

Clinical

Croup calculator: frequently asked questions

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Why have a croup calculator?

General practitioners have to deal with a wide range of medical problems and croup is an infrequent respiratory emergency. Paediatric doses often require mathematical calculations, which are rarely performed in general practice. Thus, in order to make dose delivery simple a dexamethasone calculator was developed for croup. Dexamethasone is rarely used by general practitioners but it was hoped that this simple calculator would provide more confidence in prescribing this drug for young children. Although the calculator is for dexamethasone the author decided to name it after the specific disease, croup, in order to increase awareness of this treatment.

Why use dexamethasone oral liquid rather than soluble steroid tablets?

It has been a common experience that prednisolone and dexamethasone tablets are difficult to give to children as the taste is very unpleasant once they are dissolved in water – the latter drug is very bitter in solution. Such poor palatability will inevitably lead to under dosing as the child spits out the unpleasant solution. I described the use of soluble betamethasone tablets, which I considered more palatable, in order to overcome the taste problems. However, dissolving the tablets can be difficult and time consuming. A liquid dexamethasone solution became available in 2000 but despite the fact that the solution is expensive relative to soluble tablets it can give greater dosing accuracy and is highly palatable. Thus, children easily swallow the correct dose. The croup calculator has been designed to use this specific pharmaceutical product.

What is the shelf life of dexamethasone liquid once the bottle is opened?

Three months.

Can dexamethasone be given for any other paediatric disorders?

The licence for dexamethasone liquid lists a range of disorders that may be treated with this steroid. One particularly difficult area of treatment is acute asthma episodes in young children where compliance with treatments, especially unpleasant tasting tablets, can be problematic. Although traditionally prednisolone soluble tablets are given for five days for asthma, just two doses of 0.6 mg/kg of dexamethasone solution have been used with equally good results, fewer side effects and better compliance.¹

What is the evidence for use of dexamethasone and other treatments in mild croup?

Although mild croup usually settles within 72 hours, research has shown clear benefits of a single dose of dexamethasone. It has been shown to improve sleep, reduce parental anxieties and reduce healthcare contact. Steam, salbutamol and antibiotics have been shown to be ineffective. Cold air can be advised to the parents as a simple home based way to provide relief (opening a fridge or freezer door has been described)

but there is no scientific evidence for this. Nebulised steroids such as budesonide can be helpful but expensive and difficult to administer.² The *British National Formulary* for children states that mild croup is largely self-limiting but treatment with a single dose of dexamethasone 150 micrograms/kg by mouth is of benefit. Severe croup (or mild croup that might cause complications) calls for hospital admission but advises either dexamethasone or prednisolone by mouth before transfer to a hospital.

Why don't doctors use dexamethasone for croup?

An audit study carried out by a team at Leicester Royal Infirmary in 1999 showed that of 101 croup cases attending their emergency department, of which 58 had seen a general practitioner, none had received steroids. Eighteen had received antibiotics, six salbutamol and two steam – all these treatments have been shown to be ineffective.² A new calculator for paediatric emergency care has been developed at Livingston Hospital but only advises prednisone for the management of croup.³ A recent study to compare methods to increase use of best practice in croup in emergency paediatric departments has been set up in Canada using a variety of educational intervention strategies because best practice does not appear to have been undertaken yet in the care of croup.⁴ Huntingdon Primary Care Trust in the United Kingdom developed a website for general practitioners in the management of croup in April 2005 as an educational aide-memoir. The authors of this site recommended dissolving dexamethasone tablets which resulted in approximated doses only.

We surmise that the reason for failed uptake of dexamethasone in croup has mainly centred on unpleasant tablet preparations that are difficult to use and the anxieties about the use of steroids in young children. Most family doctors also correctly perceive croup as a usually benign short-lived illness. Nevertheless research has shown oral steroids significantly reduce complications. It is hoped that the combination of a simple dose calculator and a palatable dexamethasone solution would improve uptake for this evidenced-based management of croup.

Who developed the croup calculator?

Dr Nigel Masters was responsible for the idea and design of the croup calculator. Caroline Macfarlane created the original layout using Excel for use on computer screens. Judy Macfarlane assisted in initial wording and layout. Dr Alfaz Emadi made suggestions about the use of dexamethasone liquid for croup.



Dr Nigel Masters with some of his team. From left to right: Kim Georgiou, Nisar Yaseen, Jill McEwan, Catherin Tutt, Nigel Masters, Judy Macfarlane, Marilyn Boot and Carolyn Antonik

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Guidelines for croup management in primary care and the croup calculator are available free of charge from nigel.masters@nhs.net

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