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Oral liquid antipsychotic formulation in the treatment of psychosis.

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Introduction

For the most part, the treatment and management of people with psychosis involves the use of antipsychotics and nurses play an important part in the management of these medications. An increasing number of nurses prescribe as well as administer medicines and this necessitates an intimate knowledge of psychopharmacology and specifically, the nuances of drug formulations. The nurse prescriber, in collaboration with the service user, has a responsibility to prescribe medicines in formulation that is effective and minimises adverse effects. Antipsychotics come in various formulations that include oral tablets, injections and oral liquid formulations. Of these, oral liquids have received scant attention in spite of advancement in their preparations. This article discusses oral liquid antipsychotics as a treatment option to either oral tablets or injection formulation. In particular, the article discuss oral liquid antipsychotics in relation to bioavailability, treatment in emergencies and briefly outlines the potential merits of using oral liquid preparations in terms of relevant practical issues.

Oral liquid formulation

The oral route remains the first choice for drug administration due to its convenience and low medicine production costs (Fasano 1998). These benefits lead to the fact that oral medicines account for 60% of the drug delivery systems used (Colombo *et al.* 2009). Following oral administration, the gut absorbs the medicine and enters various tissues via blood circulation. Absorption of the medicine in the gastrointestinal tract involves a dissolution step that transforms the medicine to aqueous luminal fluids. Medicine dissolution is the rate determining step in the oral delivery of medicines. At present about 40% of tablet oral antipsychotics have poor bioavailability due to poor dissolution rate (Keck and Müller, 2006). However, liquid oral antipsychotics tend to exhibit improved bioavailability due to their favourable dissolution profile. Bioavailability or the extent to which a drug in the blood is available for therapeutic purpose is a key determinant of its effectiveness that is dependent in part, on its formulation.

There are different types of oral liquid antipsychotic formulations and these include solutions, emulsions, micro suspensions and nanosuspension. These different types of oral liquid formulations offer varying degrees of superiority over oral tablet or injection formulations. Of particular interest

are the nanosuspensions that use extremely small particles (nanosized; i.e. below 1-nanometre) to aid solubility and dissolution (Lenhardt *et al.* 2008). The use of nanotechnology has improved dissolution, a key step in improving drug bioavailability.

Suitability of oral liquid antipsychotics

A number of oral liquid suspension formulations have been developed and found to be equally effective in the treatment of psychosis. At least one study has compared clozapine liquid suspension with tablet formulation. The study found that both formulations are equally effective and have similar bioavailability at similar dosages (Glue *et al.* 2012). A recent study that compared aripiprazole nanosuspension liquid and tablets found that nanosuspension liquid showed increased dissolution of 95% compared to a dissolution rate of 80% for aripiprazole tablets (Xu *et al.* 2012). Thus, aripiprazole liquid formulation has clear advantages over tablets in terms of bioavailability. This advantage should translate into better efficacy for oral liquid antipsychotics in terms of the rate at which they reach peak blood levels.

Because oral liquid antipsychotics take a relatively shorter time to enter the blood stream, they are equally suitable for treatment in emergencies. For example, when a service user experiences agitation due to psychosis, it creates an emergency where the service user is often confused, scared or paranoid. In consultation with the service user, the prescriber might opt to prescribe oral liquid antipsychotics because injections are painful, invasive and the service user might perceive their use as hostile or 'coercive. In the medium to long term, this can be a significant barrier to the therapeutic alliance between the service user and the team. Barriers of this nature have the potential to compromise the team's ability to provide good effective care that is acceptable to the service user and may discourage the service user from seeking further help from the clinicians should it be required at a later date.

From a staff safety perspective, injections expose nursing staff to an increased risk of needle stick injury, therefore rendering them vulnerable to diseases such as AIDS and hepatitis. By contrast, oral liquid antipsychotics can be administered easily in emergencies than tablets and are non-invasive. Available evidence suggest that oral liquid antipsychotics such as risperidone has a similarly rapid onset of action as an intra-muscular injection and are equally efficacious (Currier and Allen 2000; Carlson *et al.* 2010).

In a prospective, naturalistic study, 60 acutely psychotic patients treated in the acute settings were given either risperidone oral solution (2 mg) in combination with oral lorazepam (2 mg) or

intramuscular haloperidol (5 mg) along with intramuscular lorazepam (2 mg). The study found that the level of agitation declined equally in both groups of patients within the first 60 minutes (Currier and Allen 2000). However, the downside of using liquid oral antipsychotics is their propensity for unstable pharmacokinetics, poor adherence and they are influenced by first pass metabolism therefore, increases the potential for drug-drug interactions (Emsley *et al.* 2008).

Where a service user may be prone to weight gain due to antipsychotic usage, oral liquid antipsychotics may be appropriate as available evidence suggest that; compared to long term injection, patients taking oral antipsychotics of the same drug and dosage significantly gain less weight than those taking depot antipsychotics (Emsley *et al.* 2008).

Therefore, oral liquids should not only be reserved for resistant patients and patient choice should be extended to include the choice of a liquid formulation where available in order to individualise treatment and potentially enhance treatment satisfaction. On a practical level, oral liquid antipsychotics are particularly useful in service users with swallowing difficulties, those with profound cognitive problems, where supervised administration is required, or in the rare occasions where covert administration of medication is necessary. However, where service users are self-administering particular attention should be placed on ensuring that there are no potential practical problems likely with measuring, pouring and storing liquid formulations.

Conclusion

The centrality of antipsychotic treatment is now taken for granted. Nurses assume a pivotal role both in prescribing and administering these medicines in the care of those with psychosis. In this respect, not only knowledge of general psychopharmacology is essential for nurses, but also the importance of different antipsychotic formulations and their indications. Oral liquid antipsychotic formulations are a viable treatment alternative particularly in emergencies, difficulties in swallowing, where intramuscular injections are not indicated or when patient preference is established.

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