

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

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Accessible summary

What is known on the subject?

Research findings 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. However, without knowledge of pharmacology, it is impossible for nurses to be able to provide adequate advice.

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.

What are the implications for practice?

A recent study 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.

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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: A total of 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, knowledge, mental health, nurse, side effects

1 | 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, Rofail, Allen, & Newey, 2005; Mancini, Hardiman, & Lawson, 2005; Piat, Sabetti, & Bloom, 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 & 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-hospitalization (Higgins, 2007). In this respect, the use of antipsychotic medicines poses

important challenges for mental health nurses working in inpatient 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 medicine-related issues (Armitage & 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 & 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 (Jones, Robson, Whitfield, & Gray, 2010; Keijsers et al., 2012; Meehan, Mason, & Catling, 2011; Page & McKinney, 2007; Wiernik & 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, Mui, & Wells, 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 medicine-related errors (Soerensen, Lisby, Nielsen, Poulsen, & Mainz, 2013) and can result in patient harm. For example, anecdotal evidence suggests 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 healthcare providers due to remedial treatment costs and potential litigation expenses (Latter, Yerrell, Rycroft-Malone, & Shaw, 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 & McKinney, 2007) or registered nurses and lecturers' views about pharmacology education (Latter et al., 2000; Skingsley, Bradley, & Nolan, 2006). A significant drawback of self-report approach is nurses often rate their knowledge of psychopharmacology as higher than their actual knowledge (Ives, Hodge, Bullock, & Marriott, 1996; Meechan 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.

2 | 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.

3 | METHOD AND DESIGN

This study employed a cross-sectional questionnaire survey to examine knowledge of antipsychotic medication side effects of registered nurses working in inpatient 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 selected)*; *Antipsychotic medications (other psychotropic medications excluded)*; *Route (Oral, Intramuscular & 'blanks')*; *Year (2005–2016)*.

Analysis of the NRLS data using the (above) filters, indicated errors related to clozapine, olanzapine, quetiapine, haloperidol, chlorpromazine and risperidone accounted for approximately 60% of all reported incidences. Thus, the survey included MCQs specifically related to these antipsychotics.

It was initially piloted on 10 individuals from the first authors NHS hospital trust and the feedback received from participants and interpretation of responses led to a reduction in the number of questions asked. The final version had 6 items related to demographic data and a further 24 questions in the main body. There were 4 answer options, with one correct answer only. Each correct answer awarded a mark of one, with a possible total score of 24 (100%). A score of 19 (80%) or more gave participants a pass mark. This threshold of 80% is generally accepted as the standard pass mark for pharmacology and has been used in previous studies (Ndosi & Newell, 2009). The questionnaire was conducted online and the weblink was disseminated by Research and Development departments. All 57 mental health trusts in England were invited to participate in the study. The design was deemed appropriate for this study as MCQs can test more than one isolated fact recall (McCoubrie & McKnight, 2008). They are appropriate for measuring knowledge and comprehension and can be designed to measure application and analysis (Kaur, Singla, & Mahajan, 2016).

Only registered mental health nurses, with a clinical banding of 5 and above, working in inpatient settings were eligible for the study. Clinical banding refers to the pay scale used in the UK's NHS to pay employees appropriately, according to their abilities and responsibilities, under the Agenda for Change (AfC) Scheme, 2019. There are 9 bands (1–9) but this study only included nurses who were a band 5 or above as this is the starting clinical band for qualified nurses.

We defined inpatients as any hospital settings where nursing staff have responsibility for patient medications and these settings include acute admission wards, psychiatric intensive care units and recovery settings. To estimate an a priori sample size need for the study, a method of power estimation where the population under study is known was used (Denscombe, 2014). The Department of Health (DH) indicate that there were approximately 19,000 RMNs working in NHS inpatient mental health wards at the time of the study (Rahman, 2018). Using this figure and a confidence level of 95%, a sample size of 378 was extrapolated from a chart (Denscombe, 2014; Krejcie & Morgan, 1970).

4 | PROCEDURE

Ethical approval was obtained from the Health Research Authority (HRA) and the Research Ethics Committee based at the academic institution the research was completed in, after which recruitment of participants in NHS mental health trusts across England was initiated from September 2017 and ended in mid-February 2018. To help with the efficient distribution of the questionnaire nationwide, Research and Development (R&D) teams of various NHS trusts were enlisted to disseminate the survey. In addition, social media sites

(specifically Twitter and Facebook) were used to promote and maximize exposure of the study.

The data were analysed using SPSS version 24 (IBM, 2018). Initially, descriptive statistics were used to explore the demographic characteristics of the sample. Further, multiple regression techniques were used to establish relationships between variables and a One-Way Analysis of Variance (ANOVA) was used to estimate group differences and subsequent post hoc tests.

5 | RESULTS

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

5.1 | Respondents' characteristics

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

5.2 | Statistical analysis

The outcome variable of interest (total knowledge scores on the MCQ) was tested for normal distribution to justify the use of using statistical tests. The data were explored for skewness and kurtosis was tested which was 1.3 and -0.8 , respectively, suggesting normal distribution (Peat & Barton, 2008). For total knowledge scores, the mean scores between the groups (clinical banding and educational level) were compared using a one-way ANOVA. For clinical banding,

the results showed there was an in-group difference which was statistically significant ($F = 4.3$, $df = 3$, $p = .01$). To determine which groups differed, a post hoc Bonferroni test was conducted and revealed that band 8 nurses scored significantly better than band 5 nurses. However, this was only at trend level ($p = .08$). For level of education, the difference in scores was not statistically significant ($F = 0.094$, $df = 2$, $p = .91$). See Table 3 below for further details.

A stepwise linear regression was carried out to determine whether nurses' knowledge of antipsychotic medication side effects was influenced by age or length of service. Only length of service appeared to significantly influence knowledge of antipsychotic medication side effects but accounting for only 4% of the variance (adjusted $R^2 = .04$, $df = 1$, $p = .001$). This indicates that nurses who have been working for a relatively longer period are more likely to have a better knowledge of side effects. To determine if the regression analysis was sufficiently powered to minimize the potential of a type 2 error, a confirmatory post hoc power analysis as recommended by Soper (2018) was carried out. Using results from the regression analysis of an effect size of 0.04, a probability level of 0.05 and a sample size of 245 revealed that the study is powered at 82%. A sample size powered at 80% or above is normally considered to be adequate to avoid a type 2 error (Magnusson, 2018). Hence, our a priori sample estimate of a minimum of 378 was in fact an overestimate of the true sample size required.

6 | DISCUSSION

This study sought to examine the hypothesis that knowledge of side effects amongst registered mental health nurses is related to their academic qualification, clinical banding, and length of experience. The study found that only length of experience and clinical banding was related to the level of side effects knowledge. In other words, those who have been working as mental health nurses for a longer period were more likely to have a better knowledge of antipsychotic medication side effects. Equally, those who were of a higher clinical banding were more likely to have a better knowledge of side effects than those of lower banding. However, higher clinical banding could simply reflect length of service.

A key finding from this study is that only 21 (9%) of the nurses who took part passed at the 80% threshold. This finding supports the view that mental health nurses have a relatively poor knowledge of antipsychotic medication side effects and this is in line with previous findings by De Hert et al. (2016) who assessed side effects knowledge of clozapine of 85 mental health nurses in Belgium. They found that only 25% of participants passed the test. The difference in pass rate between De Hert and colleagues and our study could be explained by the pass threshold used. Whilst our study used an 80% pass threshold, De Hert and colleagues used a 50% pass threshold and focused on clozapine side effects. Furthermore, demographic and cultural differences could have accounted for the differences.

From a service user perspective, limited knowledge of side effects has led to treatment dissatisfaction according to some investigators.

TABLE 1 Demographic data for participants who completed survey (n = 245)

Gender	
Male	81 (33.1%)
Female	163 (66.5%)
Total	244 (9.6%)
Missing data	1 (0.4%)
Age (years)	
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%)
Total	244 (9.6%)
Missing data	1 (0.4%)
Ethnicity	
White–British	174 (1.0%)
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%)
Total	144 (99.6%)
Missing data	1 (0.4%)
Highest level of education	
Associates degree/Diploma	79 (32.2%)
Bachelor's degree	121 (49.4%)
Master's degree	37 (15.1%)
PhD	1 (0.4%)
Total	238 (97.1%)
Missing data	7 (2.9%)
Length of practice (years)	
<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%)
Total	241 (8.4%)
Missing data	4 (1.6%)

TABLE 1 (Continued)

Current banding	
Band 5	98 (40.0%)
Band 6	79 (32.2%)
Band 7	51 (20.8%)
Band 8 or above	14 (5.7%)
Total	242 (98.8%)
Missing data	3 (1.2%)

Note: Table describing demographic data of questionnaire respondents.

Concerns about nurses' purported lack of recognition and attention to adverse medication effects are prominent topics of discussion for patient self-support groups (Gray et al., 2005). Considering that a recent study found that nearly three-quarters (73%) of patients taking antipsychotics reported side effects to some degree (Iversen et al., 2018), the findings from this study assume an even greater clinical significance.

This relatively 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. 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. This means that patients may continue to have knowledge deficits regarding the effects of medicines and side effects of the medications they are taking (Pearson, Carter, McCormick, & Wright, 2018). As a result, this is likely to result in treatment dissatisfaction which in turn, may lead to treatment non-adherence on the part of the patient. Non-adherence to treatment due to unpleasant side effects is relatively common (Velligan, Sajatovic, Hatch, Kramata, & Docherty, 2017) and almost always leads to patient relapse (Dibonaventura, Gabriel, Dupclay, Gupta, & Kim, 2012).

The suboptimal knowledge of antipsychotic medication side effects is not unique to mental health nurses as previous studies have indicated. A study that assessed the confidence of 241 general practitioners to prescribe for mental health conditions found that 71.5% of the general practitioners reported that they prescribe psychotropic medication to their patients despite often assessing their own knowledge of these drugs, including side effect knowledge as absent or marginal (Fraser & Oyama, 2013). This finding is echoed in an earlier view expressed by eminent psychiatrists in the UK who expressed doubts about the adequacy of current clinical psychopharmacological training and competence of newly qualified psychiatrists. They called for the postgraduate education in psychopharmacology for doctors to be substantial and rigorous (Harrison et al., 2011). Overall, findings from our study are consistent with previous studies that examined and concluded that antipsychotic medication side effects knowledge is inadequate in mental health professionals as whole.

(Continues)

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%)
Total	79	121	37	1	238
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%)
Total	98	79	51	14	242

Note: Table describing percentage of scores answered correctly on questionnaire.

A further, well-recognized clinical significance of the findings is that inadequate side effect knowledge can increase the risk for errors (Lu et al., 2013). This view is supported by a systematic review by Keers, Williams, Cooke, and Ashcroft (2013), which examined 54 studies and reported knowledge-based errors to be the most commonly reported acts in medicines management within hospital settings. Another systematic review of 20 studies found medication errors to be as much as 17.5 per 1,000 patient days with adverse drug events ranging from 3.3% to 48.0%. Their findings further indicate medication errors and adverse drug events were often associated with atypical antipsychotics and associated with patient harm (Alshehri, Keers, & Ashcroft, 2017).

The Institute of Medicine (2007) has previously identified mental health care as having higher medication errors than any other branch of health care with errors potentially leading to patient harm. This has important health policy implications considering the Francis Report (Francis, 2013) that emphasized patients should be protected from avoidable harm. Patient safety is further discussed in the Berwick report (Berwick, 2013) and one of the recommended guiding principles for improving patient safety is placing the quality and safety of patient care above all other aims for the NHS.

In addition to quality and safety, medication errors can have economic implications for the healthcare system. In the United Kingdom

(UK), the Department of Health report states that preventable medication errors cost the NHS by as much as £2.5bn a year (Torjesen, 2014). This is buttressed by an earlier report from the National Patient Safety Agency (NPSA, 2007) that conservatively estimated that preventable harm from medicines may cost the NHS in excess of £750 million each year in England. It is therefore apparent that medication errors due to inadequate knowledge have important policy ramifications at operational and strategic levels.

The inadequate knowledge of side effects has been attributed to the way nurses are trained as previous studies have suggested. In general, these studies have concluded that nurses are poorly trained in pharmacology and have recommended changes in curriculum that accommodates more pharmacology in view of the growth of nurse prescribing (Morrison et al., 2017; Simonsen, Daehlin, Johansson, & Farup, 2014). Other investigators have specifically called for improvement in the teaching of psychopharmacology not only for nurses, but for doctors and pharmacists as well. This is because current teaching in this subject appears insufficient for undergraduate doctors, nurses and pharmacists (Gardner, 2014). Moreover, the explosion in neuro-scientific and psychological understanding of mental disorders have compounded the problem (Glick & Rush, 2016). Strategies for teaching psychopharmacology are needed at both pre- and post-registration levels to support the development and demonstration of minimum competencies for the psychopharmacology for

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

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

mental health nurses. This may require continual review and updating to meet the rapidly changing demands of the mental health workplace. A greater focus on psychopharmacology at both pre- and postgraduate level would benefit patients by improving standards in the judicious use of medication.

Despite these well-recognized challenges, it has been argued that nurse training has increasingly shifted towards a psychosocial model of care in recent years at the expense of biosciences (Skingsley et al., 2006). The amount of time undergraduates nurses spend on medicine-related aspects of care is disproportionate to the time devoted to pharmacology teaching within the clinical area or within academic institutions (Morrison-Griffiths, Snowden, & Pirmohamed, 2002).

However, findings from this study also suggest many mental health nurses' knowledge of side effects tends to increase with experience and this is supported by previous findings (Perehudoff et al., 2016) but a cautionary stance is warranted when interpreting this finding. No matter how much effort goes into improving experiential learning, it will always be hampered by time constraints and competing clinical demands. For example, many mental health services have been experiencing problems with recruitment of nurses and this has led to an increased use of temporary staff (Addicott, Maguire, Honeyman, & Jabbal, 2015). Such an environment is likely to compromise experiential learning. In support of this view, the results from our regression analysis showed that knowledge gained through experience accounted for only 4% of the variance, suggesting that 96% of the learning was through other means. Because of these limitations, proposals for improving the teaching of psychopharmacology have been discussed (Gardner, 2014; Jones et al., 2010; Skingsley et al., 2006) but the implementation of these strategies remains a significant challenge.

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

7 | STUDY LIMITATIONS

Our study has several limitations which may impact on the generalizability of our findings. First, 259 participants completed demographic details or returned the questionnaire unanswered and this represents missing data and its associated problems. Eight examples cited in research by Nulty (2008) found most online surveys

achieved response rates that were much lower than the paper-based ones (on average 23% lower).

Face-to-face studies usually have high response rates for participants. If a participant is willing to show up for a study, it is likely they will stay for the entire study, and the researcher will have the ability to collect a full set of data (Rice, Winter, Doherty, & Milner, 2017). The ability of a researcher to verbally instruct participants and answer questions during the research process greatly increases the participants' understanding of the task they need to complete. However, this interaction becomes much more difficult online, where the researchers and participants never meet (Crump, McDonnell, & Gureckis, 2013). Online participants frequently start a study and then abandon it after the first few questions. They often review a study to see if it is interesting, and then if it does not seem engaging, they will often abandon it after the instructions (Buhrmester, Kwang, & Gosling, 2011). Many researchers have reported that they have trouble getting online participants to spend more than 20–30 min on a survey before they either quit or start responding randomly. This may explain our study finding that 19% clicked the link but did not complete the survey. As previously observed, this limits a researcher's ability to collect accurate data from a time-consuming survey (Crump et al., 2013).

Second, only 25 of the 57 mental health trust research and development teams agreed to take part in the study. Many organizations may have restrictions or are even unwilling to send out instruments on behalf of researchers to protect their staff from unwanted solicitations. The high proportion of non-participants trusts experienced by this study may constitute systematic bias.

Third, questionnaires, specifically MCQs, are deemed to lack validity with no way of telling how truthful a respondent is being or how much thought they have put into their responses (Popper, 2005). It will also not be possible to tell if a respondent completes the survey themselves or if they receive help (Schmidt, 1997), which will surely impact the overall findings. However, the overall low scores and not one single respondent answering all questions correctly suggests this not to be the case and scores were not simply 'gamed' by participants wishing to achieve high scores. Rather, it implies individual scores are an accurate and real reflection of participants' knowledge levels, and this study obtained an accurate measure of the current state of knowledge.

8 | STRENGTHS OF THE STUDY

The statistical power from this study is 0.82 suggesting that the likelihood of avoiding a type 2 error is high. Our use of data from NRLS has further increased the construct validity of questions because they were informed by real-life incidents. Therefore, the overall questionnaire possesses depth, exploring knowledge levels using meaningful questions (Schmidgall, 2017). Another strength of the study is the direct measurement of knowledge using MCQ questionnaire.

There are several advantages of using MCQs as a method of directly assessing knowledge, one being that they allow the testing of a broad range of knowledge in a short space of time and are easy to

construct. Despite criticism from some quarters (Brookhart, 2015), MCQs are being used more due to higher reliability, validity and ease of scoring (Tarrant & Ware, 2012) compared to more traditional true/false format MCQs (McCoubrie & McKnight, 2008).

9 | CONCLUSION

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

10 | RELEVANCE STATEMENT

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

CONFLICT OF INTEREST

None.

ETHICAL APPROVAL

Ethical approval was obtained from the Health Research Authority (HRA) and the School of Health Sciences Research Ethics Committee based at the academic institution (City, University of London) the research was completed in.

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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

D5 How long have you been working as a registered mental health nurse?

- Less than 1 year
- 1–2 years
- 3–5 years
- 6–10 years
- 11–15 years
- 15 years and above

D6 What band are you currently working as?

- Band 5
- Band 6
- Band 7
- Band 8 or above

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

- Tardive dyskinesia
- Muscular dystonia
- Akathisia
- Neuroleptic malignant syndrome

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

- Akathisia
- Akinesia
- Hyperkinesia
- Dyskinesia

Q3 Akathisia is:

- A neurotic disease
- Seen in Schizophrenia
- A side effect of lithium
- A side effect of antipsychotic drugs

Q4 Neuroleptic malignant syndrome is characterized by:

- Bradycardia
- Labile hypertension
- Hypotonia
- Hypothermia

Q5 A side effect of Chlorpromazine, for which anti cholinergic is used, is:

- Blurred vision
- Oculogyric crisis
- Hypotension
- Dry mouth

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

- Haloperidol
- Thioridazine
- Clozapine
- Chlorpromazine

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

- Acute psychosis
- Conversion reaction
- Acute drug dystonia

- Cerebrovascular accident

Q8 Which of the following statements is incorrect?

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

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

- Clozapine
- Amisulpride
- Olanzapine
- Aripiprazole

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

- May improve if the patient is switched to Quetiapine
- Can be caused by peripheral vascular disease
- May be due to depression
- Can respond to sildenafil treatment

Q11 Which of the following is a complication of prescribing high-dose antipsychotics?

- Prolonged PR interval
- Peaked t-wave
- Prolonged QTc interval
- Shortened QTc interval

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

- Fluphenazine only
- All antipsychotic drugs
- Clozapine only
- Pimozide only

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

- Tremor
- Abnormal face and body movements
- Restlessness

- Rhythmic, involuntary movements of the tongue, face and jaw

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

- Amisulpride
- Risperidone
- Clozapine
- Quetiapine

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

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

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

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

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

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

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

- Promazine
- Chlorpromazine
- Haloperidol
- Levomepromazine

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

- Document your actions
- Inform your line manager/employer
- Inform the pharmacist
- Report to the prescriber as soon as possible

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

- Pimozide
- Olanzapine
- Loxapine
- Perphenazine

Q21 A less common side effect of Quetiapine is?

- Restless legs syndrome
- Sexual dysfunction
- Depression
- Urinary disorders

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

- Aripiprazole
- Quetiapine
- Olanzapine
- Risperidone

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

- Risperidone
- Flupentixol
- Aripiprazole
- Haloperidol

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

- Clozapine
- Aripiprazole
- Lurasidone
- Asenapine