TECHNICAL COMMENTARY

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Perphenazine

Introduction

First generation 'typical' antipsychotics are an older class of antipsychotic than second generation 'atypical' antipsychotics. They are used primarily to treat positive symptoms including the experiences of perceptual abnormalities (hallucinations) and fixed, false, irrational beliefs (delusions).

First generation antipsychotics may cause side effects which can differ depending on which antipsychotic is being administered and on individual differences in reaction to the drug. Reactions may include dyskinesias such as repetitive, involuntary, and purposeless body or facial movements, Parkinsonism (cogwheel muscle rigidity, pill-rolling tremor and reduced or slowed movements), akathisia (motor restlessness, especially in the legs, and resembling agitation) and dystonias such as muscle contractions causing unusual twisting of parts of the body, most often in the neck. These effects are caused by the dopamine receptor antagonist action of these drugs.

This table summarises overall group effectiveness of perphenazine from information gained from randomised controlled trials (RCTs). Individual treatment programs need to be tailored by trained clinicians as response - both in symptoms and adverse effects - can vary between individuals.

Method

Owing to the vast number of reviews on antipsychotics, we have included only information reported in the abstracts of Cochrane systematic reviews[1]. This is because the Cochrane internal review process ensures a high level of scientific rigor and meta-analyses are usually conducted, giving treatment effect sizes. Data from the abstracts were supplemented from the full text when clarification was required. We have included only Cochrane reviews that have been published from the year 2000 to date to ensure the latest available evidence is presented. When multiple copies of reviews were found and/or when findings conflict, we present the most recent version and the most recent conclusions.

Evidence was graded using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group approach where high quality evidence such as that gained from RCTs may be downgraded to moderate or low if review and study quality is limited, if there is inconsistency in results, indirect comparisons, imprecise or sparse data and high probability of reporting bias. It may also be downgraded if risks associated with the intervention or other matter under review are high. Conversely, low quality evidence such as that gained from observational studies may be upgraded if effect sizes are large, there is a dose dependent response or if results are reasonably consistent, precise and direct with low associated risks[2]. The resulting table represents an objective summary of the evidence, although the conclusions are solely the opinion of staff of NeuRA (Neuroscience Research Australia).

Results

We found three reviews that met our inclusion criteria[3-5].

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Compared to placebo **Efficacy: Low quality evidence (1 RCT with small sample) is unable to determine any benefits of oral perphenazine over placebo.** **Adverse effects: Low quality evidence (1 RCT with small sample) is unable to determine any harms of oral perphenazine over placebo.** **Compared to first generation clopenthixol decanoate** **Efficacy: Moderate to low quality evidence (imprecise, 1 RCT with medium-sized sample) suggests no differences between perphanazine decanoate and clopenthizol decanoate for global improvement or relapse rates.** **Adverse effects: Moderate to low quality evidence (imprecise, 1 RCT with medium-sized sample) suggests perphenazine enanthate is associated with more use of anticholinergic drugs.** **Compared to other first or second generation antipsychotics** **Efficacy: High quality evidence (consistent, precise, direct, large sample) suggests no differences in effectiveness between oral perphenazine and other antipsychotics.** **Adverse effects: Moderate quality evidence (small to medium-sized samples, consistent, some imprecision, direct) suggests severe toxicity is less frequent with perphenazine than with low-potency chlorpromazine, but akathisia is more frequent with perphenazine than with low-potency chlorpromazine or thioridazine.** **See below for detailed results from three reviews.**	
David A, Quraishi S, Rathbone J. Depot perphenazine decanoate and enanthate for schizophrenia. Cochrane Database of Systematic Reviews 2005; (3):Art. No.: CD001717. DOI:	
This review includes 4 RCTs (N = 313). No differences in global improvement between perphanazine decanoate and clopenthixol decanoate (N = 172, 1 RCT, RR 1.14, CI 0.87 to 1.49), or in relapse rates (N = 172, 1 RCT, RR 1.31, CI 0.89 to 1.92).	
Risks	Compared to clopenthixol decanoate, more people in the perphenazine enanthate group required anticholinergic drugs (N = 172, 1 RCT, RR 1.12, CI 1.0 to 1.2, NNT 10). Compared to perphenazine decanoate, perphenazine enanthate was associated with more movement disorders (N = 64, 1 RCT, RR 1.36, CI 1.1 to 1.8, NNT 5), and the requirement for more anticholinergic drugs (N = 64, 1 RCT, RR 1.47, CI 1.1 to 2.0, NNT 4).
Consistency in results	Not applicable; 1 RCT.

Precision in results	Imprecise
Directness of results	Direct
Hartung B, Sampson S, Leucht S. Perphenazine for schizophrenia. Cochrane Database of Systematic Reviews 2015, Issue 3. Art. No.: CD003443. DOI: 10.1002/14651858.CD003443.pub3	
This review includes 31 RCTs (N = 4662). Compared to placebo, perphenazine was associated with less people rated as either 'no better or deterioration' for global state (N = 61, 1 RCT, RR 0.32, CI 0.13 to 0.78). Compared to placebo, perphenazine was associated with fewer relapses (N = 48, 1 RCT, RR 0.14, CI 0.02 to 1.07). Compared to other first or second generation antipsychotics, there were no differences in global state or mental state (eg; no better or deterioration, N = 1850, 17 RCTs, RR 1.03, CI 0.90 to 1.17, I^2 = 32%, p = 0.10).	
Risks	Compared to placebo, there were no differences in dystonia (N = 48, 1 RCT, RR 1.00, CI 0.07 to 15.08). Compared to other antipsychotics, there were no differences in any serious adverse event (N = 1760, 2 RCTs, RR 0.98, CI 0.68 to 1.41, I^2 = 29%, p = 0.23).
Consistency in results	Consistent
Precision in results	Precise for efficacy measures for other antipsychotic comparison only.
Directness of results	Direct.
Tardy M, Huhn M, Engel RR, Leucht S. Perphenazine versus low-potency first-generation antipsychotic drugs for schizophrenia. Cochrane Database of Systematic Reviews 2014, Issue 10. Art. No.: CD009369. DOI: 10.1002/14651858.CD009369.pub2.	
4 RCTs, N = 365 Compared to low-potency first generation antipsychotics, there were no differences in response to treatment (2 RCTs, N = 138, RR 0.97, CI 0.74 to 1.26, I^2 = 0%, p = 0.81), or in the number of participants leaving the studies early for any reason (3 RCTs, N = 323, RR 0.78, CI 0.35 to 1.76, I^2 = 51%, p = 0.15).	
Risks	Akathisia was more frequent with perphenazine (2 RCTs, N = 227, RR 9.45, CI 1.69 to 52.88, I^2 = 0%, p = 0.36) than with chlorpromazine or thioridazine. Severe toxicity was less frequent with perphenazine than with chlorpromazine (1 RCT, N = 96, RR 0.61, CI 0.41 to 0.89).

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Consistency in results‡	Consistent where applicable (> 1 RCT).
Precision in results§	Precise for toxicity.
Directness of results‖	Direct

Explanation of acronyms

CI = Confidence Interval, I^2 = the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance), N = number of participants, *p* = statistical probability of obtaining that result ($p < 0.05$ generally regarded as significant), RR = relative risk

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Explanation of technical terms

† Different effect measures are reported by different reviews.

Weighted mean difference scores refer to mean differences between treatment and comparison groups after treatment (or occasionally pre to post treatment) and in a randomised trial there is an assumption that both groups are comparable on this measure prior to treatment. Standardised mean differences are divided by the pooled standard deviation (or the standard deviation of one group when groups are homogenous) which allows results from different scales to be combined and compared. Each study's mean difference is then given a weighting depending on the size of the sample and the variability in the data. 0.2 represents a small effect, 0.5 a medium effect, and 0.8 and over represents a large effect[1].

Odds ratio (OR) or relative risk (RR) refers to the probability of a reduction (< 1) or an increase (> 1) in a particular outcome in a treatment group, or a group exposed to a risk factor, relative to the comparison group. For example, a RR of 0.75 translates to a reduction in risk of an outcome of 25% relative to those not receiving the treatment or not exposed to the risk factor. Conversely, a RR of 1.25 translates to an increased risk of 25% relative to those not receiving treatment or not having been exposed to a risk factor. A RR or OR of 1.00 means there is no difference between groups. A medium effect is considered if RR > 2 or < 0.5 and a large effect if RR > 5 or < 0.2[6]. lnOR stands for logarithmic OR where a lnOR of 0 shows no difference between groups. Hazard ratios measure the effect of an explanatory variable on the hazard or risk of an event.

Correlation coefficients (eg, r) indicate the strength of association or relationship between variables. They are an indication of prediction, but do not confirm causality due to possible and often unforseen confounding variables. An r of 0.10 represents a weak association, 0.25 a medium association and 0.40 and over represents a strong association. Unstandardised (*b*) regression coefficients indicate the average change in the dependent variable associated with a 1 unit change in the independent variable, statistically controlling for the other independent variables. Standardised regression coefficients represent the change being in units of standard deviations to allow comparison across different scales.

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‡ Inconsistency refers to differing estimates of effect across studies (i.e. heterogeneity or variability in results) that is not explained by subgroup analyses and therefore reduces confidence in the effect estimate. I^2 is the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance) - 0% to 40%: heterogeneity might not be important, 30% to 60%: may represent moderate heterogeneity, 50% to 90%: may represent considerable heterogeneity and over this is considerable heterogeneity. I^2 can be calculated from Q (chi-square) for the test of heterogeneity with the following formula[1];

$$I^2 = \left(\frac{Q - df}{Q}\right) \times 100\%$$

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§ Imprecision refers to wide confidence intervals indicating a lack of confidence in the effect estimate. Based on GRADE recommendations, a result for continuous data (standardised mean differences, not

weighted mean differences) is considered imprecise if the upper or lower confidence limit crosses an effect size of 0.5 in either direction, and for binary and correlation data, an effect size of 0.25. GRADE also recommends downgrading the evidence when sample size is smaller than 300 (for binary data) and 400 (for continuous data), although for some topics, these criteria should be relaxed[7].

‖ Indirectness of comparison occurs when a comparison of intervention A versus B is not available but A was compared with C and B was compared with C, which allows indirect comparisons of the magnitude of effect of A versus B. Indirectness of population, comparator and/or outcome can also occur when the available evidence regarding a particular population, intervention, comparator, or outcome is not available and is therefore inferred from available evidence. These inferred treatment effect sizes are of lower quality than those gained from head-to-head comparisons of A and B.

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