

Reducing the Use of PRN Medication in In-Patient Psychiatric Hospitals

George C. T. Mugoya and
Charlene M. Kampfe

Despite lack of evidence for clinical effectiveness, the use of *as required* medications, commonly known as PRN (from the Latin *pro re nata*: for an occasion that has arisen), is a typical practice in most in-patient mental hospitals. Some researchers have argued that the use of psychotropic PRNs may expose patients to unnecessary psychotropic medications. The purpose of this literature review was to provide an overview of research regarding the effectiveness of policies, procedures and/or researcher-designed programs aimed at reducing PRN medication reliance. The article includes a review of eight research studies that met the following criteria: (a) researchers attempted to reduce or explain the high incidence of PRN medication use for behavioral related issues, and (b) researchers provided information on the use of PRN medications used. Policy and procedural changes appeared to be effective in reducing the use of PRN medications; however, weaknesses in other researcher-designed interventions may have led to insignificant findings.

The use of *as required* medications, commonly referred to as PRN medications, is a typical practice in most acute in-patient mental health settings. Researchers estimate that between 23% and 50% of patients in psychiatric units in the United States of America will receive PRN medications (Craig & Bracken, 1995; Fishel et al., 1994). Similar or even higher rates have been reported in other countries, including Australia, where rates have been placed at 79.6% (Curtis & Capp, 2003); Canada 50 % (Craven, Voore, & Voineskos, 1987); and Britain 50% (Davies et al., 1990).

The term, PRN, is derived from the Latin term "*pro re nata*," meaning for an occasion that has arisen, as circumstances require, or as needed. PRN psychotropic medications are usually prescribed by physicians to be given at the discretion of a nurse or at a patient's request. The most commonly prescribed PRN psychiatric medications include anxiolytics (used to treat and prevent anxiety disorders) and antipsychotics (used to treat psychosis), followed by hypnotics (used to treat insomnia) and anticholinergics (used to treat extrapyramidal side-effects of antipsychotics) (Curtis & Capp, 2003; Geffen et al., 2002). The underlying rationale for the use of PRN orders is that nursing staff need to be able to administer psychotropic medica-

tions in a timely manner to prevent or contain agitated or violent patients in an acute psychiatric ward without having to first call a physician (Walker, 1991).

Despite the high frequency of use and importance placed on PRN psychotropic medications, their clinical effectiveness in acute mental health settings has yet to be established (Geffen et al., 2002; Whicher, Morrison & Douglas-Hall, 2003). Furthermore, significant risks have been associated with use of PRN medication. For example, PRN medications may (a) confound the assessment of the efficacy of regular medication (Ayd, 1985), (b) result in high (above-recommended) dosages (Milton, Lawton, Smith, & Buckley, 1998), (c) lead to polypharmacy (e.g., mixture of typical and atypical antipsychotics) (Bowden, 1999; Geffen et al., 2002), (d) lead to adverse drug interactions (Davies et al., 2007), and (e) increase morbidity (Ayd, Newton, Murthy, & Qureshi, 1997).

Researchers have also argued that behaviors, such as agitation, for which PRN medications are prescribed, are imprecise and ill defined (Ayd 1985; Gray, Smedley, & Thomas, 1996). This phenomenon was demonstrated by Walker (1991) using prescription orders written by physicians. He reported that, due to lack of objective definitions for behaviors such as anxiety and agitation, physicians wrote orders with wide

ranges of dose prescriptions. For example, he reported that for a drug like lorazepam, prescribed for anxiety, the dosage varied from 0.5 milligrams to 2 milligrams, while the dose for thioridazine, prescribed for agitation, varied from 10 milligrams to 100 milligrams.

Whicher et al. (2003) reported that, prescription of PRN psychotropic medication was based on clinical judgment and habit rather than high quality evidence. After reviewing published literature, Whicher et al. concluded that due to the absence of high quality randomized trials, no evidence was found to demonstrate the effectiveness of PRN psychotropic medications. Furthermore, Tharpa, Palmer, Huntley, Clardy, & Miller (2003), in a study to evaluate the practice of writing PRN orders, concluded that "the use of PRN orders may expose psychiatric inpatients to unnecessary psychotropic medications" (p. 1286).

Several researchers have attempted to determine whether various policies, procedures, or researcher-designed interventions led to reduction in excessive use of PRN psychotropic medications. In this paper, we will provide an overview of the current research regarding the effectiveness of policies, procedures and/or researcher-designed programs aimed at reducing PRN medication reliance. Due to several risks that have been associated with overuse of PRN medications, the information provided in this literature review is intended to assist clinicians and hospital managers in formulating policies and procedures to help reduce reliance on PRN medications.

The purpose of this literature review will, therefore, be to provide an overview of policies, procedures and/or researcher-designed intervention programs that have been evaluated for their effectiveness in reducing PRN medications reliance. The questions that guided this review included the following:

1. What policies, procedures or researcher-designed intervention programs have been found to be effective in reducing reliance on PRN medications?
2. What are the characteristics of these policies, procedures or researcher designed intervention programs?
3. What are the effects of reducing PRN medications?

Method

Studies were obtained by (a) tracing of references listed in previous studies and reviews and (b) using computer searches of EBSCOhost, Web of Science, PsychINFO, Medline, and Google Scholar databases for materials published in English. The following key words were used to conduct the computer searches: *PRN medication, as needed medication, psychotropic medications, reducing PRN medication.*

Criteria for inclusion of studies in this review included (a) researchers attempted to reduce or explain the high incidence of PRN medication use for behavioral related issues, and (b) researchers provided information on the use of PRN medications used. In this literature review, we excluded studies that considered the use of PRN medications for non-psychiatric issues such as pain management.

Findings

Nine studies that met the criteria set for inclusion in this review are presented in Table 1. All the studies except one, which was conducted in a brain injury unit of a rehabilitation hospital (Beaulieu et al., 2008), involved patients in psychiatric hospitals. Four of the studies involved participants in the United States (Beaulieu et al., 2008; Donat, 2006; Smith et al., 2008; Tharpa et al., 2003), two in the United Kingdom (Baker, Lovell & Harris, 2008; Paton, Barnes, Cavanagh, Taylor, & Lelliott, 2003), two in Australia (Dean, McDermott, & Scott, 2009; Stein-Parbury, Reid, Smith, Mouhanna, & Lamont, 2008), and one in Thailand (Chaichan, 2008).

PRN Medications Use

Researchers in all the studies except one (Donat, 2006) described the kinds of PRN medications used. Whereas Beaulieu et al. (2008) considered PRN medications use for only one behavior (i.e., agitation); all the other researchers included the use of PRN medication for multiple reasons including anxiety, agitation, insomnia and psychosis. In four of the studies, benzodiazepines were the most prescribed (Baker et al., 2008; Beaulieu et al., 2008; Smith et al., 2008; Stein-Parbury et al., 2008); while in two studies, antipsychotics were the most prescribed (Chaichan, 2008; Tharpa et al., 2003).

Effect of Change in Policies, Procedure, and Researcher-Designed Interventions

Policy changes appeared to be effective in reducing the use of PRN medications. In studies by Tharpa et al. (2003) and Smith et al. (2008), the researchers reported that a policy change requiring cessation of PRN medication orders led to significant reductions in the use of PRN medications. In Tharpa et al., issuance of nonscheduled psychotropic medications required physician approval as a "now" order while in Smith et al. study, medication ordering, and ordering was standardized. All the hospitals had a physician on-call 24-hours, 7 days a week. Further, clinical alerts were issued to any hospital that served a patient receiving 30 or more unscheduled psychiatric medications.

Several researchers (Smith et al., 2008; Stein-Parbury, Reid, Smith, Mouhanna, & Lamont, 2008; Tharpa et

Table 1
Study Characteristics

Author	Setting	Sample	Study Aim	Results
Baker (2008)	Two acute mental health wards in England.	12 doctors, 11 nurses, 7 junior staff and 35 patients.	To assess the impact and acceptability of a good practice manual on the use of PRN medication.	Significant decrease in the use of benzodiazepines and antipsychotic and increase in the use of hypnotics.
Beaulieu (2008)	20-bed unit brain injury rehabilitation hospital.	84 employees and 222 patients.	To evaluate the effect of behavior management training on restraint use and PRN medication delivery.	Temporary reduction in physical restraint use, but an increase in PRN medication use.
Chaichan (2008)	Psychiatric Hospital.	76 patients: 41 assessed and 35 not assessed.	To evaluate the use of PANSS-EC as a criterion for use of PRN medication.	No significant difference in PRN medication use between the two groups.
Dean (2009)	Psychiatric facility for children and youth in Australia.	254 patients assessed.	To assess changes in patterns of utilization of PRN medication over time.	Significant reduction in the PRN medication use.
Donat (2006)	A public psychiatric hospital in Virginia.	95 patients on acute status and 215 patients on extended care.	To assess the impact of a clinical/administrative review procedure on psychotropic PRN reliance.	Significant reduction in psychotropic PRN reliance was reported.
Paton (2008)	National Health Service trusts and private healthcare facilities in England	3942 patients at baseline and 3271 patients at follow-up.	To evaluate the effectiveness of a quality improvement program in reducing the prevalence of high-dose or combined antipsychotics.	Little change in the prevalence of high-dose or combined antipsychotic prescribing.
Smith (2008)	Nine Pennsylvania state hospitals	All patients in the hospitals. Average daily census, 1,961	To evaluate the effect of discontinuing the use of psychiatric PRN orders.	Significant reduction in the use of PRN medications.
Stein-Parbury (2008)	Four acute, inpatient mental health care units in Australia	All patients admitted for more than 24 hours during the 2 month study period	To describe the circumstances surrounding the use of PRN medications across four inpatient units.	97% per cent of all patients were prescribed PRN medications. The most frequently prescribed PRN medications benzodiazepine

Note. PRN (medications given to provide short-term relief of aggression, distress, or agitation)

al., 2003) found that the use of PRN medications was primarily initiated by staff. Smith et al. (2008) reported that 78% of the requests to use PRN medications were initiated by staff. Similar findings were reported by Stein-Parbury et al. (2008) who found that the use PRN medication administration was initiated by staff 60.7% of the times and 10.8% of the times by patients.

Despite initial concerns by the nursing staff that a change in policy prohibiting the use of PRN medications would lead to adverse effects such as inability of staff to prevent and contain disruptive behavior, Smith et al. (2008) and Tharpa et al. (2003) indicated that the change in policy led to a decrease in the use of PRN medications without any subsequent increase adverse effects or use of seclusion and restraint as it had been speculated by staff. From their findings, Tharpa et al. and Smith et al. concluded that the change in policy had not only led to a reduction in the use of PRN medications, but also significantly decreased exposure of patients to unnecessary psychotropic medications. Further, based on the findings that most of PRN medication use was initiated by staff and a change in policy prohibiting the use of PRN medication orders led to a decrease in the use of PRN medications without an increase in adverse effects, Tharpa et al. (2003) questioned whether PRN orders were for the benefit of the patient or staff.

Procedural changes were also effective in reducing the use of PRN medications. Dean and colleagues (2009) found that modifying the medical administration forms to incorporate an area for recording the reason for administering PRN medications led to a significant reduction in (a) the proportion of patients receiving PRN sedation medications, (b) the mean number of PRN drugs prescribed per patient, (c) the number of doses administered per patient and (d) the number of PRN drugs administered per patient. Dean et al. further indicated that the change led to a shift of the most frequently used PRN medication from an antipsychotic (olanzapine) to a benzodiazepine (diazepam). The researchers indicated that the change of the most frequently prescribed medications may have been due to concerns by medical staff about side effects and clinical recommendations that promoted the use of benzodiazepines.

Donat (2006) introduced a clinical/administrative review procedure for the administration of PRN medications. The procedure stipulated that a patient who used three or more PRN medications, per week, be referred to a clinical team to evaluate the reliance of PRN medications by that patient. This review procedure led to a 40% reduction in the number of patients who used 3 or more PRN medications per week.

Researcher-designed interventions were not found to decrease reliance on PRN medications. Beaulieu et al. (2008) evaluated the effect of training staff on a nonviolent crisis intervention program on the use of physi-

cal restraints and PRN medications. The researchers reported that the training program was not "effective in reducing the use of either physical or chemical restraints" (p. 309).

Paton et al. (2008), in a study to evaluate the effect of a quality improvement program on reducing high-dose and combination antipsychotic medication prescription, indicated that the program had little impact in reducing the prevalence of PRN medications use. The study was carried out in a three step process as follows: (a) baseline audit data were collected on the use of psychiatric medication; (b) quality improvement interventions (i.e., change interventions) were developed based on the baseline audit data. The researchers indicated that the interventions developed were of a type that has been shown to effect behavior change on healthcare workers; (c) prescribing practices were re-audited one year after the baseline audit (i.e., researchers repeated data collection) was conducted. The researchers reported that the quality improvement program did not have any impact in the prescription practices. The researchers indicated that poor results were primarily accounted for by prescription of PRN medications for management of behavioral disturbances.

Baker et al. (2008) introduced a good practice manual designed to improve clinical practice in prescribing and administering of PRN psychotropic medication. The researchers reported that, despite staff members' indicating that the manual had changed their clinical practice, no evidence was found to indicate that the manual had impacted on either the prescription or administration of PRN psychotropic medications. Similar results were reported by Chaichan (2008) who indicated that the use of the score on the Positive and Negative Syndrome Scale (PANSS-EC) as a criterion for administering PRN medications did not lead to reduction in the use of PRN medications.

Strengths and Weaknesses of Studies Reviewed

The strengths and weaknesses of the studies used in this review are presented in Table 2. Poor implementation of the various researcher-designed interventions intended to change staff behavior may have been a major contributor to the failure of these researchers to find significant reductions in the use of PRN medications. Beaulieu et al. (2008) indicated that, while implementing the training program, staff members did not actively participate during the training. Further, the training program was not adapted to represent the real work environment. The researchers concluded that "imparting knowledge, role playing, practice and demonstration in a classroom setting are not sufficient to produce desired outcomes" (p. 310). Paton et al. (2003) reported that after conducting an audit of the prescribing practice, they developed nine

Table 2
Strengths and weaknesses

Author & Yr.	Strengths	Weaknesses
Baker (2008)	Study included a wide range of participants (patients, doctors, nurse and junior staff)	• Only 56% of the participants participated in the post evaluation • No training was provided on how to use the manual.
Beaulieu (2008)	Used an objective measure for agitation (Agitated Behavior Scale)	• During the training, the participants (staff) were largely passive, and program did not involve real work environment. • Agitation scores were only collected during admission.
Chaichan (2008)	Administration of PRN medications were to be based on an objective measure (i.e., the PANSS-EC score)	• Scoring on the scale was based on observation only. • Only part of the study group received the intervention (scoring was complete for only 46% of the participants).
Dean (2009)	Sample included all patients admitted for more than 24 hours during the 2 month study period. Thus no chance for selection bias	• No information provided on the average stay of patients at the hospital.
Donat (2006)	Clear criteria given on the number of PRN medications to be exceeded to warrant a review. Also a clear review procedure is provided.	• For institutions that lack the staff with skills and training used for this review, implementing the review procedure may be difficult.
Paton (2008)	Involved large sample size.	• Researchers did not train staff on suggested interventions.
Smith (2008)	Large sample size was involved in the study.	• May be hard to replicate to different settings.
Tharpa (2003)	Low chances of bias in selection of study participants as sample included all participants who had been admitted to the hospital, pre and post intervention.	• The study site was an institution in which psychiatrists were available 24 hours a day, thus generalizing the findings to settings where this is impossible may be difficult.
Stein-Parbury (2008)	Very good and thorough description of patient characteristics.	• Only involved one location. Difficult to generalize to other settings.

Note. PANSS-EC = Positive and Negative Syndrome Scale-Excited Component.

change interventions intended to change behavior. The researchers then reported that the interventions were "made available to participating services" (p. 436). The researchers did not indicate whether they assisted staff members to learn the interventions suggested. Baker et al. (2008) did not indicate whether staff members were assisted to learn how to use the good practice manual to improve clinical practice. The researchers only indicate that a letter was sent to staff reiterating that by consenting to participate in the study, staff had agreed to use the manual in their clinical practice. In the Chaichan (2008) study, medical staff did not use the scores on the PANSS-EC to make decisions on the issuance of PRN medication as the researcher had intended. Chaichan reported that only 51.1% of patients whose scores on the PANSS-EC scale required that they be issued with PRN medication actually received the medications. Chaichan further indicated that only 46% of the PANSS-EC assessments were completed. Future studies using researcher-designed interventions should include clear guidelines and strict adherence to the intervention protocols. Without doing so, findings will not accurately answer the research questions.

Behavior interventions appeared to be effective in reducing the use of PRN medications in studies where the researchers assisted staff to acquire the skills required to apply the behavior intervention techniques. Smith et al. (2008) reported that, in addition to policy changes that prohibited the use of PRN medication orders, clinical staff were assisted in developing various techniques necessary to help patients deal with symptoms of their mental health problems. Furthermore, Donat (2003) reported that one of the stages in the review procedure was the reinforcement of behavioral competencies in which staff had had prior training.

Conclusion

Decreasing the use of PRN medication may require that mental health facilities implement policy measures limiting the use of PRN medication orders. In addition, staff members need to be assisted to develop behavior intervention techniques that can be used to prevent escalation of adverse events such as agitation, which eventually lead to the need for PRN medications. For example, staff members need to be more actively involved in identifying the early stages of a behavioral chain that would eventuate in the need of a psychotropic PRN use (commonly referred to as escalation). After which they proactively encourage involvement in preferred behaviors that are reinforcing to the person and that could serve to break the former behavior chain (typically labeled as "redirecting" the person), and hence stop the need for using PRN medications (Donat, 2006).

The most effective policy measures appear to be those that prohibit the use of PRN medication orders. In the studies where researchers evaluated the impact of prohibiting the use of PRN medication orders (Smith et al., 2008; Tharpa et al., 2003), the researchers found that such policy measures led to significant decreases in the use of PRN medications without leading to an increase in adverse effects. One possible reason that may have led to significant decreases in the use of PRN medication without subsequent increase in adverse effects is that the staff members were forced to utilize alternative measures, such as behavioral intervention techniques to control the behavior that could otherwise required the use of PRN medications.

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Author Note

George Mugoya, MRC, CRC is a doctoral student at the University of Arizona, Rehabilitation Counseling Department. He obtained a Master's Degree in Rehabilitation Counseling from Bowling Green State University in 2007 and became a Certified Rehabilitation Counselor in November, 2007. He has worked as a Substance Abuse Counselor and Behavioral Health Technician for over three years and has been engaged in group and individual counseling for individuals with various substance abuse problems and co-occurring disorders. .

Charlene Kampfe, PhD, CRC, NCC, NCGC, has been a rehabilitation educator for 26 years, and is currently teaching at the University of Arizona. Dr. Kampfe is known for her pioneer work in the research of the clinical internship of rehabilitation counseling and for her sustained work regarding rehabilitation and the older population. She has served as president, member of the board, and chair of many committees for the National Council on Rehabilitation Education, the Association for Adult Development and Aging, the American Rehabilitation Counseling Association, and the American Counseling Association.