Nurses' perceptions of medication adherence in schizophrenia: results of the ADHES cross-sectional questionnaire survey

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Abstract

Objectives: Poor adherence to antipsychotic treatment is a widespread problem within schizophrenia therapy with serious consequences including increased risks of relapse and rehospitalization. Mounting evidence supports the key roles that nurses play in monitoring patient progress and facilitating long-term treatment adherence. The Adherencia Terapéutica en la Esquizofrenia (ADHES) nurses' survey was designed to assess the opinions of nurses on the causes and management of partial/nonadherence to antipsychotic medication.

Methods: A questionnaire-based cross-sectional survey of 4120 nurses from Europe, the Middle East and Africa. Interpretation of results was based on a descriptive comparison of responses.

Results: Nurses perceived 54% of patients seen in the preceding month to be partially/nonadherent to treatment. Most nurses (90%) reported some level of experience with administration of long-acting injectable (LAI) antipsychotics, with 24% of nurses administering >10 injections per month. The majority (85%) of nurses surveyed believed that improving adherence would improve patient outcomes. Nearly half (49%) reported that most of their patients depend on a family member or other nonprofessional carer to remind them to take their medication as prescribed. A similar proportion of nurses (43%) reported that most of their patients relied on a professional to remind them to take medication. Most nurses (92%) felt that ensuring continuous medication with LAI antipsychotics would yield long-term benefits for patients, but their opinion was that over a third of patients were unaware of LAI antipsychotic treatments. In a series of forced options, the strategy used most often by respondents (89%) to promote medication adherence was to build trusting relationships with patients while listening to and interpreting their needs and concerns. Respondents also rated this as the most effective strategy that they used (48%).

Conclusion: Nurses are highly aware of adherence issues faced by their patients; further patient education on treatment options is needed.

Keywords: adherence, antipsychotic, nurse, schizophrenia, survey

Introduction

Poor treatment adherence in patients with schizophrenia is associated with an increased risk of relapse and rehospitalization [Sun *et al.* 2007; Morken *et al.* 2008; Masand *et al.* 2009; Velligan *et al.* 2009; Novick *et al.* 2010]. Even short gaps in medication (1–10 days) can double the risk of hospitalization [Weiden *et al.* 2004]. Furthermore, poor adherence imposes a large economic burden

both on patients' families [Knapp, 1997] and society in general [Sun *et al.* 2007; Knapp *et al.* 2004; Marcus and Olfson, 2008]. The excess annual costs for total service use associated with nonadherence were estimated at >£5000 per patient in the UK [Knapp *et al.* 2004], while costs of rehospitalization due to nonadherence in 2005 were an estimated \$1479 million in the United States [Sun *et al.* 2007]. Given the social and

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economic impact of nonadherence, effective strategies are required to improve medication adherence in schizophrenia [Goff *et al.* 2010; Haddad *et al.* 2014].

A wide range of factors associated with partial or nonadherence to medication by patients with schizophrenia have been identified [Ascher-Svanum *et al.* 2006], including lack of patient insight, medication side effects, attitudes toward treatment and a poor therapeutic alliance [Velligan *et al.* 2009; Lacro *et al.* 2002; Day *et al.* 2005; Dassa *et al.* 2010; Beck *et al.* 2011]. Of these factors, a strong therapeutic alliance is widely acknowledged to be central to promoting engagement in care [Kikkert *et al.* 2006; Gray *et al.* 2010; Hardeman *et al.* 2010]. Within the therapeutic alliance, nurses have an invaluable role. Nurses are not only pivotal in monitoring patient progress [Bowers *et al.* 2011] and improving their physical health [Robson and Haddad, 2012], but studies suggest they may be important for patients' symptom control. For example, in a UK-based study, nurses who had received medication management training produced a greater reduction in patients' overall psychopathology at 6 months compared with treatment as usual [Gray *et al.* 2004]. Furthermore, nurses are ideally placed to monitor long-term adherence patterns and engage patients in strategies to improve adherence to treatment as prescribed. Indeed, competency in a broad range of medication management issues can assist nurses to engage patients in shared decision making regarding their treatment [Gray *et al.* 2009]. It is postulated that adherence is greater amongst patients who discuss choices related to their care with a professional as they are personally owned and meaningful [Gray *et al.* 2010]. Furthermore, psychosocial interventions by nurses can improve patient outcomes and adherence [Manuel Montes *et al.* 2011]. Nurses can also help carers by increasing their understanding of schizophrenia, improving their ability to cope, reducing their burden or improving their mental health [Macleod *et al.* 2011]. Despite nurses' invaluable role in the care and rehabilitation of patients, there is limited literature addressing the relevance of the role of nurses to patient outcomes.

The Spanish Adherencia Terapéutica en la Esquizofrenia (ADHES) program was initiated in 2003 to assess psychiatrists' and relatives' perceptions of partial and nonadherence by patients treated for mental illness in Spain [Giner *et al.*

2006]. This initiative was further developed to include psychiatrists [Olivares *et al.* 2013] and carers [Svettini *et al.* 2015] across Europe, the Middle East and Africa (EMEA). These surveys highlighted that both psychiatrists and carers perceived high levels of partial/nonadherence to medication among patients with schizophrenia, with only a third of patients able to attribute deterioration following a gap in medication to this nonadherence [Olivares *et al.* 2013]. Carers reported that treatment adherence was a burden for the patient and over a third noted a daily struggle for patients to take their medication [Svettini *et al.* 2015]. Although these surveys highlight the perceptions of psychiatrists and carers, few studies have addressed nurses' attitudes regarding adherence to medication in schizophrenia [Happell *et al.* 2002; Coombs *et al.* 2003]. The survey reported here was therefore designed to gauge nurses' opinions on the causes and management of partial/nonadherence to medication in schizophrenia. Particular attention was placed on the role of long-acting injectable (LAI) antipsychotics in the management of nonadherence.

Methods

This survey was conducted from January to March 2011. A total of 29,549 surveys were distributed to nurses working in inpatient and outpatient psychiatric facilities as well as in psychiatric day hospitals in the public and private sectors within 29 countries across Europe and the Middle East. The sample collected was therefore a convenience sample.

The questions were based on the ADHES survey of psychiatrists produced in collaboration with a steering committee comprising a group of psychiatrists with an interest in addressing problems of adherence to treatment of patients with schizophrenia [Olivares *et al.* 2013], but were adapted accordingly to be more relevant and appropriate for psychiatric nurses. The final survey consisted of 14 questions that were designed and finalized through discussion among the authors, relating to perceptions of the extent and potential causes and consequences of partial and nonadherence to medication (Q1, Q4 and Q5), the role of carers in supporting treatment adherence (Q2 and Q3), the use of LAI antipsychotics (Q6–Q12), and psychosocial activities intended to improve adherence (Q13 and Q14). The questions related to respondents' current caseload.

Nurses were required to enter an estimated value (open field) of what proportion of their patients adhered to their prescribed treatment regimens to each of the following extents: adherent ($\geq 90\%$ prescribed treatment dose), partial adherent (≥ 30 to $< 90\%$ prescribed treatment dose) or nonadherent ($< 30\%$ prescribed treatment dose). Overall estimates of how many of nurses' patients were fully, partially or nonadherent to treatment were calculated as the arithmetic mean of the values entered for each of the above categories. In responding to questions about patients' requirements and patients' feelings about medication, nurses estimated the proportion of their patients who they felt were affected, according to the following categories: $< 20\%$, $20\text{--}50\%$ or $> 50\%$ of patients. Nurses' demographic data were also recorded.

As international listings of psychiatric nurses are not publicly available, mental health nurses were identified from a listing of healthcare professionals held by Janssen. The eligibility criteria for participating in the survey were to be a trained, psychiatric nurse working in inpatient or outpatient psychiatric facilities or in psychiatric day hospitals in the public or private sector and working in the countries where the survey took place.

With the exception of Spain (surveys completed online) and France (surveys distributed *via* a local nurses' publication), surveys were circulated by Janssen personnel who visited nurses at their place of work or were sent by post (in the UK, Italy and Ireland) in a sealed pack containing the questionnaire, a prepaid return envelope and a letter explaining the aims of the survey. In countries where surveys were circulated by Janssen personnel, the representative explained to nurses the aims of the survey based on the terms of the letter that was sent to participants in other countries.

The questionnaire required approximately 15 minutes for completion and nurses were not remunerated for participation.

Ethical approval was not required. Responses were anonymous and no individual patient data were collected. Survey responses were saved in secure computer files. Participants were assured that their responses would not in any way be linked to their name, email address or any other identifying information and of their right to withdraw from the survey at any time.

Completed surveys were returned for analysis to a third-party agency, blinded to respondent identity. No further follow up was made to obtain responses where completed surveys were not returned.

The survey was not designed to allow statistical analysis of the differences in responses. Interpretation of results was based on descriptive comparison of responses.

Results

Data were obtained from 4120 nurse respondents reflecting a response rate of 14% (based on number of surveys distributed [see Supplementary Table 1]) comparable with that of the original survey [Olivares *et al.* 2013].

Table 1 outlines the demographics of the respondents. The majority (68%) were female; 62% were aged 31–50 years; 85% were employed in the public setting; and 41% had > 15 years' clinical experience as a psychiatric nurse. Approximately one third (36%) reported seeing > 20 patients with schizophrenia in an average month. Most nurses (90%) reported experience of administering LAI antipsychotics, with 24% delivering > 10 LAI antipsychotics per month. Of these, 48% worked in outpatient facilities, 15% in inpatient facilities and 24% in day hospitals.

Table 2 outlines the nurses' perceptions of patients' attitudes to medication and related behaviors. Respondents perceived that 54% of their patients were partially or nonadherent to treatment in the month preceding survey (Q1, Table 2; 46% of respondents did not complete all required fields of this question). A total of 85% of nurses believed that improving adherence would impact patient outcomes to a huge or sizeable extent (see Q5, Supplementary Table 2).

Approximately a quarter (24%) of nurses believed that the majority of the patients they had seen in the past month were embarrassed or upset about having to take medication on a daily basis (Q4, Table 2). Almost half (49%) of nurses reported that the majority of their patients were dependent on a family member or other nonprofessional carer to remind them to take their medication as prescribed (Q2, Figure 1a). The estimated number of patients who relied on a professional to remind them was similar (43% of nurses; Q3, Figure 1b).

Table 1. Demographics and clinical experience of nurse respondents ($n = 4120$).*

	Nurses (n)	Nurses (%) [†]
Gender		
Male	1085	26
Female	2820	69
No response	215	5
Age		
Under 20 years	47	1
20–30 years	580	14
31–40 years	1301	32
41–50 years	1255	30
51–60 years	689	17
Over 60 years	87	2
No response	161	4
Experience as psychiatric nurse [‡]		
>15 years	1699	41
5–15 years	1504	37
<5 years	740	18
No response	177	4
Practice setting		
Inpatient facility	2648	64
Outpatient facility	1117	27
Day hospital	276	7
No response	189	5
Type of facility		
Public	3494	85
Private	351	9
No response	290	7
Patients with schizophrenia seen in an average month [§]		
>20	1471	35
11–20	1297	31
≤10	1215	30
No response	137	3
Experience of administering LAI antipsychotics		
Never administered	185	4
≤3 per month	1379	33
4–10 per month	1378	33
>10 per month	992	24
No response	186	5
Practice setting in which nurses report administering >10 LAIs per month		
Inpatient facility	399	15
Outpatient facility	537	48
Day hospital	66	24
*Participating countries and number of respondents: Austria (148), Belgium (56), the Czech Republic (152), Denmark (76), Finland (214), France (137), Greece (115), Gulf Cooperation Council (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates) (111), Hungary (484), Ireland (114), Israel (512), Italy (150), the Netherlands (20), Norway (62), Poland (191), Portugal (199), Romania (238), Slovakia (240), Slovenia (59), Spain (140), Sweden (67), Switzerland (25), Turkey (503) and the UK (35).		
[†] For some of the questions the sum of responses may not equal 100% due to rounding of the individual categories.		
[‡] 4% of respondents did not provide an answer to this question.		
[§] 3% of respondents did not provide an answer to this question.		

Table 2. Patient attitudes towards medication and their medication-related behaviors as perceived by nurses ($n = 4120$).

	Nurses (n)	Mean estimated % of patients
Q1. Of the patients with schizophrenia you saw in the past month what percentage do you suspect may have been nonadherent, partially adherent or fully adherent?*		
Non-adherent (<30% of prescribed dose)	1003	24 [†]
Partially adherent (30–90% of prescribed dose)	1205	29 [†]
Adherent (>90% of prescribed dose)	1911	46
	Nurses (n)	Nurses (%)[‡]
Q4. What percentage of the patients with schizophrenia you have seen in the past month has at any time felt embarrassed or upset at having to take tablets every day for their illness?		
<20%	1462	37
20–50%	1387	34
>50%	955	24
No answer	167	4
Q7. Approximately what percentage of the patients with schizophrenia do you think would prefer a deltoid administration of a long acting injectable antipsychotic medication over a gluteal one?		
<20%	1753	44
20–50%	1234	31
>50%	795	20
No answer	169	5
Q11. In your opinion, how well are patients informed about the advantages and disadvantages of the LAI antipsychotics available?		
Very well informed	541	13
Quite well informed	1974	48
Not very well informed	1356	33
Not informed at all	141	3
No answer	108	3
Q12. Are patients who are informed about the advantages and disadvantages of the LAI antipsychotics available in a better position than others to make educated choices about their treatment?		
Information helps most of the time	1619	39
Information helps some of the time	2021	49
Information does not help	269	7
No answer	211	5
*Open field question. 46% of respondents did not complete this question.		
[†] Sum of patients considered to be partially or nonadherent is 54% due to rounding of individual categories.		
[‡] For some of the questions the sum of responses may not equal 100% due to rounding of the individual categories.		

Responses related to adherence-focused activities and the relevance of such activities are presented in Table 3. A total of 48% of nurses considered building relationships with patients as the most relevant method of improving adherence, while 23% believed that correct administration of medication and monitoring of treatment results was of greatest relevance (Q14, Table 3). These activities were among the most frequently employed

adherence-enhancing strategies conducted by nurses in their clinical setting (89% and 88%, respectively), along with preparing and maintaining patient records (71%) and education of the family/carers (65%; Q13, Table 3).

Almost all respondents (92%) felt that ensuring continuous medication with an LAI antipsychotic would yield long-term patient benefits (see Q8,

Figure 1. Nurses' perspectives of the responsibility imposed on non-professional carers (a)* and professional carers (b)* by the need to remind patients to take their medication.

*Q2. What percentage of your patients with schizophrenia do you think need family members or other non-professional carers to remind them to take their medication in order for them to take it as prescribed? $n = 4120$. 169 (4%) of respondents did not answer this question. Number of respondents: >50%, $n = 2010$; 20–50%, $n = 1404$; <20%, $n = 537$.

*Q3. What percentage of your patients with schizophrenia do you think need a nurse, psychiatrist or other professional carer to remind them to take their medication in order for them to take it as prescribed? $n = 4120$. 278 (7%) of respondents did not answer this question. Number of respondents: >50%, $n = 1753$; 20–50%, $n = 1420$; <20%, $n = 669$.

Supplementary Table 2). A quarter of nurses (27%) perceived that the majority of their patients would prefer treatment with an LAI formulation (Q6; approximately what percentage of the patients with schizophrenia do you think would prefer treatment with a LAI antipsychotic medication? >50%, $n = 1122$ [27%]; 20–50%, $n = 1778$ [43%]; <20%, $n = 1058$ [26%]). A total of 61% of nurses considered their patients to be 'very well' or 'quite well' informed about LAI antipsychotics (Q11, Table 2) and, correspondingly, informed patients were perceived to be in a better position to make educated treatment choices most (39% of nurses) or some (49% of nurses) of the time (Q12; Table 2). Approximately half (51%) of nurses reported a preference for

administering LAI antipsychotics into the gluteal muscle, while 13% reported a preference for deltoid administration (see Q9, Supplementary Table 2). Approximately half (44%) of respondents believed that <20% of their patients would prefer to receive LAI antipsychotics into the deltoid muscle (Q7, Table 2). Regarding the potential patient-related benefits of a deltoid formulation of LAI antipsychotics, nurses perceived the various potential benefits to be of similar importance (Q10, Table 4).

Discussion

Nurses are pivotal in the management of patients with schizophrenia, with key roles in

Table 3. Adherence methods employed by nurses in clinical practice and viewpoints on their relevance in promoting adherence to medication ($n = 4120$).

	Conducted in practice*		Considered most relevant†	
	Nurses (n)	Nurses (%)	Nurses (n)	Nurses (%)
Building relationships with patients to encourage trust while listening to and interpreting their needs and concerns	3663	89	1988	48
Ensuring the correct administration of medication including injections, and monitoring the results of the treatment	3612	88	954	23
Working with patients' families and carers helping to educate them and the patient about their mental health problems	2666	65	593	14
Providing evidence-based individual therapy	1887	46	213	5
Preparing and maintaining patient records	2917	71	104	3
Ensuring that the legal requirements appropriate to a particular setting or group of patients are observed	1921	47	51	1
Organizing social events aimed at developing patients' social skills	1419	34	60	1
No answer	38	1	157	4

*Q13. Which of the following activities do you conduct in your practice? Please select all that apply.

†Q14. Of the activities carried out in your practice, which one is the most relevant in order to increase adherence, in your opinion? Please select one answer.

monitoring patients' progress [Bowers *et al.* 2011], administering and encouraging medication adherence [Gray *et al.* 1999, 2009, 2010] and in supporting care in the community. Nurses educated in medication management can also engage patients in shared decision making, which may increase their motivation to adhere to their treatment plan [Gray *et al.* 2009]. Evidence suggests significant potential benefits of receiving support from a nurse, particularly one trained in broader issues of medication management [Gray *et al.* 2010].

Nevertheless, there remains a paucity of data concerning nurses' opinions on the causes and impact of poor adherence to medication. This survey of 4120 respondents therefore represents a valuable resource pertaining to the perception of adherence-related issues among nurses treating patients with schizophrenia across Europe and the Middle East.

While definitions of partial/nonadherence are available in consensus recommendations [Velligan *et al.* 2009], the intervals used in this survey were based on the authors' clinical experience. Overall, nurses reported a high frequency of partial/nonadherence among their patients and the estimated average partial/ nonadherence rate of 54% is consistent with

that reported in the ADHES psychiatrists' survey [Olivares *et al.* 2013] and previous reports [Marder, 2003] that at least 50% of patients may not fully adhere to their medication in the 2 years following hospital discharge. While the present data pertain to nurses' perceptions, previous data have shown that physician perceptions may overestimate true levels of adherence [Velligan *et al.* 2007].

Results from this survey support those of the psychiatrists' survey [Olivares *et al.* 2013] with respect to the large burden of responsibility placed on professional and nonprofessional carers to help patients to take their medication as prescribed. It would be of interest in future to investigate the extent of overlap in the groups of patients reported as being dependent upon professional carers for support and those who rely heavily on nonprofessional carers. Given that poor adherence exacts a significant personal toll on patients with schizophrenia [Masand *et al.* 2009], these suspected low levels of adherence and reported burden of responsibility on carers are likely to represent significant problems in the lives of patients with schizophrenia and those involved in their care. The majority (85%) of nurses surveyed believed that improving adherence would improve patient outcomes.

Table 4. Nurses' viewpoints on potential benefits of deltoid administration of LAI treatment.*

	Most beneficial		Any benefit seen	
	Nurses (n)	Nurses (%)	Nurses (n)	Nurses (%)
Reduced stigma for patient	867	22	3203	80
An improvement in the ability to find comfort in therapy	877	22	3203	81
Improved patient adherence	674	17	3082	79
Improved patient contact	660	17	3082	78
Improved respect/trust between nurse/patient	518	13	3050	77
Improved relationship or alliance with patient	466	12	3041	77

*Q10. Below there is a list of potential benefits of using a LAI medication deltoid administration over other forms of administration. Please rank these in order from 1 to 6, where 1 has the most benefit and 6 has the least benefit. Please rank only the ones that you consider relevant. *n* = 3951; not asked in the UK, Ireland or the Netherlands. 237 (6%) of respondents did not answer this question.

Building of relationships with patients to encourage trust was reported to be the most commonly used, and the most relevant, strategy to promote adherence. The value of a strong therapeutic alliance in promoting adherence has previously been documented [Kikkert *et al.* 2006; Gray *et al.* 2010; Hardeman *et al.* 2010]. Other strategies reported by nurses to be frequently conducted in practice (beyond the tenets of good clinical practice) included psychoeducation for families/carers, which is supported by evidence in the literature [Chan *et al.* 2009]. This indicates that many practitioners recognize the importance of promoting adherence and act thereupon using established means of improving adherence. However, it may also be necessary to consider other means of promoting adherence. It may be of future benefit to investigate nurses' understanding of the risk factors of nonadherence to evaluate whether nurses are equipped to identify at-risk patients.

Expert opinion reports underutilization of LAI antipsychotics in many countries [Kane and Garcia-Ribera, 2009]. LAI antipsychotic prescriptions in the US, Belgium and Australia were 28%, 22% and 25%, respectively, with prescription frequency being lowest in New Zealand (15%) and highest in Hong Kong (37%). In the UK, LAI antipsychotics were found to be prescribed for between a quarter and a third of patients, depending on the clinical setting [Barnes *et al.* 2009]. Most nurses (90%) in the current survey reported some level of experience with administration of LAI antipsychotics, with 24% of nurses administering >10 injections per month. Furthermore, 92% of nurses responded

that continuous medication with an LAI antipsychotic would produce long-term patient benefits. Indeed, an observational naturalistic study of LAI antipsychotics, the electronic Schizophrenia Treatment Adherence Registry (e-STAR), has shown clinical benefits of LAI antipsychotics in treatment retention, symptom severity, and length and frequency of hospitalization [Olivares *et al.* 2009a, 2009b; Peuskens *et al.* 2010]. Overall, observational studies tend to show better outcomes for those treated with LAIs *versus* oral antipsychotics while randomized controlled trials (RCTs) tend to show equivalent outcomes [Kirson *et al.* 2013]. This difference by trial methodology may reflect methodological issues; it has been argued that traditional RCTs are not the 'gold standard' method to assess the equivalent efficacy of LAIs and oral antipsychotics, and that a pragmatic RCT may be the optimum methodology [Haddad *et al.* 2015].

Although many patients are well informed about treatment choices, the nurses surveyed in this initiative reported that more than a third of patients remain unaware of the availability of LAI antipsychotics. Another recent questionnaire-based study reported that 67% of patients (*n* = 83; 21 with prior experience with depot formulations) had not been provided with information about LAI medications by their psychiatrist [Caroli *et al.* 2011]. These surveys highlight the need for more effective dissemination of information to patients and carers regarding LAI antipsychotics. This is particularly pertinent given that, in a recent study of patients with schizophrenia receiving ≥3 months' treatment with an LAI antipsychotic (*n* = 206; 95% with experience of treatment

with ≥ 1 antipsychotic formulation), more than two-thirds reported a preference for injectable medication over oral tablets (35%), solutions (7%) or orally disintegrating tablets (1%) [Caroli *et al.* 2011]. Most patients in the study (70%) felt better supported in the management of their illness when receiving LAI antipsychotic medication due to greater contact with their healthcare professionals.

Approximately half of the nurses in this survey preferred administering gluteal to deltoid injections (13% preferring deltoid administration). Half of the respondents felt that $<20\%$ of their patients would prefer the deltoid route of administration. It is not known whether nurses' preferences for gluteal administration stem from factors associated with the method of injection or whether they are simply indicative of greater familiarity with this type of treatment. Indeed, given the paucity of LAI antipsychotics that can be delivered into the deltoid muscle, nurses' perceptions of what their patients would prefer may also be due to patients' lack of experience with this route of administration. These findings suggest a need to improve awareness among nurses and their patients of the feasibility of deltoid administration of LAI antipsychotics in order to provide information on the full range of treatment choices available.

It is a necessary limitation of this study that the results are based on the clinical opinions of the nurses surveyed. In order to receive responses from as many nurses as possible, a variety of methods were employed to distribute surveys. As with other questionnaire-based surveys, it cannot be established whether the respondents, who comprised 14% of survey recipients, were fully representative of the broader population of nurses throughout Europe and the Middle East. As 64% reported working in inpatient settings, these respondents may have a greater awareness of adherence problems or a more pessimistic view of the extent of partial and nonadherence by patients with schizophrenia than the broader population of nurses. Similarly, the extent to which the demographics of the respondents to the survey may systematically differ from the nurses across the EMEA region as a whole, and the impact on the survey results, is not known. The low response rate meant that the survey did not allow exploration of differences between countries. Furthermore, in countries such as Turkey, visiting nurses at their place of work may have facilitated a higher

response rate than that of the countries that responded online, such as the UK. It can also not be excluded that respondents were comprised of nurses more engaged or interested in the care of patients with psychotic disorders. In addition, as the interpretation of the results from this survey was based on descriptive comparison of responses only, in a relatively small convenience sample, it is therefore unsuitable to make meaningful interpretations of the attitudes of nurses between countries. The survey was made available in the following languages: Arabic, English, German, French, Italian, Spanish, Russian, Dutch and Swedish. A separate assessment of the reliability and validity of the questionnaire was not performed.

Conclusion

The EMEA ADHES survey is, to our knowledge, the first large-scale assessment of nurses' attitudes towards the causes, extent and consequences of partial or nonadherence to antipsychotic medication in schizophrenia. These nurses' opinions offer valuable insights into the impact that adherence-related matters may have on the lives of those with schizophrenia and provide a basis for more in-depth analysis of nurses' perceptions concerning treatment adherence identified herein.

The survey results indicate that there was recognition of the problem of poor adherence to medication. Although the majority of nurses had clinical experience administering LAI antipsychotics, and most believed that their patients were well informed about LAI antipsychotics, a third reported poor awareness of LAI antipsychotics among their patients.

Together with findings from the psychiatrists' survey [Olivares *et al.* 2013], these results suggest a need for a greater awareness among both patients and healthcare professionals of the treatment options available. Increasing awareness of available treatment options as part of a multidisciplinary strategy may help to increase adherence and ultimately to improve clinical outcomes of schizophrenia patients.

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Conflict of interest statement

K.A. has received grants and honoraria for consulting work, lecturing and research from Lundbeck, Janssen, Pfizer, Schering-Plough, AstraZeneca, Bristol-Myers Squibb, Sanofi-Aventis, Santa Farma, Sanovel, Zentiva, Eczacibas, Nobel, Bilim, Abdi Ibrahim and Wyeth. J.M.A. has received research support and has acted as a consultant and/or served on a speaker's bureau for Bristol-Myers Squibb, Janssen, Eli Lilly, Lundbeck, Novartis, Pfizer, Servier, AstraZeneca and Sanofi-Aventis. F.C. has received honoraria for participating in advisory boards for Bristol-Myers Squibb, Janssen, Pfizer and Servier, and has received financial support/honoraria for his work as a speaker by AstraZeneca, Bristol-Myers Squibb, Janssen, MSD, Pfizer and Servier. V.D. has been a member of advisory boards, has been involved in designing and participating in clinical trials or has received educational grants for research, honoraria and travel from Janssen as well as other pharmaceutical companies. R.E. has participated in speakers/advisory boards and received honoraria from AstraZeneca, Janssen and Servier. P.G. has received research grants from Eli Lilly and Servier, honoraria for presentations in congresses from AstraZeneca, Bristol-Myers Squibb, Janssen, Lundbeck and Servier, has participated in advisory board with AstraZeneca, Janssen, Roche and Servier, and has a paid position at University of Paris-Descartes and hospital Sainte-Anne (but does not hold shares). P.M. Haddad has received fees for lecturing and/or consultancy work (including attending advisory boards) from companies including AstraZeneca, Bristol-Myers Squibb, Eli Lilly, Endo, Janssen-Cilag, Lundbeck, Otsuka, Quantum Pharmaceutical, Roche, Servier, Sunovion, Takeda and Teva, and in addition several of these companies have provided support to attend conferences. D.N. has participated in advisory boards for Janssen. J.M.O. has received educational grants for research, honoraria and travel support for activities as a consultant/adviser

and lecturer/faculty member for Janssen, AstraZeneca, Pfizer, Lundbeck and Bristol-Myers Squibb. G.P. has received grants and consultancy fees/honoraria from Pfizer, Janssen, Schering-Plough, Bristol-Myers Squibb and Novis, as well as grants from Lilly. M.R. has received grant support from Almirall, Lilly, Lundbeck and Janssen, and served on advisory boards for Janssen and Servier. P.T. has received speakers' honoraria from Lilly, Lundbeck, BMS Otsuka, Janssen, AstraZeneca and Euthérapie. L.H. and A.S. are employees of Janssen.

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