

prevent situations deteriorating to the extent that abuse becomes readily proven in a court of law. It appears that the law is not really geared to assist in this essential objective. There is a need for continuing dialogue between involved professionals from both disciplines to try and resolve the current problem areas 'in the best interests of the child'. Doctors who read the report will not be heartened by a lengthy judgment, reproduced in full, on a case of alleged neglect. The Social Welfare Department had laid a complaint that a mother was neglecting her child. The judge agreed that the facts of the case provided grounds for grave concern but dismissed the complaint since legally it had been laid against the wrong section of the act.

The working party made no attempt to determine or discuss the size of the problem, nor the various theories concerning aetiology. Passing reference only is made to the important area of prevention.

The current deficiencies outlined and the unresolved issues highlighted demand some ongoing action. The working party has requested that the Minister of Social Welfare appoint a national advisory group to continue the task begun in Dunedin. While remaining sceptical as to the value of many committees, it appears as though the circumstances are such that the establishment of a task force with a clear mandate to tackle the problems raised is warranted, together with an assurance from the Minister that recommendations will not be shelved. In the foreword to the report it is stated "All of us must accept responsibility for allowing this situation to exist. It is to be hoped that as New Zealanders we will indicate to those who determine policies and allocate resources that improvements must be made. This report . . . points the way" (p1).

The problems are of considerable complexity and there is reluctance to air some of the crucial issues openly. To recognise that the situation is unsatisfactory does not take us very far. With the object of making general recommendations the pilot co-ordinating committee on child abuse foreshadowed by the Minister of Health⁶ has now come into being with the expectation that remedies will be found. However there are two basic factors which inhibit effective action. The first is that the home is every family's fortified pa and invasion of its privacy fraught with difficulty. The other is that physical discipline is regarded by our society as a widely acceptable part of child-rearing with the distinction between the permissible and the unacceptable being indefinable. Only slowly can traditional attitudes be modified.

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VIEWPOINT

Appropriate technology: Coconut water for the oral rehydration of childhood diarrhoeas

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1.

Childhood diarrhoeas are a common cause of morbidity and mortality particularly in developing countries. The causes of diarrhoea in early life are numerous, but the pathophysiological mechanisms lead to the same result—dehydration. In areas where the nutritional status of children is marginal or poor (often due to the vicious diarrhoea/malnutrition cycle) an episode of dehydration can seriously threaten a child's life. Recent evidence has

shown that deaths in children caused by the dehydration of infectious diarrhoeas, particularly cholera, can be prevented through the use of oral rehydration.¹ The current emphasis of the World Health Organisation in the oral rehydration of diarrhoeas is on the use of pre-packaged ingredients which, when put into water, result in an "ideal" oral rehydration solution (ORS).² Is the use of this instant rehydration fluid appropriate for inaccessible and remote areas such as the Pacific islands or other countries where a possible alternative, coconut water, is available? Coconut water is the free fluid present in the nut and is distinct from coconut milk which is an emulsion obtained when coconut

is grated, mixed with water, and wrung out. In light of recent renewed interest in the use of coconut water in the oral hydration of diarrhoea,³ it appears an area of appropriate technology may have been overlooked. To examine this hypothesis, it might be profitable to point out some of the real, and possible, problems in implementing the use of packaged chemicals in the rehydration of childhood diarrhoeas in remote areas and discuss the possible advantage of coconut water.

The major problem in the use of ORS is implementing the proven technology in isolated and remote areas. Certainly, physically getting the material to these areas will be a problem, but this can eventually be accomplished in even the most remote areas. The person who usually is first aware of diarrhoea in a child is the mother. Thus, the logistic efforts of supplying the chemicals must be combined with the education of mothers in remote areas; another difficult, but not impossible task. In general, the more educated mothers live near urban centres and have access to medical facilities which can deal with dehydration, while uneducated mothers are in the most remote areas and at highest risk of having their children die of dehydration. Although these mothers may be intelligent, the concept of mixing chemicals in the appropriate proportions will be foreign to many of them. The ORS has, in large part, been developed by western physicians who think in terms of precise electrolyte replacement. A scheme which seems simple to them may not be simple for mothers in a developing country. Indeed proper oral rehydration has proved to be a problem in developed countries.⁴

2.

The early use of coconut water for childhood diarrhoeas was used with apparent (but unproven) success in the New Hebrides and only recently was this approach changed to the use of ORS (Bowden D, personal communication). This introduction led to the implementation of a relatively complicated education campaign during which several major revisions were required to make adjustments for local problems and conditions. Whether the efforts have been effective or worthwhile remains to be seen, but there appears to be reasonable doubt about the acceptability and proper use of the scheme.

The ORS being promoted has been devised mainly from studies done on the rehydration of cholera patients and may not be entirely recommended for all diarrhoeas and patients of all ages.^{4, 5} Cholera does not occur in endemic form in many countries and most of the common diarrhoeas in childhood are due to other agents. Is the recommended oral rehydration fluid entirely appropriate for these? Could it possibly be dangerous? For example, could the low sodium loss observed during some common forms of childhood diarrhoeas result in hypernatremia and attendant problems after treatment with the relatively high sodium content of ORS?⁶

Evaluation of ORS has generally been carried out under supervised and controlled conditions, however, these conditions will not exist in areas where primary health care workers and mothers will be expected to make up the solution for use. Some variability in the electrolyte content of coconut water can be observed dependent on age and location of the coconut.³ However this probably would be less than the variability that might be found with ORS in the hands of poorly counselled paramedical personnel or over-zealous parents. If coconut water is effective in rehydration, the variable of making up solutions will be not a problem; indeed, if only a small difference in efficacy between ORS and coconut water is demonstrated, any advan-

tage of ORS might be cancelled because of the realistically present problems of having lay personnel make up the ORS in the correct proportions.

3.

What is the efficacy of coconut water in rehydration and what is its cost-effectiveness compared to a chemical preparation? These questions cannot be answered because adequate documentation is lacking. Anecdotally coconut water can be, and has been, used effectively in the treatment of diarrhoeas.⁷ However, controlled trials have not been done.

The comparative electrolyte contents of cholera stool, enteritis stool, normal plasma, ORS and coconut water are given in Table 1. The major deficiencies of coconut water, relative to the optimal rehydration fluid, are the lack of sodium, chloride and bicarbonate. The coconut water does contain ample amounts of glucose and potassium in about one-half litre of water per nut.^{3, 7} The main disadvantage of coconut water may be the low sodium content. However, lower than the recommended sodium concentration in an oral rehydration fluid has been shown to be effective in infantile diarrhoea.⁶ Certainly coconut water will provide free water. If the poor sodium and chloride content of coconut water is found to be a problem, this might be simply remedied by adding a thumb and two-finger pinch of salt to the appropriate amount of coconut water.⁸ The possibility of using sea water, at the sacrifice of sterility, might also be an alternative source for correcting the sodium deficiency.

Table 1.—Approximate electrolyte contents (mmol/l) of stool in acute watery diarrhoea in children less than five years compared to that of normal plasma, oral rehydration solution and coconut water (modified²)

	Na ⁺	K ⁺	Cl ⁻	HCO ₃ ⁻	Glucose
Cholera stool	101	27	92	32	—
Enteritis stool	56	25	55	14	—
Normal plasma	142	4.5	105	25	90
Oral rehydration solution	90	20	80	30	111
Coconut water	3	50	—	—	114

Coconut water clearly has a number of practical advantages over ORS, the obvious ones being availability and acceptability. The cost of ORS is being reduced, but is any cost too much for certain areas? An alternative to importing ORS components is the formulation of a comparable solution from coconut water within the country for use in rural clinics. This might be an industry to implement in association with copra processing where the coconut water generally goes unused.

Coconut water also has proteins, vitamins and minerals which are absent from ORS.⁷ The major objectives in treating most childhood diarrhoeas are the early replacement of fluids and maintenance of nutrition,² objectives which might more easily be met using coconut water rather than ORS. Coconut water is sterile⁹ and when a water supply is contaminated and the source of diarrhoea, this fluid offers an alternative which will not result in the exposure to additional enteric pathogens. Coconut water has a reasonably good taste and would be acceptable to most children familiar with the fluid. Nausea and vomiting can

sometimes be observed in sick children following the ingestion of ORS which is relatively tasteless.¹⁰ Whether this would happen with coconut water is unknown. Another area of untested, but possible efficacy is the intravenous use of coconut water. It has been used parenterally with success in humans and animals on a small scale,^{7, 9, 11-13} but no good controlled evaluation has been done.

The use of coconut water in childhood diarrhoeas is not being advocated without proper evaluation, but in our reliance on sophisticated methods certain areas of appropriate technology may have been bypassed. A controlled trial of coconut water in childhood diarrhoeas seems warranted, not necessarily in cholera patients, but in children suffering from diarrhoea of all forms. Coconut water has been used by native medical practitioners with good results,¹³ but these accounts rarely appear in the medical literature where they come to the attention of the western world and can be developed into appropriate technology.

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'Inderal' LA Prescribing Information

PRESENTATION

Spheroids of propranolol hydrochloride having sustained release coating to provide long action and contained in a lavender and pink gelatine capsule marked 'Inderal' LA. Each capsule contains 160 mg of Propranolol Hydrochloride B.P.

DOSAGE AND ADMINISTRATION

Oral, once daily.

1. **Hypertension**—the starting dose is one capsule daily, taken either morning or evening. An adequate response is seen in most patients at this dosage. If necessary, it can be increased to two capsules and a further reduction in BP can be attained if a diuretic or other anti-hypertensive agent is given in addition to 'Inderal'.

2. **Angina**—an adequate response is usually obtained with one capsule daily, either morning or evening, dependent on patient convenience.

Notes: This formulation of 'Inderal' LA provides controlled release such that adequate blood levels of 'Inderal' are maintained for over 24 hours following a single oral dose and unlike therapy with conventional tablets irregular peaks and troughs of blood level are avoided.

CONTRAINDICATIONS, WARNINGS, etc.

Contraindications—'Inderal' LA should not be used:-

1. In the presence of second and third degree heart block.
2. If there is a history of bronchospasm.
3. After prolonged fasting.
4. In metabolic acidosis (e.g. in some diabetics).

Precautions—Special care should be taken with patients whose cardiac reserve is poor. Myocardial contractility must be maintained and signs of failure controlled with digitalis and diuretics. One of the pharmacological actions of 'Inderal' is to reduce the heart rate. Bradycardia, (usually less than 50-55 beats/minute) indicates that dosage should not be further increased. It is important that treatment with a beta-blocking agent is not discontinued abruptly. Either the equivalent dosage of another beta-blocker may be substituted or the withdrawal of 'Inderal' should be gradual. This can be achieved by first substituting the 'Inderal' LA by the equivalent in 40 mg tablets spread throughout the day and then gradually reducing the dose.

Anaesthesia—'Inderal' can cause an altered response to stress and therefore it may be necessary to withdraw the drug before surgery. If it is decided to withdraw 'Inderal' it should be done 24 hours before elective surgery.

In emergency, or when interruption of treatment might expose the patient to severe uncontrolled angina or dysrhythmia, such withdrawal may be impracticable. Anaesthesia may still proceed, however, provided that the patient is protected against vagal dominance by the intravenous administration of atropine 1-2 mg and that agents such as ether, chloroform, cyclopropane, and trichloroethylene are avoided.

Pregnancy—As with all other drugs, 'Inderal' should not be given in pregnancy unless its use is essential. There is no evidence of teratogenicity with 'Inderal'.

Adverse reactions—'Inderal' LA is usually well tolerated. Minor side-effects such as cold extremities, nausea, insomnia, lassitude and diarrhoea are usually transient resolving on withdrawal of the drug. Isolated cases of purpura, erythematous rash and paraesthesia of the hands have been reported. In the rare event of intolerance to 'Inderal' LA manifested as bradycardia and hypotension, the drug should be withdrawn and if necessary, treatment instituted as below:-

Overdosage—Excessive bradycardia can be countered with atropine 1-2 mg intravenously, followed, if necessary, by a beta-receptor stimulant such as isoprenaline 25 micrograms intravenously or orciprenaline 0.5 mg intravenously.

'INDERAL' LA
works a 24 hour day