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**Antipsychotic medication side effects knowledge amongst registered mental health nurses in England: A National Survey**

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### What is known on the subject?

- Research findings (Soerensen *et al.*, 2013) indicate the percentage of knowledge related errors in medicines management is high, accounting for approximately 75% of all errors, with insufficient knowledge levels one of the most significant contributors of medication errors. Patients should be able to trust nurses to engage therapeutically and actively listen to their needs and concerns, responding using skills that are helpful, providing information that is clear, accurate, meaningful and free from jargon (Walker, 2014). However, without knowledge of pharmacology, it is impossible for nurses to be able to provide adequate advice.

### 2: What the paper adds to the existing knowledge

- This study has examined an area that had not yet been systematically examined previously, which draws together previous research findings on mental health nurses' knowledge of adverse events, including side effects and medication errors, related to antipsychotic medication within NHS inpatient settings.

### 3: What are the implications for practice?

- A recent study (Iversen *et al.*, 2018) has found that almost three-quarters (73%) of patients taking antipsychotic medication reported side effects to some degree. This high number of people experiencing antipsychotic medication side effects is likely to compromise care, especially in situations where nurses have inadequate knowledge of side effects and are unable to provide effective advice to patients.
- The findings from this study allow the mental health nursing profession an opportunity to reflect on the best means to increase knowledge and increase patient safety awareness and benefits for mental health service users.

## Abstract

### *Introduction:*

Antipsychotic medications play a significant role in the treatment and recovery of people with several psychiatric disorders. However, research findings indicate mental health nurses are insufficiently knowledgeable about antipsychotic medication side effects.

### *Aim:*

To assess practising mental health nurses' knowledge of antipsychotic medication side effects using a Multiple-Choice Questionnaire (MCQ) across National Health Service (NHS) Trusts in England.

### *Hypothesis:*

Knowledge of antipsychotic medication side effects amongst registered mental health nurses is related to their academic qualification, clinical banding and length of experience.

### *Method:*

A national survey of registered mental health nurses was carried out using an online questionnaire which was disseminated by Research and Development departments.

### *Results:*

504 questionnaires were returned, 245 of which had full data and further analysed. The mean score for the sample was 14.4 and only 21 participants attained a mark of >80%.

### *Implications for Practice:*

Two out of three of our hypotheses (that length of experience and clinical banding are directly related to knowledge of antipsychotic medication side effects) were supported. Our study found many nurses have a suboptimal working knowledge of antipsychotic medication side effects which has the potential to compromise care. Strategies need to be put in place to enhance pharmacology knowledge.

### *Keywords:*

Antipsychotic, side effects, mental health, nurse, knowledge

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3 **Relevance Statement**  
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5 Drug errors in nursing (including mental health nursing) are common. Previous studies  
6 suggest many of these errors can be attributed to mental health nurses' poor knowledge of  
7 psychopharmacology and more specifically, side effects. Medicines errors can cause patient  
8 harm and, in some instances, can be fatal. Despite the importance of the subject, to our  
9 knowledge, our study is the only one we are aware of that has directly assessed mental  
10 health nurses' knowledge of side effects. Results from our study can potentially influence  
11 clinical practice from a therapeutic and safety perspective and shape Continuous  
12 Professional Development for mental health nurses.  
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For Peer Review

## Background

Antipsychotic medications can play a significant role in the treatment and recovery of people with mental health disorders and in many respects, they are considered a first line of treatment for people suffering from a psychotic illness (Leucht *et al.*, 2012). Patients and their carers also place a high importance on the use of antipsychotics (Gray *et al.*, 2005; Mancini *et al.*, 2005; Piat *et al.* 2009) but questions remain about their safety and tolerability when used long term. An enduring and troubling feature of these medicines is their potential for causing serious adverse effects of a degree that can obscure the very reason for their prescription in the first place. For example, evidence suggests that patients taking antipsychotics are three times more likely to die suddenly from cardiac arrest or stroke than the general population (Salvo *et al.*, 2016). Other potentially fatal side effects include cardiac arrhythmias, weight gain, neuroleptic malignancy and the serotonin syndrome. Furthermore, an often-overlooked complication of antipsychotic usage is, some of their side effects, like akathisia, often mimic underlying mental health symptoms and can be confused with actual symptoms of the illness (Mutsatsa *et al.* 2003). Additionally, there is evidence of polypharmacy globally (Barnes and Paton, 2011) and an injudicious use of antipsychotics leading to debilitating emotional, cognitive and physical effects on the patient and non-adherence to treatment (Mancini *et al.*, 2005).

Non-adherence to antipsychotics is apparent in a high proportion of patients (up to 90%) which can trigger a myriad of problems for the patient including illness relapse and re-hospitalisation (Higgins, 2007). In this respect, the use of antipsychotic medicines poses important challenges for mental health nurses working in in-patient settings. In these settings, nurses are responsible for administering each medication dose to the patient, as well as being alert for monitoring potential side effects and their management. Furthermore, it is estimated that 40% of a nurse's clinical time is involved with medicines related issues (Armitage and Knapman, 2003) and to compound matters, the repertoire of mental health medicines has expanded over the last six decades and shows no signs of abating, thus making the decision-making process more complex (Glick and Rush, 2016). Consequently, the ability of mental health nurses to manage medicines safely and give appropriate advice to patients has been called into question (White, 2004).

There is consistent evidence suggesting that nurses in general have inadequate working knowledge of pharmacology (Page and McKinney, 2007; Jones *et al.*, 2010; Ronnie Meechan *et al.*, 2011; Keijsers *et al.*, 2012; Wiernik and Public Policy Committee of the American College of Clinical, 2015) and this has frequently resulted in suboptimal care to patients. Moreover, nurses have reported to be lacking in confidence when discussing treatment options with patients, carers and medical colleague (Bressington *et al.*, 2013). A lack of knowledge about these medicines can lead to errors during the management process as demonstrated by a relatively recent study that observed administration errors accounted for 75% of all medicines related errors (Soerensen *et al.*, 2013) and can result in patient harm. For example, anecdotal

evidence suggest that nurses frequently mistake the side effects of neuroleptic malignant syndrome or akathisia with psychotic agitation. This can result in the nurse administering when necessary antipsychotic medication (PRN) but the solution in this case is to withhold administering antipsychotic medication to the patient. In addition to patient harm, medicines errors can cause significant financial burden for health-care providers due to remedial treatment costs and potential litigation expenses (Latter *et al.*, 2000). Therefore, the evaluation of mental health nurses' knowledge of side effects is a valuable starting point towards understanding the problem.

Although many studies have examined side effect knowledge of mental health nurses, most of these studies used surveys that sought student nurses' views (Page and McKinney, 2007) or registered nurses and lecturers' views about pharmacology education (Latter *et al.*, 2000; Skingsley *et al.*, 2006). A significant drawback of self-report approach is nurses often rate their knowledge of psychopharmacology as higher than their actual knowledge (Ives *et al.* 1996; R. Meehan *et al.*, 2011). To overcome this shortcoming, this study used a direct objective questionnaire, exploring registered mental health nurses' knowledge of side effects related to antipsychotic medication, within NHS inpatient settings. Only one study to our knowledge has systematically and directly examined mental health nurse's knowledge of side effects (De Hert *et al.*, 2016). However, De Hert *et al.* only examined the side effects of clozapine, with their study based in Belgium.

### **Aim**

The aim of this study was to directly assess practising mental health nurses' knowledge of antipsychotic medication side effects using a Multiple-Choice Questionnaire (MCQ) across different National Health Service (NHS) Trusts in England. Specifically, the study sought to test the hypothesis that the knowledge of side effects amongst registered mental health nurses is related to their academic qualification, clinical banding and length of experience.

### **Method and design:**

This study employed a cross sectional questionnaire survey to examine knowledge of antipsychotic medication side effects of registered nurses working in in-patient services in the NHS. The questionnaire was developed by the authors based on commonly known side effects as stated in the British National Formulary (BNF, 2017) and common antipsychotics side effects reported to the National Reporting and Learning system (NRLS) from 2005 to 2016. The authors filtered the data from the NRLS using the following categories; *Mental Health Unit/Facility; Inpatient areas; Medication; Patient age range (all available selected); Patient age at time of event (all ages selected); Speciality (Adult mental health, child and adolescent mental health, forensic mental health, inpatient assessment and treatment, mental health rehabilitation and older adult mental health); Medication Process (all available selected); Medication error (all available selected); Degree of harm (all available*

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3 *selected); Antipsychotic medications (other psychotropic medications excluded); Route (Oral,*  
4 *Intramuscular & 'blanks');* Year (2005-2016).

6 Analysis of the NRLS data using the (above) filters, indicated errors related to clozapine,  
7 olanzapine, quetiapine, haloperidol, chlorpromazine and risperidone accounted for  
8 approximately 60% of all reported incidences. Thus, the survey included MCQs specifically  
9 related to these antipsychotics.  
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12 It was initially piloted on 10 individuals from the first authors NHS hospital trust and the  
13 feedback received from participants and interpretation of responses led to a reduction in the  
14 number of questions asked. The final version had 6 items related to demographic data and a  
15 further 24 questions in the main body. There were 4 answer options, with one correct answer  
16 only. Each correct answer awarded a mark of one, with a possible total score of 24 (100%). A  
17 score of 19 (80%) or more gave participants a pass mark. This threshold of 80% is generally  
18 accepted as the standard pass mark for pharmacology and has been used in previous studies  
19 (Ndosi and Newell, 2009). The questionnaire was conducted online and the weblink was  
20 disseminated by Research and Development departments. All 57 mental health trusts in  
21 England were invited to participate in the study. The design was deemed appropriate for this  
22 study as MCQs can test more than one isolated fact recall (McCoubrie and McKnight, 2008).  
23 They are appropriate for measuring knowledge and comprehension and can be designed to  
24 measure application and analysis (Kaur *et al.*, 2016).  
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32 Only registered mental health nurses, with a clinical banding of 5 and above, working in  
33 inpatient settings were eligible for the study. Clinical banding refers to the pay scale used in  
34 the UK's NHS to pay employees appropriately, according to their abilities and responsibilities,  
35 under the Agenda for Change (AfC) Scheme, 2019. There are 9 bands (1-9) but this study only  
36 included nurses who were a band 5 or above as this is the starting clinical band for qualified  
37 nurses.  
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42 We defined inpatients as any hospital settings where nursing staff have responsibility for  
43 patient medications and these settings include acute admission wards, psychiatric intensive  
44 care units and recovery settings. To estimate an a priori sample size need for the study, a  
45 method of power estimation where the population under study is known was used  
46 (Denscombe, 2014). The Department of Health (DH) indicate that there was approximately  
47 19,000 RMNs working in NHS inpatient mental health wards at the time of the study (Rahman,  
48 2018). Using this figure and a confidence level of 95%, a sample size of 378 was extrapolated  
49 from a chart (Krejcie and Morgan, 1970; Denscombe, 2014).  
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#### 54 Procedure

55 Ethical approval was obtained from the Health Research Authority (HRA) and the Research  
56 Ethics Committee based at the academic institution the research was completed in, after  
57 which recruitment of participants in NHS mental health trusts across England was initiated  
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3 from September 2017 and ended in Mid-February 2018. To help with the efficient distribution  
4 of the questionnaire nationwide, Research and Development (R&D) teams of various NHS  
5 trusts were enlisted to disseminate the survey. In addition, social media sites (specifically  
6 Twitter and Facebook), were used to promote and maximize exposure of the study.  
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9 The data was analysed using SPSS version 24 (IBM, 2018). Initially, descriptive statistics were  
10 used to explore the demographic characteristics of the sample. Further, multiple regression  
11 techniques were used to establish relationships between variables and a [One-Way Analysis  
12 of Variance \(ANOVA\)](#) was used to estimate group differences and subsequent post hoc tests.  
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## 15 16 **Results**

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18 In total 504 questionnaires were returned. Of these, 245 (48.6%) questionnaires were  
19 returned with full data, 165 (32.7%) respondents only entered demographic data and a  
20 further 94 (18.7%) clicked the link but did not complete any aspect of the survey. The mean  
21 score for the sample was 14.4 (60%) with a standard deviation of 3.4. The scores ranged from  
22 2 (8.3%) to 22 (91.7%) and only 21 (8.6%) out of 245 participants attained a mark of 80% or  
23 above.  
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### 26 27 *Respondents' characteristics*

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29 As shown in *Table 1*, most of the respondents were White British and females and this is in  
30 accord with previous research that has examined ethnicity and gender on inpatient  
31 psychiatric wards (Bowers *et al.*, 2009). The sample age ranged from 21 years to 61 years or  
32 over, with most nurses being in the 41-50 years age category, accounting for 28.6% of the  
33 total sample. Just less than half of the respondents, 121 (49.4%), had completed a Bachelor's  
34 degree with the second largest group (79) having an associate degree/diploma (32.2%). There  
35 were only 37 (15.1%) of respondents who had completed a master's degree and none who  
36 had completed a PhD. With regards to clinical banding, most of the respondents worked as  
37 Band 5 (40.0%), band 6 (32.2%), Band 7 (20.8%), Band 8 or above (5.7%). Band 6 nurses  
38 recorded the lowest pass rate with only 2.5% of participants passing. The group that  
39 registered the highest rate of passes was the Band 8 or above group with 28.6% of participants  
40 passing. When the percentage of those who passed was analysed by level of education  
41 further, the data revealed that level of educational attainment was not associated with pass  
42 rates in the survey. *See table 2 below for further details.*  
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### 50 51 *Statistical analysis*

52 The outcome variable of interest (total knowledge scores on the MCQ) was tested for normal  
53 distribution to justify the use of using statistical tests. The data was explored for skewness  
54 and kurtosis was tested which was 1.3 and -0.8 respectively, suggesting normal distribution  
55 (Peat and Barton 2008). For total knowledge scores, the mean scores between the groups  
56 (clinical banding and educational level) were compared using a one-way ANOVA. For clinical  
57 banding the results showed there was an in-group difference which was statistically  
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3 significant ( $F=4.3$ ,  $df=3$ ,  $p=.01$ ). To determine which groups differed, a post hoc Bonferroni  
4 test was conducted and revealed that Band 8 nurses scored significantly better than Band 5  
5 nurses. However, this was only at trend level ( $p=0.08$ ). For level of education, the difference  
6 in scores were not statistically significant ( $F=.094$ ,  $df=2$ ,  $p=0.91$ ). *See table 3 below for further*  
7 *details.*  
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11 A stepwise linear regression was carried out to determine whether nurses' knowledge of  
12 antipsychotic medication side effects was influenced by age or length of service. Only length  
13 of service appeared to significantly influence knowledge of antipsychotic medication side  
14 effects but accounting for only 4% of the variance (Adjusted  $R^2=0.04$ ,  $df=1$ ,  $p=0.001$ ). This  
15 indicates that nurses who have been working for a relatively longer period are more likely to  
16 have a better knowledge of side effects. To determine if the regression analysis was  
17 sufficiently powered to minimise the potential of a type 2 error, a confirmatory post hoc  
18 power analysis as recommended by Soper (2018) was carried out. Using results from the  
19 regression analysis of an effect size of 0.04, a probability level of 0.05 and a sample size of  
20 245 revealed that the study is powered at 82%. A sample size powered at 80% or above is  
21 normally considered to be adequate to avoid a type 2 error (Magnusson, 2018). Hence, our a  
22 priori sample estimate of a minimum of 378 was in fact an overestimate of the true sample  
23 size required.  
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## 29 Discussion

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31 This study sought to examine the hypothesis that knowledge of side effects amongst  
32 registered mental health nurses is related to their academic qualification, clinical banding,  
33 and length of experience. The study found that only length of experience and clinical banding  
34 was related to the level of side effects knowledge. In other words, those who have been  
35 working as mental health nurses for a longer period were more likely to have a better  
36 knowledge of antipsychotic medication side effects. Equally, those who were of a higher  
37 clinical banding were more likely to have a better knowledge of side effects than those of  
38 lower banding. However, higher clinical banding could simply reflect length of service.  
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43 A key finding from this study is that only 21 (9%) of the nurses who took part passed at the  
44 80% threshold. This finding supports the view that mental health nurses have a relatively poor  
45 knowledge of antipsychotic medication side effects and this is in line with previous findings  
46 by (De Hert *et al.*, 2016) who assessed side effects knowledge of clozapine of 85 mental health  
47 nurses in Belgium. They found that only 25% of participants passed the test. The difference in  
48 pass rate between De Hert and colleagues and our study could be explained by the pass  
49 threshold used. Whilst our study used an 80% pass threshold, De Hert and colleagues used a  
50 50% pass threshold and focused on clozapine side effects. Furthermore, demographic and  
51 cultural differences could have accounted for the differences.  
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56 From a service user perspective, limited knowledge of side effects has led to treatment  
57 dissatisfaction according to some investigators. Concerns about nurses' purported lack of  
58 recognition and attention to adverse medication effects are prominent topics of discussion  
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3 for patient self-support groups (Gray *et al.*, 2005). Considering that a recent study found that  
4 nearly three-quarters (73%) of patients taking antipsychotics reported side effects to some  
5 degree (Iversen *et al.*, 2018), the findings from this study assume an even greater clinical  
6 significance.  
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10 This relatively high number of people experiencing antipsychotic medication side effects is  
11 likely to compromise care, especially in situations where nurses have inadequate knowledge  
12 of side effects and are unable to provide effective advice to patients. Patients should be able  
13 to trust nurses to engage therapeutically and actively listen to their needs and concerns,  
14 responding using skills that are helpful, providing information that is clear, accurate,  
15 meaningful and free from jargon (Walker, 2014). However, without knowledge of  
16 pharmacology, it is impossible for nurses to be able to provide adequate advice. This means  
17 that patients may continue to have knowledge deficits regarding the effects of medicines and  
18 side effects of the medications they are taking (Pearson *et al.*, 2018). As a result, this is likely  
19 to result in treatment dissatisfaction which in turn, may lead to treatment non-adherence on  
20 the part of the patient. Non adherence to treatment due to unpleasant side effects is  
21 relatively common (Velligan *et al.*, 2017) and almost always leads to patient relapse  
22 (Dibonaventura *et al.*, 2012).  
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29 The suboptimal knowledge of antipsychotic medication side effects is not unique to mental  
30 health nurses as previous studies have indicated. A study that assessed the confidence of 241  
31 general practitioners to prescribe for mental health conditions found that 71.5% of the  
32 general practitioners reported that they prescribe psychotropic medication to their patients  
33 despite often assessing their own knowledge of these drugs, including side effect knowledge  
34 as absent or marginal (Fraser and Oyama, 2013). This finding is echoed in an earlier view  
35 expressed by eminent psychiatrists in the UK who expressed doubts about the adequacy of  
36 current clinical psychopharmacological training and competence of newly qualified  
37 psychiatrists. They called for the postgraduate education in psychopharmacology for doctors  
38 to be substantial and rigorous (Harrison *et al.*, 2011). Overall, findings from our study are  
39 consistent with previous studies that examined and concluded that antipsychotic medication  
40 side effects knowledge is inadequate in mental health professionals as whole.  
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47 A further, well-recognized clinical significance of the findings is that inadequate side effect  
48 knowledge can increase the risk for errors (Lu *et al.*, 2013). This view is supported by a  
49 systematic review by (Keers *et al.*, 2013), which examined 54 studies and reported  
50 knowledge based errors to be the most commonly reported acts in medicines management  
51 within hospital settings. Another systematic review of 20 studies found medication errors to  
52 be as much as 17.5 per 1000 patient days with adverse drug events ranging from 3.3 to 48.0%.  
53 Their findings further indicate medication errors and adverse drug events were often  
54 associated with atypical antipsychotics and associated with patient harm (Alshehri *et al.*,  
55 2017).  
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3 The Institute of Medicine (2007) has previously identified mental health care as having higher  
4 medication errors than any other branch of health care with errors potentially leading to  
5 patient harm. This has important health policy implications considering the Francis Report  
6 (Francis, 2013) that emphasised patients should be protected from avoidable harm. Patient  
7 safety is further discussed in the Berwick report (Berwick, 2013) and one of the recommended  
8 guiding principles for improving patient safety is placing the quality and safety of patient care  
9 above all other aims for the NHS.  
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14 In addition to quality and safety, medication errors can have economic implications for the  
15 healthcare system. In the United Kingdom (UK), the Department of Health report states that  
16 preventable medication errors cost the NHS by as much as £2.5bn a year (Torjesen, 2014).  
17 This is buttressed by an earlier report from the National Patient Safety Agency (NPSA, 2007)  
18 that conservatively estimated that preventable harm from medicines may cost the NHS in  
19 excess of £750 million each year in England. It is therefore apparent that medication errors  
20 due to inadequate knowledge have important policy ramifications at operational and  
21 strategic levels.  
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26 The inadequate knowledge of side effects has been attributed to the way nurses are trained  
27 as previous studies have suggested. In general, these studies have concluded that nurses are  
28 poorly trained in pharmacology and have recommended changes in curriculum that  
29 accommodates more pharmacology in view of the growth of nurse prescribing (Simonsen *et*  
30 *al.*, 2014; Morrison *et al.*, 2017). Other investigators have specifically called for improvement  
31 in the teaching of psychopharmacology not only for nurses, but for doctors and pharmacists  
32 as well. This is because current teaching in this subject appears insufficient for undergraduate  
33 doctors, nurses and pharmacists (Gardner, 2014). Moreover, the explosion in neuro-scientific  
34 and psychological understanding of mental disorders have compounded the problem (Glick  
35 and Rush, 2016). Strategies for teaching psychopharmacology are needed at both pre and  
36 post registration levels to support the development and demonstration of minimum  
37 competencies for the psychopharmacology for mental health nurses. This may require  
38 continual review and updating to meet the rapidly changing demands of the mental health  
39 workplace. A greater focus on psychopharmacology at both pre and post graduate level would  
40 benefit patients by improving standards in the judicious use of medication.  
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48 Despite these well recognised challenges, it has been argued that nurse training has  
49 increasingly shifted towards a psychosocial model of care in recent years at the expense of  
50 biosciences (Skingsley *et al.*, 2006). The amount of time undergraduates nurses spend on  
51 medicines related aspects of care is disproportionate to the time devoted to pharmacology  
52 teaching within the clinical area or within academic institutions (Morrison-Griffiths *et al.*,  
53 2002).  
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57 However, findings from this study also suggest many mental health nurses' knowledge of side  
58 effects tends to increase with experience and this is supported by previous findings  
59 (Perehudoff *et al.*, 2016) but a cautionary stance is warranted when interpreting this finding.  
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3 No matter how much effort goes into improving experiential learning, it will always be  
4 hampered by time constraints and competing clinical demands. For example, many mental  
5 health services have been experiencing problems with recruitment of nurses and this has led  
6 to an increased use of temporary staff (Addicott *et al.*, 2015). Such an environment is likely to  
7 compromise experiential learning. In support of this view, the results from our regression  
8 analysis showed that knowledge gained through experience accounted for only 4% of the  
9 variance, suggesting that 96% of the learning was through other means. Because of these  
10 limitations, proposals for improving the teaching of psychopharmacology have been  
11 discussed (Skingsley *et al.*, 2006; Jones *et al.*, 2010; Gardner, 2014) but the implementation  
12 of these strategies remains a significant challenge.

13  
14 One such challenge is that, although some universities in the UK take a very proactive  
15 approach to delivering structured pharmacology which includes side effects knowledge (Haw  
16 *et al.*, 2008), only about 33% of lecturers in UK Universities felt pharmacology should be  
17 covered in pre-registration curriculum (Bradley *et al.*, 2005). From a mental health  
18 perspective, this raises important questions as 92% of mental health service users in the UK  
19 are prescribed psychotropic medicines and nurses play a key role in the management of these  
20 medicines (Healthcare Commission, 2007). Further, this stance goes against  
21 recommendations from the Royal College of Psychiatrists and the Royal College of Nursing  
22 who recommend a greater focus on teaching psychopharmacology and physical health to  
23 mental health nurses at both pre and post registration level (Gardner, 2014).

### 24 25 **Study limitations**

26  
27 Our study has several limitations which may impact on the generalisability of our findings.  
28 First, 259 participants completed demographic details or returned the questionnaire  
29 unanswered and this represents missing data and its associated problems. [Eight examples  
30 cited in research by Nulty \(2008\) found most online surveys achieved response rates that  
31 were much lower than the paper-based ones \(on average 23% lower\).](#)

32  
33 [Face-to-face studies usually have high response rates for participants. If a participant is willing  
34 to show up for a study, it is likely they will stay for the entire study, and the researcher will  
35 have the ability to collect a full set of data \(Rice \*et al.\*, 2017\). The ability of a researcher to  
36 verbally instruct participants and answer questions during the research process greatly  
37 increases the participants' understanding of the task they need to complete. However, this  
38 interaction becomes much more difficult online, where the researchers and participants  
39 never meet \(Crump \*et al.\*, 2013\). Online participants frequently start a study and then  
40 abandon it after the first few questions. They often review a study to see if it is interesting,  
41 and then if it does not seem engaging, they will often abandon it after the instructions  
42 \(Buhrmester \*et al.\*, 2011\). Many researchers have reported that they have trouble getting  
43 online participants to spend more than 20–30 minutes on a survey before they either quit or  
44 start responding randomly. This may explain our study finding that 19% clicked the link but](#)

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3 did not complete the survey. As previously observed, this limits a researcher's ability to  
4 collect accurate data from a time-consuming survey (Crump *et al.*, 2013).  
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8 Second, only 25 of the 57-mental health trust research and development teams agreed to  
9 take part in the study. Many organisations may have restrictions or, are even unwilling to  
10 send out instruments on behalf of researchers to protect their staff from unwanted  
11 solicitations. This high proportion of non-participating trusts experienced by this study may  
12 constitute an informative systematic bias.  
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16 Third, questionnaires are deemed to lack validity with no way of telling how truthful a  
17 respondent is being or how much thought they have put into their responses (Popper, 2005).  
18 It will also not be possible to tell if a respondent completes the survey themselves or if they  
19 receive help (Schmidt, 1997), which will surely impact the overall findings. However, the  
20 overall low scores and not once single respondent answering all questions correctly suggests  
21 this not to be the case, rather implying this study obtained an accurate measure of the current  
22 state of knowledge.  
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26  
27 Fourth, our use of MCQs invites some speculation about the validity of the information provided  
28 by participants. For example, there is no way of establishing if a participant completed the  
29 questionnaire without help and this has the potential to impact on the overall findings. However,  
30 it is also possible to argue that the scores were not simply 'gamed' by participants wishing to  
31 achieve high scores. The overall low pass rate and a lack of 100% suggest individual scores are  
32 an accurate and real reflection of participants' knowledge levels.  
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### 36 37 **Strengths of the study**

38  
39 The statistical power from this study is 0.82 suggesting that the likelihood of avoiding a type  
40 2 error is high. Our use of data from NRLS has further increased the construct validity of  
41 questions because they were informed by real life incidents. Therefore, the overall  
42 questionnaire possesses depth, exploring knowledge levels using meaningful questions  
43 (Schmidgall, 2017). Another strength of the study is the direct measurement of knowledge  
44 using MCQ questionnaire.  
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48  
49 There are several advantages of using MCQs as a method of directly assessing knowledge,  
50 one being that they allow the testing of a broad range of knowledge in a short space of time  
51 and are easy to construct. Despite criticism from some quarters (Brookhart, 2015), MCQs are  
52 being use more due to higher reliability, validity, and ease of scoring (Tarrant and Ware, 2012)  
53 compared to more traditional true/false format MCQs (McCoubrie and McKnight, 2008).  
54  
55

### 56 57 **Conclusion**

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3 The level of pharmacology knowledge demonstrated by mental health nurses remains a  
4 contentious issue. This study and other previous studies found that many nurses have a  
5 suboptimal working knowledge of antipsychotic medication side effects. Specifically, our  
6 study found that the level of knowledge tends to improve with length of experience, but the  
7 effect size is very small. Furthermore, our hypotheses that academic qualification (and age)  
8 is directly related to knowledge of side effects were not supported. Poor knowledge of anti-  
9 psychotic medication has the potential to compromise care mental health nurses provide in  
10 clinical practice. Strategies need to be put in place to enhance pharmacology and specifically  
11 side effects knowledge of mental health nurses.  
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For Peer Review

**Table 1**

<b>Demographic data for participants who completed survey (n = 245)</b>	
<b>Gender</b>	
➤ Male	81 (33.1%)
➤ Female	163 (66.5%)
<b>Total</b>	<b>244 (99.6%)</b>
➤ Missing Data	1 (0.4%)
<b>Age (years)</b>	
➤ 21 – 30	61 (24.9%)
➤ 31 – 40	66 (26.9%)
➤ 41 – 50	70 (28.6%)
➤ 51 – 60	39 (15.9%)
➤ 61 years and above	8 (3.3%)
<b>Total</b>	<b>244 (99.6%)</b>
➤ Missing data	1 (0.4%)
<b>Ethnicity</b>	
➤ White - British	174 (71.0%)
➤ White - Irish	6 (2.4%)
➤ Any other White background	10 (4.1%)
➤ Mixed - White and Asian	3 (1.2%)
➤ Mixed - White and Black Caribbean	2 (0.8%)
➤ Any other mixed background	1 (0.4%)
➤ Asian or Asian British - Bangladeshi	8 (3.3%)
➤ Asian or Asian British - Indian	6 (2.4%)
➤ Asian or Asian British - Pakistani	2 (0.8%)
➤ Any other Asian background	6 (2.4%)
➤ Black or Black British - African	21 (8.6%)
➤ Black or Black British - Caribbean	2 (0.8%)
➤ Any other ethnic background	3 (1.2%)
<b>Total</b>	<b>144 (99.6%)</b>
➤ Missing data	1 (0.4%)
<b>Highest level of education</b>	
➤ Associates degree/Diploma	79 (32.2%)
➤ Bachelor's degree	121 (49.4%)
➤ Master's degree	37 (15.1%)
➤ PhD	1 (0.4%)
<b>Total</b>	<b>238 (97.1%)</b>
➤ Missing data	7 (2.9%)
<b>Length of practice (years)</b>	
➤ Less than 1 year	19 (7.8%)
➤ 1 - 2 years	28 (11.4%)
➤ 3 - 5 years	38 (15.5%)
➤ 6 - 10 years	51 (20.8%)
➤ 11- 15 years	27 (11.0%)
➤ 15 years and above	78 (31.8%)
<b>Total</b>	<b>241 (98.4%)</b>
➤ Missing data	4 (1.6%)
<b>Current banding</b>	

➤ Band 5	98 (40.0%)
➤ Band 6	79 (32.2%)
➤ Band 7	51 (20.8%)
➤ Band 8 or above	14 (5.7%)
<b>Total</b>	<b>242 (98.8%)</b>
➤ Missing data	3 (1.2%)

Table describing demographic data of questionnaire respondents

**Table 2**

Breakdown of participants who answered 80% or more of questions correctly					
Highest level of education					
	Associates degree/diploma	Bachelor's degree	Master's degree	PhD	Total
Pass	9 (11.4%)	9 (7.4%)	2 (5.4%)	0 (0%)	20 (8.4%)
Fail	70 (88.6%)	112 (92.6%)	35 (94.6%)	1 (100%)	218 (91.6%)
<b>Total</b>	<b>79</b>	<b>121</b>	<b>37</b>	<b>1</b>	<b>238</b>
Clinical banding					
	Band 5	Band 6	Band 7	Band 8 or above	Total
Pass	8 (8.2%)	2 (2.5%)	7 (13.7%)	4 (28.6%)	21 (8.7%)
Fail	90 (91.7%)	77 (97.5%)	44 (86.3%)	10 (71.4%)	221 (91.3%)
<b>Total</b>	<b>98</b>	<b>79</b>	<b>51</b>	<b>14</b>	<b>242</b>

Table describing percentage of scores answered correctly on questionnaire

**Table 3**

Means scores for participants				
Level of education				
	Associate Degree/diploma (n)	Bachelor's Degree (n)	Master's Degree (n)	PhD (n)
Mean score	14.49 (79)	14.30 (121)	14.27 (37)	16 (1)
Range	4 – 22	2 – 21	7 – 20	16
Clinical Banding				
	Band 5 (n)	Band 6 (n)	Band 7 (n)	Band 8 or above (n)
Mean score	13.80 (98)	14.30 (79)	15.06 (51)	16.92 (13)
Range	2 – 22	4 - 20	4 – 21	13 - 20

Mean scores answered correctly on questionnaire based on level of education and clinical banding

## Appendices

### Appendix 1: Questionnaire completed by respondents

Antipsychotic medication side effects knowledge amongst registered mental health nurses in England: A national survey

D1 What gender are you?

- Male
- Female
- Other

D2 What is your age?

- 21-30 years
- 31-40 years
- 41-50 years
- 51-60 years
- 61 years and above

D3 Which of the following best describes your ethnic origin?

- White - British
- White - Irish
- Any other White background
- Mixed - White and Asian
- Mixed - White and Black African
- Mixed - White and Black Caribbean
- Any other mixed background
- Chinese
- Asian or Asian British - Bangladeshi
- Asian or Asian British - Indian
- Asian or Asian British - Pakistani
- Any other Asian background
- Black or Black British - African
- Black or Black British - Caribbean
- Any other Black background
- Any other ethnic background

D4 What is the highest degree or level of education you have completed?

- Associates degree/Diploma
- Bachelor's degree
- Master's degree
- PhD

1  
2  
3 D5 How long have you been working as a registered mental health nurse?  
4

- 5  Less than 1 year  
6  1 - 2 years  
7  3 - 5 years  
8  6 - 10 years  
9  11 - 15 years  
10  15 years and above  
11

12  
13  
14 D6 What band are you currently working as?

- 15  Band 5  
16  Band 6  
17  Band 7  
18  Band 8 or above  
19

20  
21  
22 Q1 A patient suffering from Schizophrenia and treated with first generation antipsychotics for 5 years,  
23 developed abnormal involuntary movement in limbs and face. The patient has:  
24

- 25  Tardive dyskinesia  
26  Muscular dystonia  
27  Akathisia  
28  Neuroleptic malignant syndrome  
29

30  
31 Q2 A patient on antipsychotic medication has developed an irritable urge to move limbs and has inner  
32 restlessness. This condition is called:  
33

- 34  Akathisia  
35  Akinesia  
36  Hyperkinesia  
37  Dyskinesia  
38

39  
40 Q3 Akathisia is:

- 41  A neurotic disease  
42  Seen in Schizophrenia  
43  A side effect of lithium  
44  A side effect of antipsychotic drugs  
45  
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48 Q4 Neuroleptic malignant syndrome is characterized by:

- 49  Bradycardia  
50  Labile hypertension  
51  Hypotonia  
52  Hypothermia  
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3 Q5 A side effect of Chlorpromazine, for which anti cholinergic is used, is:  
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- 5  Blurred vision
- 6  Oculogyric crisis
- 7  Hypotension
- 8  Dry mouth
- 9

10  
11 Q6 Which of the following antipsychotic drugs induces the least extrapyramidal side effects?  
12

- 13  Haloperidol
- 14  Thioridazine
- 15  Clozapine
- 16  Chlorpromazine
- 17

18  
19 Q7 A 45 year old was brought to casualty with abnormal involuntary contraction of the muscles especially of  
20 the head and neck. A day earlier, she had been prescribed Haloperidol 5mg three times daily by the  
21 psychiatrist. Which of the following is the most likely symptom she is suffering from?  
22

- 23  Acute psychosis
- 24  Conversion reaction
- 25  Acute drug dystonia
- 26  Cerebrovascular accident
- 27

28  
29 Q8 Which of the following statements is incorrect?  
30

- 31  In psychiatric practice, drug-induced hyperprolactinaemia is most likely due to secondary antipsychotic  
32 medications effect
- 33  Although first-generation antipsychotics can cause marked elevation in prolactin levels, not all secondary-  
34 generation antipsychotics have this effect
- 35  Consideration should be given to other causes of hyperprolactinaemia in patients taking antipsychotics if  
36 the prolactin levels are above the expected range
- 37  Aripiprazole has only a dopamine antagonist effect.
- 38
- 39

40  
41 Q9 Prolactin-sparing antipsychotics tend to show lower frequencies of hyperprolactinaemia-associated side  
42 effects. Which of the following is not a prolactin-sparing antipsychotic?  
43

- 44  Clozapine
- 45  Amisulpride
- 46  Olanzapine
- 47  Aripiprazole
- 48
- 49

50  
51 Q10 Which of the following is the best answer: Erectile failure in a middle-aged man with chronic  
52 Schizophrenia and diabetes mellitus, undergoing phenothiazine treatment:  
53

- 54  May improve if the patient is switched to Quetiapine
- 55  Can be caused by peripheral vascular disease
- 56  May be due to depression
- 57  Can respond to sildenafil treatment
- 58
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3 Q11 Which of the following is a complication of prescribing high-dose antipsychotics?  
4

- 5  Prolonged PR interval
- 6  Peaked t-wave
- 7  Prolonged QTc interval
- 8  Shortened QTc interval
- 9

10  
11 Q12 Neuroleptic malignant syndrome is a potentially fatal side-effect of:  
12

- 13  Fluphenazine only
- 14  All antipsychotic drugs
- 15  Clozapine only
- 16  Pimozide only
- 17

18  
19 Q13 Choose the best answer: Tardive dyskinesia is an extrapyramidal symptom consisting of which one of the  
20 following?  
21

- 22  Tremor
- 23  Abnormal face and body movements
- 24  Restlessness
- 25  Rhythmic, involuntary movements of the tongue, face and jaw
- 26

27  
28 Q14 Of the second generation antipsychotic drugs, which of the following has the lowest risk of Diabetes?  
29

- 30  Amisulpride
- 31  Risperidone
- 32  Clozapine
- 33  Quetiapine
- 34

35  
36 Q15 Choose the best answer: Which of the following statements regarding tardive dyskinesia is true?  
37

- 38  It is the least serious manifestation of extrapyramidal symptoms of antipsychotics
- 39  It may be irreversible on withdrawing therapy and treatment is usually ineffective
- 40  It only develops on long-term therapy
- 41  It occurs very rarely, especially in the elderly
- 42

43  
44 Q16 Prior to administering any medication, which of the following statements is false:  
45

- 46  You must administer any prescribed medication first and then discuss with an authorised prescriber if  
47 there are any concerns regarding the patient's condition
- 48  You must have considered the dosage, method of administration, route and timing
- 49  You must contact the prescriber or another authorised prescriber without delay where assessment of the  
50 patient indicates that the medicine is no longer suitable
- 51  In regards to controlled drugs, the second signatory does not need to be another registered professional
- 52

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3 Q17 If a patient experiences an adverse reaction, which of the following statements is false?  
4

- 5  You must take any action to remedy harm caused by the reaction
- 6  You must notify the prescriber
- 7  It should be recorded in the patient's notes
- 8  You do not need to notify the Yellow Card Scheme immediately
- 9

10  
11 Q18 Which of the following medication has less sedating and fewer anti-muscarinic effects?  
12

- 13  Promazine
- 14  Chlorpromazine
- 15  Haloperidol
- 16  Levomepromazine
- 17

18  
19 Q19 If a patient has been given the wrong dosage/frequency of medication, which of the following do you not  
20 need to do?  
21

- 22  Document your actions
- 23  Inform your line manager/employer
- 24  Inform the pharmacist
- 25  Report to the prescriber as soon as possible
- 26

27  
28 Q20 Weight gain is most commonly associated with which of the following antipsychotics?  
29

- 30  Pimozide
- 31  Olanzapine
- 32  Loxapine
- 33  Perphenazine
- 34

35  
36 Q21 A less common side effect of Quetiapine is?  
37

- 38  Restless legs syndrome
- 39  Sexual dysfunction
- 40  Depression
- 41  Urinary disorders
- 42

43  
44 Q22 Hyperprolactinaemia is not usually clinically significant with all of the following except:  
45

- 46  Aripiprazole
- 47  Quetiapine
- 48  Olanzapine
- 49  Risperidone
- 50

51  
52 Q23 Which one of the following antipsychotic drugs has the lowest risk of sexual dysfunction?  
53

- 54  Risperidone
- 55  Flupentixol
- 56  Aripiprazole
- 57  Haloperidol
- 58

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3 Q24 Hyperglycaemia, weight gain and sometimes Diabetes is more likely to occur with which one of the  
4 following second generation antipsychotics?  
5

- 6  Clozapine  
7  Aripiprazole  
8  Lurasidone  
9  Asenapine  
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