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RESEARCH ARTICLE

Psychotropic Medication Monitoring Checklists: Use and Utility for Children in Residential Care

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Abstract

Objective: To develop side effect (SE) monitoring checklists for four categories of psychotropic medications (antipsychotics, mood stabilizers, stimulants, and selective serotonin-reuptake inhibitors), to improve residential direct care staff's confidence and competence in SE monitoring, and to facilitate communication of potential observed SE to medical personnel (e.g., nurse, physician). **Methods:** Seventy-two staff members (three nurses, 69 child/youth workers) from five residential units at a tertiary mental health centre utilized the Psychotropic Medication Monitoring Checklists (PMMC) for eight weeks and completed pre- and post-test measures of staff characteristics and PMMC satisfaction. **Results:** The use of PMMC led to significant changes in direct care staff's awareness and beliefs associated with medication monitoring. An increase in staff-physician communication with direct care staff was marginally significant. Further investigation into the educational qualities of the PMMC revealed that staff with very little prior formal medication education showed greater change compared to those staff reporting greater formal medication instruction. Staff ratings of the PMMC exceeded mild levels of satisfaction, indicating that the checklists were a well-received and useful tool for monitoring SE in a residential care setting. **Conclusions:** The PMMC are useful as an educational SE monitoring tool for direct care staff in child residential care settings, with potential utility for multiple types of healthcare settings.

Key Words*: children, side effects, psychotropic medication monitoring checklist, residential care*

Résumé

Objectif: Dresser des listes de surveillance des effets secondaires (ES) pour quatre catégories de médicaments psychotropes (antipsychotiques, psychorégulateurs, stimulants, et inhibiteurs spécifiques du recaptage de la sérotonine), améliorer la confiance et la compétence du personnel de soins directs résidentiels en matière de surveillance des ES, et faciliter la communication des ES éventuellement observés au personnel médical (p. ex., infirmières, médecins). **Méthodes:** Soixante-douze membres du personnel (trois infirmières, 69 travailleurs auprès des enfants/adolescents) de cinq unités résidentielles d'un centre tertiaire de santé mentale ont utilisé les Listes de surveillance des médicaments psychotropes (LSMP) durant huit semaines et ont répondu à des mesures pré-test et post-test des caractéristiques du personnel et de la satisfaction relativement aux LSMP. **Résultats:** L'utilisation des LSMP a entraîné des changements significatifs de la connaissance et des croyances liées à la surveillance des médicaments chez le personnel de soins directs. L'accroissement de la communication entre les médecins en poste et le personnel des soins directs était marginalement significatif. Une autre recherche sur les qualités didactiques des LSMP a révélé que le personnel ayant très peu de formation pharmacologique antérieure démontrait un plus grand changement comparé au personnel déclarant une formation pharmacologique plus poussée. Les notations du personnel sur les LSMP excédaient les faibles niveaux de satisfaction, indiquant que les listes de surveillance étaient un outil bien reçu et utile pour surveiller les ES dans un contexte de soins résidentiels. **Conclusions:** Les LSMP sont utiles en tant qu'outil éducatif de surveillance des ES pour le personnel des soins directs d'établissents de soins résidentiels pour enfants, et peuvent éventuellement être utiles dans de multiples types d'établissements de soins de santé.

Mots clés: *enfants, effets secondaires, liste de surveillance des médicaments psychotropes, soins résidentiels*

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Children requiring mental health care in settings such as hospitals and residential treatment facilities tend to present with complex symptoms that are often managed by the use of off-label psychotropic medications (i.e., medications lacking regulatory approval for use with children or for specific indications) as part of a treatment plan. Over the last three decades, the use of psychotropic medications in children has increased dramatically (Olfson, Marcus, Weissman, & Jensen, 2002). Between 1987 and 1996, one study determined that stimulant use increased from 0.6 to 2.4 per 100 children and adolescents across the United States, and substantially increased use of other psychotropic medications, including antidepressants, anti-epileptics and clonidine (Olfson et al., 2002). A later study of youth visits to office-based practices in the United States found that between 1996 to 2007 multiclass psychotropic medication use rose from 14.3% to 20.2% (Comer, Olfson, & Mojtabai, 2010). In a child psychiatrist/developmental physician survey on antipsychotic prescribing practices, 12% of prescribed antipsychotics were reported among children less than nine years of ages (Doey, Handelman, Seabrook, & Steele, 2007).

Although psychotropic medication use in children includes agents that do not have formal indication for pediatric mental health disorders, these medications may be commonly used in clinical practice based on generalization from the adult literature. The pediatric population is very vulnerable given that drug toxicities can be age-dependent, medications are often administered for long time periods (e.g., years), and there may be interactions between growth, development and pharmacological factors. Children may metabolize medication differently than do adults, and therefore may be more likely to experience side effects (SE). For example, problematic weight gain associated with atypical antipsychotics has been implicated as contributing to the growing concern of childhood obesity (Shin, Bregman, Frazier, & Noyes, 2008). How drug interactions may influence brain development and possible long-term effects of treatment in youngsters are also not known (Correll et al., 2006; Vitiello et al., 2003). Prescribers may rely on sparse evidence to inform decisions with respect to the benefit/risk ratio (Sparks & Duncan, 2008), and many psychotropic medications are prescribed to children without systematic evaluation of pediatric effects (Vitiello et al., 2003). The literature has been criticized as significantly underreporting the rate of serious side effects associated with psychotropic medications (Hazell & Shakir, 2006; McKinney & Renk, 2011). Monitoring for potential adverse effects of psychotropic medications administered to children, and responding to those concerns, is essential in order to promote safe use of these interventions (Greenhill et al., 2004; Zito et al., 2008).

There is a clear need for tools to monitor psychotropic medication SE in children, especially in residential mental health centres and group homes. Estimates indicate that up to 90% of youth in residential care have complex mental health issues (Hurley et al., 2009; Pottick, Warner, & Yoder, 2005), with 40-80% prescribed psychotropic medication (Connor & McLaughlin, 2005; Griffith et al., 2012). Such settings may mainly employ child/youth workers who have much less medication training compared to direct care staff at inpatient settings such as hospitals (i.e., nurses). While pre-service child and youth care training programs typically include mention of medication in the broad context of treatment of mental health disorders, a gap in most programs has been identified where there is little or no training in SE monitoring, documentation, and communication (Stuart & Sanders, 2008). Key concerns in residential treatment facilities include whether all care staff are sufficiently knowledgeable about psychotropic medications, are able to recognize potential SE, and whether they have established procedures by which to bring such concerns to the attention of appropriate medical professionals (e.g., nurse, physician). Because pre-service education programs for child and youth workers differ greatly and do not provide in depth training in all areas such as medication monitoring, support for professional development in the care setting is therefore essential (Gharabaghi, 2008).

A staff-completed SE monitoring tool for pediatric mental health care systems would help to address these concerns by providing staff involved in daily care of children and youth with a list of potential SE for commonly prescribed classes of psychotropic medications, and a consistent way to document observed SE that can be easily communicated to medical personnel. Currently, no gold standard exists for empirically driven standardization of methods to monitor SE of psychotropic medication for children. The authors are aware of a non-published tool called the Antipsychotic Monitoring Form for Children and Adolescents© by the Child and Adolescent Mental Health Programs, British Columbia Children's Hospital. This tool relies on the self-monitoring of patients prescribed antipsychotic medications, with the assistance of checklists of potential SE. Although there is value in a self-report tool, challenges may occur for use with children due to developmental level and/or current psychopathology. Therefore, adults need to be involved in the monitoring process. Residential direct care staff who spend the majority of time with children have the best opportunity to observe physical symptoms possibly related to medication use. An additional tool called the Safety Monitoring Uniform Report Form (SMURF) was developed by a network sponsored by the National Institute of Mental Health aimed at investigating psychotropic medication SE in children. A test of its usefulness indicated that the tool was favored by parents, but its length was likely to be an obstacle to practical implementation by prescribers (Greenhill et al., 2004). Given these findings, a key factor in developing a monitoring tool will be to ensure ease of use and user satisfaction.

The current study sought to develop a monitoring tool that would improve knowledge and be easy to use for residential

staff in daily monitoring for potential SE. Psychotropic Medication Monitoring Checklists (PMMC) were developed through a review of the literature on psychotropic medication SE, with the purpose of promoting consistency in monitoring and documenting SE for children in residential care. Checklists were created for four common categories of psychotropic medications: antipsychotics; mood stabilizers; stimulants; and, selective serotonin-reuptake inhibitors (SSRIs). These evidence-based checklists were hypothesized to improve residential direct care staff's confidence and competence in SE monitoring, and to facilitate communication of observed SE to medical personnel. The specific study objectives were:

- to examine change in direct care staff's awareness of medication SE, beliefs about the importance of SE monitoring and communication of SE, resulting from the use of the PMMC; and,
- to examine the role of staff characteristics on changed perceptions and satisfaction with the use of the PMMC.

Method

Ethics approval was obtained from the Western University Research Ethics Board.

Participants

The use and utility of the PMMC were evaluated by direct care staff on five residential units at a tertiary mental health care facility:

a) Unit 1, a short-term stabilization unit with a collaborative problem solving approach for children between the ages of 6-12 years;

b) Unit 2, a unit for adolescent boys (between the ages of 13-18 years);

c) Unit 3, a unit for adolescent girls (between the ages of 10-18 years);

d) Unit 4, a unit for boys and girls (between the ages of 6-12 years) with developmental delays; and,

e) Unit 5, a unit for adolescents (between the ages of 13-18 years) with developmental delays.

Each unit has a designated psychiatrist who is regularly available to provide consistent psychiatric care.

Ninety-four residential staff were invited to participate in this study (i.e., all staff on the five units). A total of 83 staff members completed the pre-measures for the study (described below). Three of the staff were nurses and 80 were child/youth workers. At post-test, eight of the original 83 staff members declined to complete the measures, two others were away on leave, and one was no longer working with residential clients. A total of 72 staff members completed all pre- and post-measures (three nurses and 69 child/youth workers: 54 females, M_{age} = 40 years; SD = 10.23 years; 18 males, M_{age} = 42 years, SD = 10.31 years). The majority of staff had more than a decade of experience working with mental health clients (n = 54), but with very little formal medication instruction in post-secondary education (n = 32 with less than 4% of education curriculum instructing on medications). See Table 1 for participant demographics.

Table 1. Participant demographics

Demographics	n
Gender	
Female	54
Male	18
Staff position	
Child and youth worker	69
Nurse	3
Years of experience with mental health clients:	
1 to 4 years	6
5 to 9 years	12
10 years or more	54
Highest level of education:	
College diploma	60
University degree	12
Attained degree that most relates to current position:	
Child and youth worker	39
Developmental service worker	18
Mental retardation counsellor	10
Registered nurse	3
Community welfare degree	1
Early childhood educator	1
Percent of curriculum in post-secondary program instructing on medications:	
None to 4%	32
5% to 9%	16
10% to 24%	10
25% to 49%	10
50% or more	4

The Psychotropic Medication Monitoring Checklists (PMMC)

The PMMC were developed over a one-year period by a four-person physician-pharmacist team at the Child and Parent Resource Institute (CPRI) in London, Ontario, Canada. The team consisted of a pediatrician with expertise in behavioural health, two child and adolescent psychiatrists with psychopharmacologic expertise and a pharmacist with expertise in pediatric psychopharmacology. The team identified commonly prescribed psychotropic medications for mental health concerns in children and adolescents in North America, using the list of the US Federal Drug

Administration and Health Canada approved psychotropic medications, practice parameters on the use of psychotropic medications in children (American Academy of Child and Adolescent Psychiatry (AACAP), 2009), as well as the team's consensus opinion on commonly prescribed off-label medications to treat pediatric mental health conditions.

The team then conducted a comprehensive review of the literature on known SE of these specific categories of psychotropic medications. Product monographs, website resources such as Medscape, and other published references such as the Clinical Handbook of Psychotropic Drugs for Children and Adolescents (Bezchlibnyk-Butler & Virani, 2007) were reviewed in order to develop a comprehensive but user-friendly list of known potential SE.

Early versions of the PMMC were piloted on one of the CPRI residential units (Unit 1) to develop clarity of layout and content through feedback provided by direct care staff. The expert team revised the list of SE in accordance with clinical experience and reference to the literature in order to organize the SE into common, infrequent and rare but serious SE. Ten revised checklists resulted for the following medications: Valproic Acid, Lamotrigine, Carbamazepine, Topiramate, Atomoxetine, Clonidine, Lithium, Neuroleptics, SSRIs, and Stimulants. Each PMMC allows a full week of monitoring, with check boxes for daily indication of each possible listed SE by two raters (a daytime staff and an evening/night staff). Additionally, space was alloted for the medical professional involved with the residential unit to confirm weekly review. An example of one of the PMMC is included in Appendix A.

Procedure

To survey staff members' confidence and competence with SE monitoring before introducing the PMMC to the units, all staff were asked to complete the Awareness, Beliefs, and Communication (ABC) Scale of Medication Monitoring in addition to a Staff Characteristics Questionnaire (both described below). Staff were given a one-hour training session by a physician from the study team and a residential manager. The usual practice for documenting potential side effects on the units involved making notes in the clients' medical record. The PMMC were promoted as a standardized alternative for side effect documentation, and so the time commitment involved was assumed to be less or no different than previous practice. The PMMC were then used on the five residential units for an eight-week study period. A binder on each unit (divided into sections to accommodate the relevant PMMC for each child) was maintained by a weekend night staff person who would remove the previous week's completed sheets and replenish them based on each client's prescription regimen for the following week. After the eight weeks, all of the staff members who had completed the pretest measures were asked to again complete the ABC and a Medication Checklist Evaluation Questionnaire, which served as a measure of satisfaction and an opportunity for staff to provide feedback on the PMMC.

Measures

Awareness, Beliefs, and Communication (ABC) Scale of Medication Monitoring. This measure was created by the study team, using standard scale construction techniques (Wiggins, 1973), to determine the usefulness of the PMMC. The ABC was designed to assess staff's:

a) awareness of psychotropic medication related SE;

b) beliefs about SE monitoring; and,

c) communication of observed SE to the responsible medical personnel (i.e., the physician assigned to the unit).

These content categories were based on important outcomes identified in the literature and a previously developed outcome measure (King et al., 2003).

The ABC was designed to be an outcome measurement instrument capable of detecting change over time. An expert team, consisting of a psychologist, social scientist, pharmacist, and two psychiatrists, reviewed the items. Prior to using this measure for the current study, the ABC was piloted for clarity of wording with a group of outpatient direct care staff (n = 12) at the same centre. The preliminary ABC was comprised of 23 items, rated on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). Phrasing for all items was unidirectional, with higher scores indicating greater confidence and competence in monitoring for SE.

Due to the a priori three-factor structure of the ABC, a confirmatory factor analysis with three factors was performed on the pre-intervention data (n = 83). Our sample size is consistent with Lawley and Maxwell's (1971) rule that there should be 51 more respondents than items of a measure. Since the correlation matrix revealed significant relationships between many of the items, a promax (4) rotated oblique analysis was used to maximize the separation among factors. Loadings of 0.5 and higher were considered to be acceptable, with a required difference of at least 0.2 in loadings between factors. Two items loading highly on multiple factors were eliminated because they did not meet the criterion of a difference of 0.2. Two items loading weakly on all factors were also eliminated, resulting in a 19-item measure with a clear factor structure.

The factor analysis accounted for 57% of the variance and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy score was 0.78, indicating that it was appropriate to perform such an analysis on these data (Tabachnick & Fidell, 2007). In addition, Bartlett's Test of Sphericity was significant, indicating that the data were adequate for factor analysis to be performed. The a priori subscales conceptually mapped

Table 2. Factor loadings of items on the ABC Scale of Medication Monitoring

Items	Factor awareness	Beliefs	Communication
I am satisfied with my familiarity with common side effects associated with the use of psychotropic medications in children.	.86	-.11	-.00
I am aware of the names of commonly used psychotropic medications.	.59	-.39	.21
I am aware of the differences in side effect profiles of different psychotropic medications.	.84	-.10	.10
I am satisfied with my familiarity with rare side effects associated with the use of psychotropic medications in children.	.80	.03	-.01
I frequently observe for possible side effects of children in my care who are prescribed psychotropic medications.	.59	.17	.04
I frequently ask the children in my care who are prescribed psychotropic medications about possible side effects.	.62	.28	-.08
I am comfortable with monitoring for and documenting potential psychotropic medication side effects experienced by children in my care.	.60	.35	-.17
I am aware of the categories of psychotropic medications.	.86	-.27	-.03
I am satisfied with my familiarity with infrequent side effects associated with the use of psychotropic medications in children.	.87	.10	-.14
Close monitoring by guardians/direct care workers for potential side effects from the use of psychotropic medication does not require a significant amount of time.	-.07	.61	.16
It is very important to communicate possible psychotropic medication side effects to the most responsible or prescribing physician within days or sooner of their occurrence.	-.14	.57	-.13
Close monitoring by guardians/direct care workers for potential side effects from the use of psychotropic medication is easy to do.	.01	.79	.06
I have the time to monitor and document potential concerns regarding side effects from psychotropic medications that children in my care are prescribed.	-.06	.73	.03
The existing approach to monitoring and documenting potential psychotropic medication side effects experienced by children in my care is easy to understand and utilize.	.26	.48	.22
The physician who is prescribing psychotropic medications to the children in my care is interested in my observations for potential side effects.	-.15	-.10	.93
All side effects experienced by children in my care are caught early.	.27	.10	.53
It is currently easy to communicate my concerns regarding the potential onset of side effects resulting from the use of psychotropic medications in the children I care for to the most responsible or prescribing physician.	-.01	-.00	.84
The physician who is prescribing psychotropic medications to the children in my care has the time to assess my concerns for potential side effects.	-.09	.15	.69
The majority of psychotropic medication side effects experienced by children in my care are communicated to the most responsible or prescribing physician within 7 days.	.18	.03	.52

Table 3. Repeated measure ANOVA on changes in Awareness, Beliefs, and Communication as a result of the Psychotropic Medication Monitoring Checklist Intervention

Effect	F	df	p
Time	19.32	1, 63	.000
Time × Unit	8.19	4, 63	.000
Subscale	43.44	2, 62	.000
Subscale × Unit	2.61	8, 126	.011
Time × Subscale	2.90	2, 62	.062
Time × Subscale × Unit	1.82	8, 126	.080

Table 4. Mean ABC subscale scores pre and post-test for each of the five units

Primary units	Pre-awareness M (SD)	Post-awareness M (SD)	Pre-belief M (SD)	Post-belief M (SD)	Pre-communication M (SD)	Post-communication M (SD)
Short-term stabilization - child	5.72 (0.67)	5.66 (0.66)	5.49 (0.85)	5.59 (0.85)	6.43 (0.45)	6.46 (0.45)
Mental health - adolescent girls	4.59 (1.06)	5.47 (0.54)	4.75 (0.89)	5.54 (0.47)	5.00 (1.00)	5.73 (0.602)
Mental health - adolescent boys	4.77 (1.02)	5.16 (1.00)	5.07 (0.62)	4.87 (0.68)	5.83 (0.60)	5.51 (0.70)
Developmental - child	4.47 (0.69)	5.19 (0.53)	4.63 (1.16)	5.79 (0.55)	5.72 (0.56)	6.31 (0.37)
Developmental - adolescents	4.70 (1.22)	4.78 (1.05)	4.60 (0.71)	4.69 (0.95)	5.13 (1.26)	4.91 (1.01)
Over all units	4.87 (1.01)	5.29 (0.79)	4.94 (0.92)	5.36 (0.79)	5.68 (0.92)	5.88 (0.80)
Paired t-tests	$t(67) = -4.06$; $p < .001$		$t(67) = -3.58$; $p = .001$		$t(67) = -1.90$; $p = .06$	

onto the confirmed factor structure well (see Table 2), with the resulting subscales labeled, as anticipated:

1) awareness of medications and SE (nine items);
2) beliefs about importance and ability to monitor for SE (five items); and,
3) communicating observations about SE to medical personnel (five items).

The internal consistency reliabilities of the subscales (Cronbach's alphas) were 0.90, 0.72, and 0.79 for Awareness, Belief and Communication, respectively. These internal consistencies were good to excellent; Portney and Watkins (2000) states that strong internal consistency is evident by α of 0.70 to 0.90.

Staff Characteristics Questionnaire. This questionnaire contained 19 items capturing demographic information such as gender, date of birth, and educational level, along with questions assessing years of experience in the mental health field and with administering medications.

Psychotropic Medication Monitoring Checklist Evaluation Questionnaire. This questionnaire contained eight items, scored on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree), assessing staff members' perceptions of the ease of use and utility or effectiveness of the PMMC. Additional questions measured the frequency with which individual staff used the PMMC during the trial and how much of the staff's time was spent on their primary unit. Space also allowed staff to provide their own opinions of the PMMC and suggestions for revisions.

Results

Changes in Awareness, Beliefs, and Communication as a Result of the PMMC Intervention. A repeated measures analysis of variance (ANOVA) was conducted, with time (pre/post) and ABC subscale (Awareness, Beliefs and Communication) as within-subject factors, and residential unit (Units 1 to 5) as a between-subjects factor. The dependent variables were the pre and post-trial ABC means for each subscale. There were several significant results: a main effect for time, $F(1, 63) = 19.32$, $p < .001$; a time by unit interaction, $F(4, 63) = 8.19$; $p < .001$; a main effect for subscale, $F(2, 62) = 43.44$, $p < .001$; and, a subscale by unit interaction, $F(8, 126) = 2.61$, $p < .05$. Time by subscale and time by subscale by unit interactions did not reach significance (see Table 3).

To understand the main effect of time, paired t-tests were conducted on the mean scores of the ABC subscales. These t-tests revealed significant changes in direct care staff's awareness, t(67) = -4.06; $p < .001$, and beliefs, t(67) = -3.58; $p < .001$, associated with the PMMC intervention. The increase in communication was marginally significant, t(67) = -1.90; $p = .06$. Pre- and post-test means for each subscale are presented in Table 4, for each residential unit and collapsed over units.

The differences in ABC change between units indicated by the time by unit and subscale by unit interactions were also of interest. Tukey post-hoc comparisons indicated that Unit 1 (the pilot unit that had extensive experience with previous versions of the checklists) differed significantly from all four of the other units, for whom the checklists were new ($p < .01$ for mean differences for Units 2, 3, and 5, $p = .06$ for Unit 4). Specifically, Unit 1 had higher ABC scores across subscales at both the start and end of the study period. The other four units did not differ from each other in the post-hoc comparison.

Staff Characteristics and ABC. Our next step was to determine whether certain staff characteristics associated with relevant experience (e.g., years of practice, medication involvement, and education) were associated with pre/post change in ABC scores. With Unit 1 staff excluded, a series of repeated measures ANOVAs were conducted on the ABC scale scores, using time (pre/post) and ABC subscale as within-subjects factors, and the following staff characteristics as the between-subjects factor:

a) the number of years worked with mental health/developmental children (1-9 years, 10-19 years, 20 years and up);

b) how often staff administer medications or document medication information for clients (three or more days per week, 1-2 days per week, one day every two weeks, one day per month or less); and,

c) their amount of formal education on medications in post-secondary curriculum (none, less than 1%, 1-4%, 5-9%, 10-24%, 25% and up).

Only the third variable yielded a significant interaction with time, $F(5, 46) = 3.05$, $p < .05$. Tukey post-hoc comparisons indicated that the staff who reported that less than 1% of their educational program curriculum dealt with information on medications showed greater overall change on the ABC compared to those staff reporting 5-9% ($p < .02$) and 25% and higher ($p = .01$).

Staff Engagement and Satisfaction with the PMMC. To evaluate how many staff were engaged in using the checklists during the eight-week period, our Checklist Evaluation Questionnaire asked staff to rate how often they used the PMMC as a reference tool and how often they actually documented SE. Overall, staff members were very engaged in this procedure, with 94% reporting using the PMMC as a reference and/or to document SE during the study period.

The final analysis investigated staffs' opinions about whether the PMMC were a useful tool. Using all respondent data available from the Checklist Evaluation Questionnaire (three nurses and all casual and permanent child/youth workers), a t-test was conducted using total scores from the eight satisfaction items, in comparison to a test value. A test value of 32 was chosen to determine whether responses were significant in a positive direction, since eight items multiplied by mildly agree (value 4) resulted in a test value of 32. Staff satisfaction ratings of the PMMC were significantly higher than the test value (Total Score $M = 44.68$, $SD = 8.09$; t(70) = 13.21, $p < .001$), indicating that the checklists were a well-received and useful tool for monitoring SE in a residential care setting.

The final open-ended questions on the CEQ asked staff to indicate what would make the PMMC more helpful or easier to use. Based on their feedback, we reduced the PMMC from 10 to 7 checklists by grouping the anti-epileptic medications to one checklist (Valproic Acid, Topirimate, Carbamazepine, Lamotrigine), since the potential SE are similar. Staff also requested space for comments to be added at the end of the PMMC to document any situational variables that may have contributed to the observed potential SE (e.g., lack of appetite possibly due to an upper respiratory illness).

Discussion

Utility of the PMMC

Our preliminary results suggest that the PMMC are both well received and educational instruments to enhance the elicitation and examination of specific adverse reactions related to psychotropic medications. Staff use of the checklists was extremely high (94%), which may have contributed to the overall success of the PMMC in altering awareness, beliefs, and communication. Staff with the least amount of education in post-secondary educational programming in psychotropic medication displayed the highest level of gains with respect to monitoring SE when utilizing the PMMC.

These results have implications for future use and implementation of the PMMC across multiple settings and specific facility characteristics. These checklists may have more educational impact in settings where staff members have less formal medication instruction and training such as in group homes, rather than in hospital settings where staff would likely have higher levels of training and expertise in medications. Our results only marginally demonstrated that the PMMC was perceived by staff to increase staff-psychiatrist communication on potential side effects. However, even before this research study began, the study setting at the tertiary mental health centre allowed for consistent and regular care by a designated psychiatrist who was readily

available to communicate with staff and provide psychiatric care. In other settings where access to a psychiatrist or other prescriber is not so easily obtained, users of the PMMC may experience a more significant improvement in communication of potential side effects to prescribers.

Study limitations

One limitation of this study is that generalizability of the findings may be limited to those facilities that serve clients with complex needs. Also, it should be noted that the tertiary care facility in this study may provide more training in psychotropic medication use than many other residential treatment facilities. It is possible, therefore, that the educational impact of the PMMC could be even greater for agenices that have less exposure to training in the use of psychotropic medications.

Future research

The efficacy and safety of most psychotropic medications in children are yet to be established by clinical trials (Zito et al., 2008). Off-label prescribing practices occur, and therefore it is vital to ensure that careful monitoring for effectiveness and SE is exercised in clinical practice. Given the results of our study using the PMMC, it would be important to establish the generalizability of these findings in other settings with differing levels of medical support. Potential next steps could include modification for outpatient use, trials in other residential care settings, and possibly in child and adolescent psychiatry inpatient wards. Further investigation into whether use of the PMMC improves staff-nurse communication or staff-staff communication regarding potential SE would also be valuable. We look forward to future collaborations and partnerships with other organizations to explore the extent to which this tool can improve safe medication practices. Additional applications of the SE data collected using the PMMC are currently underway. For example, preliminary analyses suggest that psychotropic medication SE may be predictable based on other patient characteristics such as diagnoses and presenting problems (manuscript forthcoming). Early identification of children and youth at risk for SE will be useful in care planning and vigilance in SE monitoring.

Conclusions

The PMMC presented herein were designed to assist in the promotion of appropriate and safe use of psychotropic medication in children. Taken together, our findings indicate that the PMMC led to significant improvements in awareness of and beliefs concerning the usefulness/benefit of medication monitoring for a sample of direct care staff, comprised mainly of child/youth workers. Marginally significant improvement was also found in communication of observed SE to the residential units' physicians. These data support the notion that the PMMC are useful educational tools to promote safe medication practices, with potential use in many types of healthcare settings.

Clinical significance

The PMMC has demonstrated the ability to improve awareness and beliefs in residential staff concerning the benefit of medication monitoring thereby promoting psychotropic medication education as well as safe medication practices. In a setting where adults are administering psychotropic medications to children, the use of such tools can enhance the safe use of pharmacologic interventions. The PMMC serve as a useful professional development tool in the field of child and youth residential mental health where quality in-service training is critical. In addition, the ABC tool has potential health service management usefulness in assessing care provider baseline and change in knowledge, attitude and ability to communicate concerns regarding potential side effects when using side effect monitoring instruments.

Acknowledgements/Conflicts of Interest

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Appendix A

Name:	Casebook#:	Unit:	Week Start Date:
Check all **SSRI** meds given this week:	☐ CELEXA (CITALOPRAM) ☐ CIPRALEX (ESCITALOPRAM) ☐ LUVOX (FLUVOXAMINE)	☐ PAXIL (PAROXETINE) ☐ PROZAC (FLUOXETINE) ☐ ZOLOFT (SERTRALINE)	

Instructions: Initial in the correct space for observed side effects. To indicate days when no monitoring took place (i.e., leave of absence) place a line down the length of the column(s).

COMMON:	BASE LINE	MON Day / Eve	TUES Day / Eve	WED Day / Eve	THUR Day / Eve	FRI Day / Eve	SAT Day / Eve	SUN Day / Eve
Appetite Change								
Constipation								
Diarrhea								
Dizziness								
Dry Mouth / Eyes / Nose								
Headache								
Nausea								
Nervousness								
Reflux								
Sleepiness / Tiredness								
Twitching								
Weakness								
INFREQUENT:	BASE LINE	MON Day / Eve	TUES Day / Eve	WED Day / Eve	THUR Day / Eve	FRI Day / Eve	SAT Day / Eve	SUN Day / Eve
Agitation								
Blurred Vision								
Euphoria								
Insomnia								
Irritability								
Rash or Hives								
Restlessness								
Sweating Excessive								
Tremor								
Urination Trouble								
RARE BUT SERIOUS (page physician/ nurse):	BASE LINE	MON Day / Eve	TUES Day / Eve	WED Day / Eve	THUR Day / Eve	FRI Day / Eve	SAT Day / Eve	SUN Day / Eve
Symptoms of Serotonin Syndrome: Confusion, Sweating, Seizure, Agitation, Diarrhea, Tremors, Chest Pain								
Worsened Suicidal Ideation								
Initial for each shift if NO side effects were observed:								
COMMENTS:								

 Medical Professional's Initials:_____ **Date:**_____