID and pharmacy services.

The quality and accuracy of discharge summaries for patients in hospital referred to the RAID liaison psychiatry team following pharmacy review were also reviewed in this study. Overall, it was found that documentation of psychiatric review in discharge summaries was not performed in all patient cases, something that is considered to be essential to ensure an efficient transfer of care to the GP on discharge (105, 106). When a patient is referred to the psychiatric team it is recommended that the indication for psychiatric review, details of the review, any medication changes made and recommendations for follow up are documented on the discharge letter (105). Discharge summaries are intended to bridge the discontinuity of care that occurs on discharge from secondary to primary care, providing a summary of events and changes in medication during hospitalisation and facilitating transfer of care back to the GP (107). However, deficits in communication and transfer of information on discharge have been highlighted and may adversely affect patient care (106). Key findings from a 2009 national study by the Care Quality Commission included the need for acute trusts to improve the quality of discharge summaries sent to GPs, and the need for both parties to improve communication with patients regarding their medication at, and after discharge. 81% of general practices reported that details of prescribed medications on discharge summaries were incomplete or inaccurate 'all' or 'most' of the time (108). This figure is unsurprising given the missing information seen here, with nearly half (41%) of the patients reviewed by the psychiatric team not having any mention of this on the discharge summary. An accurate, comprehensive discharge summary has been shown to prevent adverse events and reduce readmissions to hospital (109). Hence accurate, comprehensive transfer of information is essential in ensuring consistency in treatment between secondary and primary care.

8.6 Conclusions

Pharmacy documentation in the medical notes was considered by the reviewing doctors to facilitate the safer medical management of patients by alerting medical staff to diagnoses, potential contraindications; prescription errors and potential strategies should the patient's behaviour become a concern during their hospital admission. Information on their usual community mental health team and contact details enabled communication lines to be maintained between care sectors.

Information sharing and a multidisciplinary approach is recommended to aid the management of the vulnerable mental health patient admitted to hospital. Access to information is pivotal, with only the psychiatric liaison pharmacists having access to all of the information deemed in this study to be essential for the successful inpatient management of the mental health patient in the

acute trust. If the care of these patients is to be improved, government recommendations and NICE guidelines followed, this must change.

Accurate, comprehensive transfer of information is essential in ensuring consistent treatment in primary and secondary care and can prevent a negative impact on patient care and health outcomes, including adverse events and readmission to hospital (109). The high number of patient discharge summaries containing missing information (41%) identified here highlights the need for continuous improvements in transfer of information between secondary and primary care. Further work could focus on the specific structure and detail of discharge summaries, using the Royal College of Psychiatrists Mental Health Discharge Summary standards as a reference.

Chapter 9:
Discussion, Conclusion and Outcomes

This research has established that a pharmacist was able to use real-time dispensing information to identify, review and refer patients to a psychiatric liaison team. This newly developed referral system facilitated a reduction in the time from admission to referral to the psychiatric liaison team, in addition to increasing the number of patients accessing the service. The increased access to liaison psychiatry ensured that medicines prescribed to manage mental health conditions were reviewed and adjusted by specialists and as such addressed the NHS England call for better medicines management in these patients (59).

9.1 Discussion

9.1.1 The PIR referral system and Patient Targeting

The 'pharmacist intelligent referral system' (PIR) developed in the pilot study and modified in response to the outcomes of phase I and II of this research provided a robust referral system that could be followed by pharmacists. This was a novel use of pharmacy dispensing data which has traditionally only been used for retrospective analysis of prescribing trends rather than to impact on patient care. The main limitation in this study was that the PIR was only tested using two pharmacists in a single hospital, and this limits any recommendations on generalisability. There is a need to extend the study to multiple pharmacists in a variety of different NHS Trusts.

It was found that a single pharmacist could not review all of the patients highlighted by the PIR system (patients prescribed antipsychotics, mood stabilisers and drugs for dementia as defined in BNF chapter 4.2), as around 10% were sent when the pharmacist was on holiday or on sickness leave. Of the patients who were highlighted, the majority (81%, n=291) were reviewed in the clinical ward environment and considered for referral. The most common reason for non-review by pharmacy was the patient having been discharged back into the community; the lack of a pharmacy service during the evening and weekends was found to be a significant factor in these patients. As the NHS strives to provide a full, multidisciplinary, service 24 hours a day, 7 days a week pharmacy opening hours and on call pharmacist commitments are likely to be reviewed. If altered pharmacy hours were combined with a greater number of pharmacists receiving alerts, then then a greater number of patients could be reviewed (59, 82, 110).

The PIR process facilitated the timely access to the RAID team, as patients were reviewed a mean of 4.4 days following their admission to hospital. This compared favourably with published data from a previous study which reported a mean of 14 days from hospital admission to medical referral to RAID (10, 11, 75). The main time delay related to the first dispensing of the patient's medication with a mean delay of 3.2 days seen. This may at least partly be attributed to the processes involved in the generation of the alert as explained by the time between hospital admission and the prescription of any necessary medication and the pharmacy review of the paper medication chart. As technology within hospitals improves and processes become more streamlined and electronic there will be the opportunity to reduce the time delay that was seen here. The most obvious of these will be the wider introduction of electronic prescribing within hospitals; this was not available within the hospital in this study but implementation is planned for 2018 when it merges with Sandwell General Hospital and becomes the Midland Metropolitan Hospital. Discussions are currently underway on the capability of the new electronic prescribing system to identify patients, and how the pharmacy team will be able to use the information to impact on patient care effectively.

Patient targeting according to perceived risk is already in place in the study hospital in patients admitted with a diagnosis of Parkinson's disease, as an email is sent automatically to the neurology and admissions pharmacist which alerts them to the admission of a patient with Parkinson's disease. One of these pharmacists will review the patient to establish if the medication has been correctly prescribed and is available on the ward, thus ensuring that the patient doesn't miss any doses which could lead to loss of control. Outside usual pharmacy opening times, the alert is sent to the on call pharmacist who is required to perform the same review. In this study an ADR to the prescription of an antipsychotic has been shown to be the cause of 1 in 9 hospital admissions in patients prescribed these agents. As such it could be recommended that the on call pharmacist reviews all of these prescriptions for potential harm, referring the patient to RAID if any adverse effects are identified. This would align patients taking antipsychotics with the model that is already in place for the management of patients with Parkinson's disease, a condition that has been identified by the Trust as having a link between medication and potential harm that requires pharmacist involvement 24 hours a day, 7 days a week.

It is suggested that patient targeting according to perceived risk could also be advantageous in antibiotic prescribing, by facilitating the national recommendations surrounding antimicrobial stewardship (83). The prescribing of antibiotics within secondary care is high, with many of the common infections being managed by the patients' medical or surgical teams following

standardised guidance, with the ward pharmacist supporting as per the traditional model of clinical pharmacy. However, an alert to the antimicrobial pharmacist to the dispensing of an antibiotic outside of guidelines could facilitate a review by a microbiologist, and would be a logical development from the PIR system developed here. Antibiotic alerts have subsequently been introduced at City Hospital to aid review with high risk antibiotics being targeted following consultation with microbiology. This was done to assist antibiotic stewardship by ensuring appropriateness, facilitating intravenous to oral switching and reducing the use of broad spectrum antibiotics due to their risk of *Clostridium difficile* infection. The antimicrobial pharmacist uses the alerts to drive a daily antimicrobial stewardship ward round with the Consultant that reviews the appropriateness of antibiotics outside of guidelines and designated 'high-risk' antibiotics.

A significant challenge to overcome if the PIR process or other patient targeting ideas are to become part of standard clinical pharmacy practice will be the funding for pharmacists within the hospital, as a review of working patterns will be required. It would mean an alternative way of pharmacist working whereby specialist pharmacists oversee the care of all of the patients within their institution prescribed identified high risk medications, liaising with the expert clinical team as considered necessary. If the concept was used in a variety of areas then it is more likely to be embedded in hospital pharmacy practice and should be considered a way of achieving some of the principles for medicines optimisation to improve patient outcomes that are outlined by the Royal Pharmaceutical society (62):

- evidenced based choice of medicines;
- ensure medicines use is as safe as possible;
- making medicines optimisation part of routine practice.

With advances in medicine and the pressure for hospital beds resulting in faster patient turn-around and shorter lengths of stay the pharmacy team will need to review how they adapt processes to ensure that they are seeing the patients where they can add the most value. Patient targeting according to high risk medication could be a way in which this is achieved, with more widespread electronic prescribing making the processes involved more efficient.

9.1.2 Pharmacist Referrals

In this research a total of 88 patients were referred to a mental health team by a pharmacist. Feedback from the psychiatric team was positive, and all of the referrals were accepted. An independent study conducted by the RAID team on the quality of referrals concluded that the most comprehensive referrals were from the pharmacist attached to the RAID team, and as such

provided validity to the new service (89). Further evidence was provided in Chapter 8 when 19 referrals made by the pharmacists were reviewed, and considered to be appropriate by two doctors independently. No information was previously available on the ability of a pharmacist to formally refer patients to specialist teams and as such this research provides valuable evidence to support this new role.

The greatest challenge encountered by both pharmacists involved in the research was the access to the information that was required to enable an informed clinical referral decision to take place rather than the completion of the referral itself. To complete the referral documentation effectively it was found necessary to establish the indication for the medication and the details of the patient's specialist mental health team (if they had one). Additional clinical information on the patient's usual baseline behaviour was desirable to help to determine whether any changes has occurred, as this was likely to be a reason for referral. In relation to dementia, information on recent review was required to establish when the antipsychotic was prescribed and if the risk and the benefit had been reviewed in accordance with the NICE guidelines. To establish the missing information the pharmacists often needed to seek information from the liaison psychiatry team who could access the electronic mental health records (RiO®) for patients under the care of the local teams (Birmingham and Solihull Mental Health Trust, BSMHT). In addition to providing the pharmacists with information that would aid the referral decision, this access also provided valuable clinical information that was subsequently documented in the patients' medical notes to aid continuity of care during the inpatient admission. This data gathering resulted in a significant number of patients not requiring a formal referral to be made to the RAID team as the pharmacists were able to document a mental health care plan in the medical notes for implementation during the hospital admission. It also highlighted how much of a problem access to clinical information can be when patients cross care sectors and the impact that this has on decisions regarding patient care.

In total 70% of patients received inpatient mental health support during their inpatient admission. Nearly half of the patients prescribed one of the study medicines in phase I were referred to RAID representing a 14% absolute increase from baseline (11). Interestingly, this increase was not continued in phase II when the total number of referrals was reduced. The most likely reason was for this change was the increasing number of patients who were managed more informally with the pharmacists acting as part of the multidisciplinary psychiatric liaison team. In general, the referrals made by the pharmacists were different to those generated by medical and nursing staff whose focus was on symptoms and behaviour as pharmacy referrals focussed

on medication safety. No single reason for pharmacist referral was found, although common reasons were identified and used to develop a pathway to guide referral decisions:

1. **Unknown indication for antipsychotic medication.** This aimed to ensure that all of the prescriptions had a clear indication for clinical need.

2. **Reason for admission was potentially related to an adverse effect e.g. fall, confusion or stroke.** To reduce patient harm and ensure a decision that balanced mental and physical health could be made by an experienced clinician.

3. **Patient was experiencing an adverse drug reaction e.g. dystonia.** To reduce patient harm and ensure a decision that balanced mental and physical health could be made by an experienced clinician.

4. **The patient had a diagnosis of dementia and was prescribed antipsychotics without evidence of a recent (<12 weeks) specialist mental health review.** This ensured that all patients within the hospital prescribed antipsychotics to manage challenging behaviour were reviewed regularly by a specialist as is recommended in the NICE guidance(52).

5. **Inadequately detailed treatment plan or review.** To ensure that patients community mental health plan could continue during the patients hospital admission and following discharge to ensure seamless care between primary, secondary and tertiary care services.

The importance of antipsychotic medication review in dementia patients suggested in the Banerjee report (29) was the initial drive for pharmacist referrals. However, all patients prescribed antipsychotics are considered to be at risk (1, 4, 38, 49, 52, 62) and as such all were included in the referral pathway. This was the correct decision as was evidenced by a diverse range of clinical conditions that led the pharmacists to make a referral. It was anticipated that patients prescribed medications for dementia would be referred to the hospitals liaison psychiatry team. However, as the prescription of a drug specifically for dementia can only be initiated by a psychiatrist in the NICE recommendations (21) hence it was found that patients admitted to hospital prescribed one of these agents were already under close and active follow-up by a CMHT and as such the PIR system was not needed for these medicines. This was confirmed by the number needed to refer (NNR) of 62, highlighting how the pharmacists made one referral every 62 patients prescribed one of these agents.

The atypical group of antipsychotics were implicated in most of the referrals. This was not unexpected as they were also the most frequently prescribed. It should be noted that although the typical antipsychotics were much less frequently prescribed, they accounted for a quarter of the referrals. When the referral and prescription rates were cross referenced it was found that the atypical antipsychotics had a NNR of 6.5, and the typical antipsychotics a NNR of 3.7 showing

how a referral was almost twice as likely to be required for the older agents. As adverse effects were a common reason for pharmacist referral these values are explained by their respective side effect profiles (1, 36, 38, 58). Adverse effects were identified in 12% of the patients prescribed antipsychotics here, adding further evidence to support that already in the literature of the patient harm that can occur with the prescription of these agents. Clozapine was the antipsychotic found to be associated with the highest ADR risk rate; aligning with the cautionary warnings in place surrounding its prescribing (1). The PIR process was found to be pivotal in the identification of ADRs and resulted in 69% of patient's medication being adjusted following mental health assessment where both the patient's mental and physical health needs were considered before dosage adjustments were made. Patient safety is key and the impact of the identification and subsequent management of antipsychotic associated ADRs should be used by pharmacy management to secure funding to support this new approach to clinical pharmacy.

9.1.3 Communication between Healthcare Practitioners

Challenges surrounding communication between primary and secondary care have been found in this research, which has also identified the sources in which mental health information is found and the health care professionals that have access to them. No single health care professional had access to the three sources of clinical information (GP, primary care mental health and hospital records) that were found to be necessary to provide a comprehensive mental health history in a newly admitted to hospital patient. As a consequence it was found that doctors clerking psychiatric patients had restricted access to health records which in theory could compromise patient care and outcome. The pharmacist's in this research ensured that there was a complete mental health history documented in the medical notes for the multidisciplinary team to review which was considered by the reviewing doctors to "assist the medical team in making holistic and informed clinical decisions". This was initially done with the pharmacists liaising with the RAID team in the first part of this research, but as the importance of pharmacy input was recognised their access was increased to include the community mental health records (Rio®). As such, the pharmacists here were the only members of the multidisciplinary team that had unrestricted and electronic access to the identified information sources required to give a full mental health history. It is recommended that there is a common electronic access point which pools information from all specialties which is easily accessible to the clerking doctor initiating management plans and the pharmacy team performing medicines optimisation. This would allow the clinical team to practice according to NICE recommendations which advise that each practitioner involved in a patient's care have the information they need to prescribe, administer and monitor medicines safely and evaluate their effects (111). The National Information Board (NIB) has recently (2016) been established by the Department of Health to ensure the NHS can

take better advantage of digital opportunity by maximising the potential of digital technology and data to bridge the gaps between care services. It aims to ensure that health care practitioners have full access to health care information to enable them to optimise the use of medicines, and as such should improve some of the issues of access to clinical information identified here.

In the first part of this research the pharmacists were found to make interventions not only regarding documentation of the mental health history as has already been discussed but also to have an impact on patient care. The value of pharmacy recommendations was confirmed in a second study in which entries in the medical notes made by pharmacy were reviewed independently by two doctors. Pharmacists of all seniority levels were found to be documenting clinical information into their patient's medical notes so that a complete record of information was available. As such the reluctance of pharmacists writing clinical information in the medical notes that has been discussed in the literature was not observed (91, 92, 101). It is hoped that this can be explained by the thought that pharmacists working within the hospital were considered a valued part of the multidisciplinary team, where their recommendations are reviewed and actioned thus giving the confidence to write in the patients notes that can be lacking. Pharmacy documentation was found to assist the medical team as the entries contained valuable information and clinical recommendations, which often prevented the need for a liaison psychiatry referral. One of the thoughts behind the fear of writing in the notes is a fear of criticism from doctors or worries around litigation (91). The positive comments made by the reviewing doctors on the quality and usefulness of the pharmacists entries here can provide evidence to support the value of pharmacist's entries in the medical notes and hopefully encourage more pharmacists to document their findings and recommendations.

A review of the discharge summaries revealed that only two thirds of the patients reviewed by RAID mentioned this review in the letter that is sent to the GP following discharge. Accurate, comprehensive transfer of information is essential in ensuring consistent treatment in primary and secondary care and can prevent a negative impact on patient care and health outcomes, including adverse events and readmission to hospital (109). As one third of patient discharge summaries contained missing information there is a need for improvements in transfer of information and care from secondary to primary care. This is in line with a recently published paper on the communication during transfer of care of older people which highlighted how the communication of accurate information can lead to better patient outcomes, reduce polypharmacy and prevent medicines related admissions. The paper discusses eleven communication tools that are currently used and as such perhaps the volume and variety of them, may be the source of the problem (112). As NHS hospitals in England are expected to be paperless

by 2020 then a single comprehensive, secure electronic system that enables effective communication and transfer of information between hospitals, GP surgeries and pharmacies is recommended. Work on this is underway, with the Academy of Medical Royal Colleges publishing a set of clinical requirements for information and digital technologies in healthcare.

9.2 Conclusions

Patient targeting according to the prescription of a medication for a mental health condition enhanced the clinical and timely management of the vulnerable mental health patient in the acute hospital setting. It is considered that the concept of patient targeting could have wider application if the generic principles developed here were applied to other high risk medications.

The PIR process provided evidence for the role of the pharmacist as a key member of the multidisciplinary psychiatric liaison team. No information was previously available on the ability of a pharmacist to formally refer patients to specialist teams using concerns over medication regimens as a driver for review.

The pharmacist referrals and clinical interventions seen in this research address the NHS England call for better medicines management in mental illness and the government call for action in dementia (57, 59). Although generalisability and reproducibility cannot be evidenced from studies involving only 2 pharmacists, and is a limitation of this research, it is the start of an exciting venture into the advancing role of the pharmacist and how we can find alternative roles that will take us forward in the changing NHS. This would be an extended role of the clinical pharmacist but would be an example of how health care professionals can work smarter together to provide the best possible outcomes for patients. As a new way of pharmacy working there are challenges to be overcome in staffing and funding if the idea is embedded more formally into practice. However, it is considered that the number needed to harm (NNH) rates seen here for the antipsychotics could be used as evidence to support the need for a referral process that ensures patient safety whenever antipsychotics are prescribed.

Access to information on admission, and the documentation available when patients transition between care sectors was found to be a problem, with the hospital making some strategic changes to improve the situation. With advancing technology and computer system availability it seems a surprise that a large, fundamental and well established governmental organisation like the NHS doesn't have a more widespread system for all Hospital Trusts to access. With an entirely paperless system planned for implementation by 2020 there is not much time to design and

develop a suitable system to improve these communication barriers within the individual trust and more widespread.

9.3 Key Messages and Recommendations

1. The pharmacy computer system contains information that, if used in real-time, could lead to changes in hospital clinical pharmacy processes by facilitating patient identification according to medication associated risk.

2. The PIR system developed in this research increased patient access to liaison psychiatry services as well as reducing the time from hospital admission to referral to the specialist psychiatric team. This gave more patients timelier access to the RAID team which is associated with significant benefit in terms of clinical outcomes for the patients and monetary outcomes for the Trust.

3. Access to clinical information is essential, with only the psychiatric liaison pharmacists having access to all of the sources deemed in this study to be essential for the successful inpatient management of the mental health patient in the acute trust. If the care of these patients is to be improved, government recommendations and NICE guidelines followed, this must change.

4. Pharmacists can be considered appropriately skilled health care practitioners to complete referrals to psychiatric services. Their recommendations in referrals and documentation in the medical notes were found to be valuable to the reviewing medical and psychiatric teams, adding additional evidence to the benefit of the pharmacist as part of the multidisciplinary team.

5. The risks associated with the prescribing of antipsychotics was confirmed, with ADRs identified in this research. Patients with all mental health conditions were seen, and as such efforts in regularly reviewing these medications should be considered in all patients and not just those with dementia.

9.4   Research Outcomes

9.4.1 Hospital Policy and Strategic Recommendations

The hospitals policy for the management of the behavioural and psychological symptoms of dementia (BPSD) was reviewed and updated by the specialist pharmacist following discussion with both the RAID consultant and the wider tertiary mental health trust. Haloperidol was removed and lorazepam recommended, with the advice to refer to RAID all patients that did not settle following this first line approach.

The pharmacists involved in this research were both awarded an honorary contract with the tertiary mental health trust in March 2014 to enable them to have access to the electronic community mental health records (Rio®). They were the only health care professionals that could be identified that had access to the three clinical data sources found in this research to be required to obtain a complete history for a patient who is admitted to the acute hospital with a mental health diagnosis.

All junior doctors (FY1 and FY2) working at City Hospital were given computerised access to GP records (SCR®) in August 2015 to facilitate medicines reconciliation on admission. Discharge letters and psychiatric reviews done by the RAID team have been made available on the hospitals electronic system (CDA®) to ensure there is wider access to psychiatric information.

Pharmacists working on the hospitals 35 bedded acute medical assessment unit (AMU) now review patients in a more strategic way. Pharmacy services are first targeted to the most unwell patients on the ward as defined by their need to be in a monitored bed. Secondly, the pharmacists review all patients who have missed doses of medication according to their medication chart to facilitate the NPSA target of reducing harm from omitted and delayed medicines in hospital. Following review of these patients the pharmacists then use the electronic bed management system to determine when the patients were admitted to the hospital to ensure that on this high turn-over ward the medicines optimisation targets of medication review within 24 hours of admission are achieved.

The PIR process as outlined in this research ceased in July 2015 when the specialist pharmacist went on maternity leave and the band 7 pharmacist left the Trust. However the methodology is currently used by the antimicrobial pharmacist to identify patients in the Trust who are prescribed antibiotics outside of the Trust guidelines as well as certain 'high risk' antibiotics (daptomycin, piperacillin and tazobactam, co-trimoxazole IV, meropenem) to guide the daily antimicrobial stewardship ward round. Although patients prescribed medicines for mental health conditions are not currently identified and reviewed automatically the RAID team accept referrals from all pharmacists where there are concerns around management or safety regarding their medication. It is planned to present the data now available on NNH and NNR to the new chief pharmacist (starting July 2017) for review and consideration.

9.4.2 Academic Outcomes
The ideas and concepts developed in this research have been presented to facilitate sharing of ideas to promote dissemination in other Hospital Trusts.

9.4.2.1 Posters Presentations at National and International Conferences

Year	Title	Conference
2012	Using pharmacy dispensing records to categorise patients referred to a psychiatry liaison service in secondary care: An exploratory study	The Royal College of Psychiatrists Faculty of old age psychiatry annual meeting, Cardiff, UK
2013	An innovative approach to Mental Health Inpatient Management in a General hospital	Psychiatric Accreditation Network Conference: Improving Mental Healthcare in General Hospitals, London, UK
2014	Clinical Pharmacy Referrals and Interventions: A New Pharmacy Role in General Hospital Liaison Psychiatry	Royal Pharmaceutical Society of Great Britain Annual Conference, Birmingham, UK
2015	1. Improving access to mental health services: A new pharmacy role in general hospital liaison psychiatry 2. Adverse drug reactions from antipsychotics contributing to admissions in an acute general hospital 3. Improving access to specialist pharmaceutical care: An alternative model to ward based pharmacy services	European Association of Hospital Pharmacists Annual Conference, Hamburg, Germany
2015	ADRs from antipsychotics contributing to admissions in an acute general hospital	Royal College of Psychiatry Annual Conference, Birmingham, UK

Table 29. Academic outcomes from this research. Posters presented at National and International conferences.

9.4.2.2 Invited Speaker at Conferences

2013   Pharmacist 'Intelligent' referrals to a Liaison Psychiatry Team. West Midlands NHS Annual Innovation Day, Birmingham, UK

2015   Mental Health Pharmacy. Invited keynote speaker at Hospital Pharmacy England Conference, Birmingham, UK

9.4.2.3 Awards and Research Grants

2013   The 2013 'Galen Award' from Pharmacy Research UK. Research grant of £24,000 awarded to support research in mental health pharmacy.

2013   Sandwell and West Birmingham Hospitals NHS Trust Staff Awards. Runner up in the innovations category for mental health pharmacy research work

2013   NHS Hero Award for mental health pharmacy work

2015   British Medical Journal Awards. Runner up in the mental health category

9.4.2.4 Publications

- Schneider C, Balloo S, Hashmi M, **Hughes J**, Mustafa N, Nabi S, et al. Using hospital pharmacy dispensing records to categorise referrals to the RAID service: a preliminary study. International Journal of Pharmacy Practice. 2012 (Sup 1); 20:35-6.

- Schneider C, **Brooks J** and Maidment I. Antipsychotic prescribing in Dementia: Are we solving the Problem? Ageing Health. 2013; 9: 69-71

- **Brooks J**, Hashmi M, Hebron B and Schneider C. Increase referrals intelligently and boost access to specialist advice. Clinical Pharmacist. 2013; 5: 176-178

- **Brooks J,** Schneider C, Wilson K, Hashmi M and Hebron B. Adverse drug reactions from Antipsychotics contributing to admissions in an Acute General Hospital. International Journal of Pharmacy Practice. 2015 (Sup 1) 23: 28-29

- **Brooks J,** Schneider C, Wilson K, and Hebron B. Patient identification according to prescribed medication: An alternative model to ward based clinical pharmacy services. International Journal of Pharmacy Practice. 2015 (Sup 1) 23: 28-29

- **Brooks J**, Schneider C, Wilson K, Hashmi M and Hebron B. Targeting hospital inpatients by prescribed medication: Improving access to Mental Health Services. International Journal of Pharmacy Practice. 2015 (Sup 1) 23: 28-29

- **Brooks J**, Holland K and Hashmi M. Clinical Pharmacy Interventions Pilot and referrals to a liaison psychiatry team. Royal College of Psychiatry: Liaison Faculty Newsletter. 2015; 15: 8

- Hawkes N, **Brooks J**. Mental Health Team of the Year (BMJ Awards 2015): The Pharmacy and Psychiatry Project. BMJ. 2015; 350: 1856-1857

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Appendices:

Appendix 1

The RAID referral form. This is the standard form that is used by the medical and nursing staff within the Trust to refer patients requiring a mental health review to the RAID team.

Birmingham and Solihull NHS
Mental Health NHS Foundation Trust

Sandwell and West Birmingham Hospitals NHS
NHS Trust

'No Health Without Mental Health'
Liaison Psychiatry Referral Form
Rapid Assessment Interface and Discharge (RAID)

Patient name:	Consultant:
DoB:	Speciality:
Address:	Location:
(Or insert patient sticker)	Date & time:
	Interpreter needed?

Reason for admission:

Physical condition and plan:

Medication:

Reason for referral to Mental Health:

Past psychiatric history and contacts (including drugs and alcohol):

Current mental state examination (behaviour, cooperation, speech, mood, cognition, confusion, hallucinations, delusions, paranoia, suicidal thoughts):

Identified risks:

Has referral been discussed with patient? If not, why?

| Referrer name | Designation (Dr or senior nurse) | Contact details/bleep |

Fax referral form to 0121 507 6065.
To discuss this referral further, please telephone ext. 6063/6064.

Appendix 2

The Pharmacy referral data collection tool (v1). The tool used prospectively in the feasibility study that will facilitate the review of the impact of the service.

Pharmacy Review 'Data Collection Tool'

Review Information
Source of information: ☐Rx information via JAC   ☐Pharmacy 'POD's
                      ☐Other..
Date information received:...
Date of admission to hospital:...
Date ward first visited:..
Time spent on ward for first referral:..

Medicines Reconciliation
Complete Psychiatric Medication Drug History Documented in the notes: ☐Yes   ☐No
DH confirmed by: ☐Clerking Dr   ☐Pharmacist   ☐Technician   ☐Other
Sources used: ☐Patient   ☐'PODs'   ☐GP letter   ☐Graphnet
                    ☐Repeat Rx   ☐Printed 'MAR' form   ☐Recent med notes   ☐CPN
                    ☐Other..
                    ☐ Rio   ☐ Epex

Liaison Pharmacist needed to perform additional Med Rec: ☐Yes   ☐No
Medidose Patient: ☐Yes   ☐No

Additional Medication Details
Antipsychotic medication:

Indication:

Approximate start date:

Team managing antipsychotic medication:

Evidence of regular review or follow up:

Pharmacy Referral to RAID Team
Referral Initiated: ☐Yes ....
                   ☐No...
Date of referral...

Method of referral:☐Phone   ☐Personal   ☐Daily RAID meeting   ☐Other.............................
Who referred to: ☐Team   ☐Consultant   ☐Other Doctor   ☐Physician's Assistant
                   ☐Manager   ☐Nurse   ☐Other...
Patient referred to RAID by medics?   ☐No
                                             ☐Yes: Date...
                                                    Reason...

Appendix 3

The Pharmacy data collection tool (v2). The tool used prospectively in study I to collect data on the patients referred and the reasons for the decision.

	Reference No.

Pharmacy Review 'Data Collection Tool'

Review Information
Source of information: □ JAC   □Pharmacy 'POD's   □ Other
Date and time alert **received**……………………………………………………………………………
Date and time alert **viewed**………………………………………………………………………………
Date and time of admission to hospital……………………………………………………………………
Date ward first visited:……………………………………………………………………………………
Time spent on ward for first referral:………………………………………………………………………

Medicines Reconciliation
Complete Psychiatric Medication Drug History Documented in the notes: □Yes   □No
DH confirmed by: □Clerking Dr   □Pharmacist   □Technician   □Other
Sources used: □Patient   □'PODs'   □GP letter/call   □Graphnet
                        □Repeat Rx   □Printed 'MAR' form   □Recent med notes   □CPN
                        □ RAID (Epex or RIO) □Other……………………………………………………

Liaison Pharmacist needed to perform additional Med Rec: □Yes   □No
Medidose Patient: □Yes   □No

RAID information needed to confirm psychiatric medication or history   □Yes   □No
Additional info on meds or history added to notes by liaison pharmacist   □Yes   □No

Additional Patient Details
□Acute Medical Admission   □ Acute surgical admission   □ Elective Surgery   □ Outpatient

Antipsychotic medication:

Indication:

Approximate start date:

Team managing antipsychotic medication:
Known to CMHT: □ BSMHT   □ Other CMHT   □ No

Pharmacy Referral to RAID Team
Referral Initiated: □Yes   □No (but patient discussed)   □No

Reasons for decision
No   Yes
□ Not needed (meds and follow up appropriate) □ Indication for antipsychotic unknown
□ Already referred by ward or A+E   □ Admission related to adverse effect (fall/confusion)
□ Patient discharged prior to view   □ Potential adverse reaction eg: dystonia
□ Already reviewed this admission   □ Dementia patient prescribed antipsychotic
□ Medication started by RAID   □ Inadequate information on review or follow-up
□ Info provided by pharmacist to clarify issues □ At the request of parent medical team or nurses
□ Other……………………..   □ Pharmacist recommends a psychiatric review
                                                          □ Other……………………………………………………
Date and time of referral……………………………………………………………………………………

Method of referral:□Phone   □Personal   □Daily RAID meeting   □Other…………………………
Who referred to: □Team   □Consultant   □Other Doctor   □Physician's Assistant
                        □Manager   □Nurse   □Other…………………………………………...

Appendix 4

A database was designed to ensure all of the data was collected and recorded prospectively for future analysis.

Appendix 5

Protocol for pharmacist referral to RAID

Guidance on Pharmacist Review of Medication for Mental Health Conditions and referral to RAID

Patient Prescribed medication for mental health condition eg: antipsychotic or mood stabiliser

Medication history for mental health conditions confirmed and documented in the medical notes (if not completed already). Where possible include information on usual CMHT, CPN, diagnosis and information on recent review and planned follow-up (see information on sources)

Pharmacist completes a clinical medication review and assesses the patient for the need to refer to RAID

RAID Referral required?

YES →

Reasons for RAID referral
- ✓ Evidence of challenging behavior or mental health issues requiring further support
- ✓ Admission related to adverse effect of medication (Box 1)
- ✓ Potential adverse reaction (Box 1)
- ✓ Dementia Patient without evidence of need (Box 2)
- ✓ Inadequate information on review or follow-up
- ✓ Request of medical or nursing team
- ✓ Pharmacist recommends a psychiatric review

NO →

Reasons for NOT referring to RAID
- ✓ Not needed – evidence of CMHT support, patient stable and admission not related to MH issues or medication. Information either in the notes already or clarified and documented by pharmacist.
- ✓ Patient already referred to RAID

Pharmacist discusses the recommendation of a RAID referral with the doctors/nurses/patient

Referral agreed?

YES →

Discussions are documented in the medical notes and the RAID referral completed. This is faxed to RAID as standard process or given in person if discussion needed

NO →

If agreement to referral not obtained, the pharmacists recommendations are documented in the patients notes.

Box 1: Adverse Effects of Antipsychotics
- ☐ Parkinsonism
- ☐ Sedation/Confusion
- ☐ Falls
- ☐ Cardiac arrhythmias
- ☐ Stroke/TIA
- ☐ Postural Hypotension
- ☐ Neuroleptic malignant syndrome
(hyperthermia, fluctuating level of consciousness, muscle rigidity, tachycardia, sweating, labile BP and urinary incontinence)

Box 2: Dementia
Antipsychotic drugs are known to be harmful and can have severe side effects. They should not be used routinely for dementia related psychosis and or behavioural disturbances (the only exception is risperidone which has a limited short-term indication for Alzheimer's). A person prescribed these drugs should be monitored for side effects and progression of symptoms. The elderly are at the highest risk of side effects and there is a small increased risk of death when used to treat dementia in this patient population due to cardiovascular and cerebrovascular risk.

All patients prescribed **antipsychotics for dementia** should receive an **inpatient RAID referral UNLESS** it can be confirmed that they are under **regular review** and follow-up by a community mental health team **AND** their **admission is not related to a potential adverse effect** of an antipsychotic.

Additional supporting information to aid alternative pharmacist in RAID referrals

<u>Supporting Information</u>

First generation (older) antipsychotics
Benperidol, Chlorpromazine, Flupentixol, Haloperidol, Levomepromazine, Pericyazine, Perphenazine, Pimozide, Prochlorperazine, Promazine, Sulpiride, Trifluperazine and Zuclopenthixol

Second generation (newer) antipsychotics
Amisulpiride, Aripiprazole, Clozapine, Olanzapine, Paliperidone, Quetiapine and Risperidone

Mood stablilisers
Carbamazepine, Lithium, Valproic Acid

<u>Sources of Information</u>

RAID (Birmingham and Solihull Mental Health Trust and inpatient review at City Hospital)
- Consultants Dr Mahnaz Hashmi and Dr Juhi Sharma, Team Manager Amy-Clarie Ledger, Consultant Psychologist Dr Eliza Johnson or any of the psychiatric liaision nurses.
- RAID office Extension: 6063 or 6064
- Can access RIO. This is the information database for all patients under Birmingham and Solihull Mental Health Trust and will detail diagnosis, medication, phone numbers of usual team, CPN, recent clinical letters and visits as well as planned appointments.
- Pharmacy at Birmingham and Solihull Mental Health Trust. Needed for Clozapine dispensing and blood results. Tel: (0121) 301 5184 or (0121) 301 5160

Black Country Partnership Mental Health Trust
- Information on patients under alternative local CMHT. Can provide information on patients under their care usually on receipt of phone call followed by fax.
- Older Adults.   Dr Blissett   Tel: (0121) 612 8203 or (0121) 612 8206
- Younger Adults   Dr El-Hilu   Tel: (0121) 612 8661

<u>Policies, Procedures and National Guidance</u>

SWBH Local Trust Guidance (Trust Intranet)
- Dementia
- Management of delirium
- Rapid Tranquilisation

BSMHT Guidance (Accessed via RAID and Pharmacy S Drive)
- Guidance for the management of challenging behavioural and psychological symptoms in dementia
- Rapid Tranquilisation
- Clozapine dosing and monitoring

NICE Guidance (accessed via app or internet)
- CG123: Common Mental Health Disorders
- CG82: Schizophrenia
- CG42: Dementia
- QS30: Supporting people to live well with dementia
- CG38: Bipolar disorder

NICE Technology Appraisals on specific drugs (accessed via app or internet)
- TA123: Schizophrenia – Aripiprazole
- TA217: Alzheimer's disease – Donepezil, Galantamine, Memantine and Rivastigmine

Appendix 6

Updated pharmacy data collection tool to include alternative pharmacist.

☐ Database	Pharmacy Review 'Data Collection Tool'	Reference No.

Alert Information
Information Source: ☐ JAC   ☐ PODs   ☐ Other...........................
Alert received: Date..   Time............................

Patient Information
RXK number... Initials................. Age.................... Sex: M   F
Alert drug(s).. ....Ward.................
Hospital Admission: Date...........................Time............................ Speciality:...
Reason for admission:..

Ward Review
Completed by: ☐ Julie   ☐ Kate   Time taken...
Ward Visit: Date.. Time..
Reason for admission ☐ Medical   ☐ Emergency surgery   ☐ Elective surgery   ☐ Outpatient
Medicines Rec Completed: ☐ Yes   ☐ No...................................☐ Done by Julie/Kate
<u>Mental Health Medication Review</u>
Medication Prescribed: ☐ 1st Generation   ☐ 2nd Generation   ☐ > 1 Antipsychotic   ☐ Dementia
☐ Antidepressant   ☐ Mood stabiliser   ☐ Benzodiazepine   ☐ 'Z' drug
Indication for MH medication in medical notes: ☐ Yes   ☐ No.....................☐ Done by Julie/Kate
Indication: ☐ Dementia...☐ Bipolar ☐ Schizophrenia ☐ Depression ☐ Psychosis
☐ Schizoaffective Disorder   ☐ LD   ☐ None MH   ☐ No clear indication
☐ Other.......................................
Information sources used: ☐ GP   ☐ CPN   ☐RAID   ☐ Other CMHT   ☐ Patient
Patient known to CMHT? ☐ BSMHT   ☐ Birmingham ☐ Other   ☐ No
Evidence of regular CMHT review?   ☐Yes   ☐ No
<u>Notes</u>

<u>Pharmacist contribution to care</u>
Liaison with: ☐ RAID ☐ CMHT ☐ CPN ☐ GP   ☐ Medical Team   ☐ Nurses
Documentation in notes ☐ Yes (small entry)   ☐ Yes (detailed >1/2 page) ☐ No
Pharmacy Follow up needed: ☐ Yes ☐ No. Reason...

Pharmacy Referral Information
Referral Initiated: ☐ Yes (RAID) ☐ Yes (Other CMHT) ☐ Informally discussed ☐ No

<u>Yes</u> (tick all that apply)
☐ Evidence of challenging behaviour/MH issues
☐ Admission related to Adverse effect
☐ Potential adverse reaction
☐ Dementia patient without evidence of need
☐ Inadequate information on review/follow-up
☐ Request of medical or nursing team
☐ Pharmacist recommends psychiatric review
Referral Date........................... Time.....................

<u>No</u> (tick all that apply)
☐ Not needed
☐ Patient already referred by ward/A+E
☐ Patient discharged prior to view
☐ Medication started by RAID
☐ Outpatient
☐ No pharmacist available to review (holiday/sick)
<u>Informally discussed</u>
☐ Pharmacist clarified any issues and documented

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