The Singapore Family Physician

The College of General Practitioners Singapore
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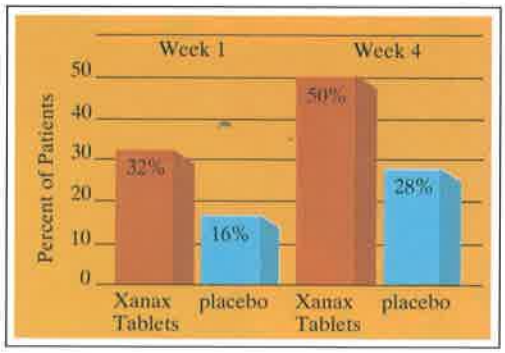

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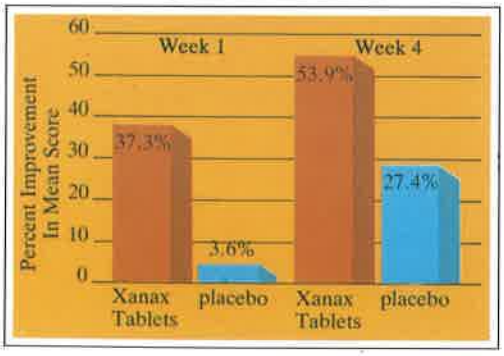

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2. Ballenger JC, Burrows, GC, DuPont RL, et al; Alprazolam in panic disorder and agoraphobia: Results from a multicenter trial. Archives of General Psychiatry, 1988; 45: 413–422.

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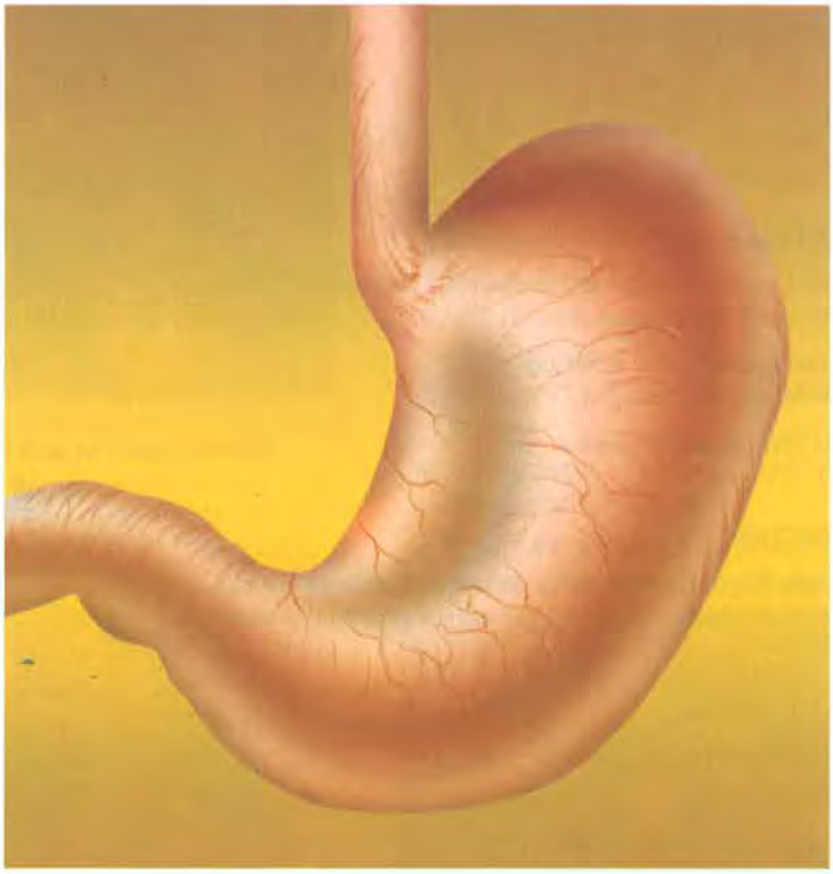

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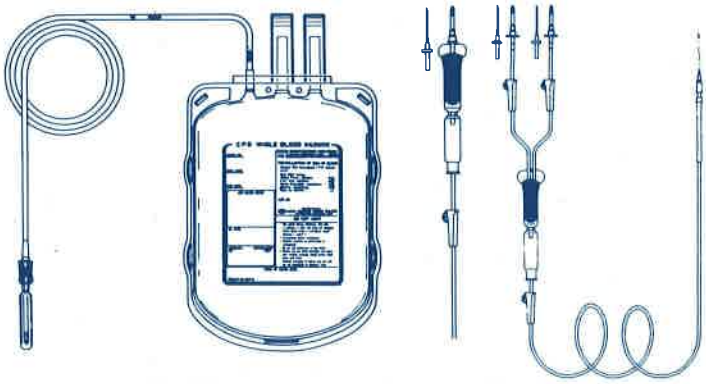

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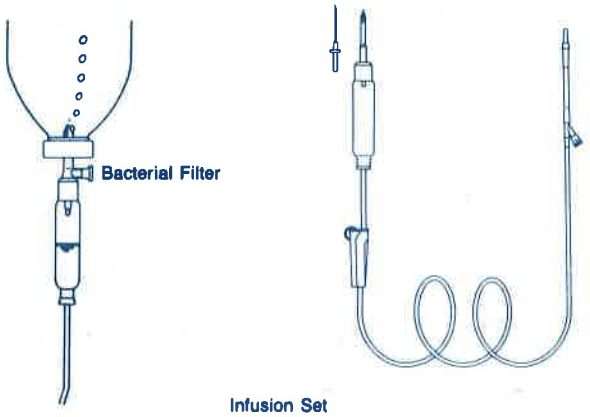

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EDITORIAL

WINDS OF CHANGE

The Beginning

The College of General Practitioners Singapore was founded in June 1971, with its prime objective being the improvement and maintenance of the standard of delivery of primary health care through education of general practitioners at all levels, from undergraduate through vocational and post-graduate training to continuing education and research.

It quickly grew from strength to strength. Within two years of its inception, the College had "refresher courses" for general practitioners going, started a course of introductory lectures to medical students prior to their attachment to GP clinics, held the first Diplomate Examination in November 1972, started on two research projects, and published the first issue of its Journal (then called "GP") in March 1973. Soon after, it hosted the First Joint Conference of general practitioners from Australia, Malaysia and Singapore and became a member of WONCA, the world body. Negotiations with the Ministry of Health led to the introduction of schemes whereby young doctors in the civil service intending to become general practitioners could be posted to various hospital departments to gain instruction and experience related to their future role, and whereby practising general practitioners could be attached to similar departments to upgrade their core knowledge in those disciplines.

Many years were spent on defining the body of knowledge and the skills that comprised general practice/family medicine, on fine-tuning the undergraduate general practice curriculum and the Continuing Medical Education programme, fighting for and receiving recognition from the Singapore Medical Council of its MCGP(S) diploma as an additional registrable qualification, initiating and encouraging research within its members and in association with other medical bodies, and improving the contents and standard of its Journal (re-named the "Singapore Family Physician"). In 1983, the College organised and held the Tenth WONCA World Conference for Family Physicians in Singapore, showing the people and the authorities here the strides taken in other countries in establishing General Practice/ Family Medicine as a distinct discipline taught to students in medical schools, to trainees in Vocational Training Centres and to established general practitioners in Continuing Education Medical programmes.

The Recent Past

The writing was on the wall, and some years later, the National University of Singapore established a Division of Family Medicine within the new Department of Community, Occupational and Family Medicine, which incorporated the previous Department of Social Medicine and Public Health. This Division has undertaken the job of teaching General Practice/Family Medicine to medical undergraduates, not only by its own faculty but also by lecturers and Clinical Tutors appointed from within the members of the College. More recently, representations made to the School of Post-Graduate Medical Studies on the need to have Master of Medicine (M. Med) examination in Family Medicine have met with very encouraging response.

The Future

While all these developments are all very exciting and bring a sense of achievement to all those who have worked for and with the College all these years, it would be appropriate at this juncture to stop and ponder how these winds of change have affected the future role of the College.

Besides working with the University and Postgraduate Medical School (when the latter takes over the running of pre-examination courses, as surely it must) to recommend and possibly

supply the Trainers required, the major tasks left with the College will be (a) continuing medical education established practitioners (CME) and (b) research.

Continuing Medical Education

With the plethora of Continuing Medical Education activities organised by other medical organisations, hospitals and pharmaceutical firms, what Continuing Medical Education should the College provide? There is still a place for the "refresher" or "Up-date" courses it has run before, for these help to reinforce the practitioner's "core knowledge" of a particular subject or problem, and provide him with the opportunity to become familiar with the latest thoughts, skills, modalities or techniques of diagnosis or treatment in that area. Perhaps the inclusion of more "hands on" sessions will help, so that practitioners can learn to use, and more importantly use correctly, machines and equipment (e.g. the ultrasound), and thus increase the quality and cost-effectiveness of care that they provide to their patients.

More emphasis must be placed on the behavioural aspects of medicine – psychology, anthropology and sociology – so that the Family Doctor can provide total patient care and be a physician, philosopher and friend to the family. Another area that will need more attention is the ethics of practice – the Family Physicians' sense of responsibility to themselves, their patients and their colleagues – so that standards of patient care will not suffer and there is mutual respect and consideration within the fraternity.

To strive for academic respectability, we will need to accept the concept of assessment or audit of our work, and accept as a personal responsibility the need for Continuing Medical Education on a life-long basis. If we do not do this ourselves as individuals and as the College, then others will do it for us, to the detriment of the profession.

Research

The scope of and opportunity for research in Family Medicine is tremendous. We see and treat more than 90% of persons requiring medical attention, and this wealth of patients and material lends itself to much study and investigation.

The College must make more than its previous modest attempts to encourage, initiate and direct research programmes both within our own discipline and together with other disciplines.

The College Journal

The College Journal has grown from the 16-page first issue of the "GP" into a robust "Singapore Family Physician", advancing the frontiers of knowledge, disseminating known facts and views and serving as a forum for the publication of research findings.

As is enters its twentieth year of publication in 1992, the journal will also change. The cover will take on a new look, with a permanent colour, instead of changing colours with every volume. Besides the familiar original papers, results of research, the comprehensive reviews and the Home Study Section, it will now include a section consisting of a few articles devoted to a particular theme (eg. emergency medicine) which deals with a contemporary issue. The latter will serve as a medium of instruction and hopefully provide reference material for our members.

We envisage the addition of excerpts from other Family Medicine journals, a column on Medical Ethics and perhaps an occasional sample question from the Diplomate Examination to stimulate our readers. The Editorial Board looks forward to bringing to you a publication you will look forward to receiving, and extends to you once more an invitation to send in your contribution, either in the form of an article or a letter or even a comment.

MV

ORIGINAL

SINUSITIS: CURRENT CONCEPTS IN PATHOGENESIS, DIAGNOSIS AND THERAPY

* *C T Lim, MBBS, FRCS (Edin, Glas)*
** *L E Loh, AM, MBBS, FRCS (Glas)*

Summary:

Owing to better understanding of the pathogenesis of sinusitis and development of endoscopy in sinus surgery, the surgical treatment of sinusitis has undergone a siginificant change. The current pathogenesis of sinusitis, methods of diagnosis and treatment based on the authors' practice are presented.

Keywords:

functional endoscopic sinus surgery, endoscopy, radiology

INTRODUCTION

The paranasal sinuses are air-filled spaces that are present in the frontal, maxilla, ethmoid and sphenoid bones of the facial skeleton. The sinus ostia drain into the middle meatus forming the ostiomeatal complex except for those of the posterior ethmoidal and the sphenoidal sinuses which open into the superior meatus and sphenoethmoidal recess respectively. The precise physiological function of the paranasal sinuses is still uncertain.

Sinusitis due to infection of the paranasal sinuses is a common problem encountered in medical practice. Clinicians do encounter many problems in the management of patients with sinusitis. Infection of the paranasal sinuses may present as subacute sinusitis, acute sinusitis, chronic sinusitis or complication of sinusitis, namely intraorbital and intracranial inflammation. The presenting symptoms may be non-specific. The paranasal sinuses and their respective ostia are not accessible to direct clinical examination. Although the principles of medical treatment are well established, the concept of surgical therapy has undergone a vast change owing to better understanding of the pathogenesis of sinusitis and development of intranasal endoscopy[1–3].

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CLASSIFICATION AND PATHOGENESIS

Infective sinusitis is categorised by the source of infection – odontogenic and non-odontogenic which is mainly rhinogenic[1]. Odontogenic sinusitis may arise from infection

ascending up the root canal of a carious maxillary premolar or molar tooth. An oroantral fistula due to dental extraction of such tooth can be the route of infection. Non-odontogenic sinusitis which is far commoner than the odontogenic type is usually due to obstruction of the sinus ostia. The bulk of the air flow during respiration passes through the middle meatus. Particles of dust inhaled during inspiration are deposited in the middle meatus especially at the anterior end. In individuals with hypersensitivity, this foreign matter induces local inflammation which may occlude the ostia leading to bacterial infection of the sinuses. Acute viral infection may cause inflammation of the nasal mucosa with ostial obstruction. Patients with impairment of the mucociliary transport as found in immotile cilia syndrome are predisposed to sinusitis[4] as are patients with mucoviscidosis where abnormal mucus is produced.

Owing to their location, the anterior ethmoidal air cells are the commonest site of infection[1]. From here the infection can spread to other sinuses. Hence infection in the frontal and maxillary sinuses is secondary to anterior ethmoidal sinusitis[2,5].

Hemophilus influenza and Diplococcus pneumoniae are the commonest organisms found in acute and chronic sinusitis. Other organisms are Staphyloeoccus epidermis, Streptococcus viridans, Neisseria catarrhalis and diphtherioids. Anaerobic organisms are usually found in chronic sinusitis. The majority are due to microaerophilus and anaerobic streptococci and Bacteriodes species[6,7].

DIAGNOSIS

The commonest symptoms are nasal blockage and purulent rhinorrhoea. Other less obvious symptoms are facial discomfort, throat irritation and cough[8]. In acute sinusitis there is additional malaise, fever and throbbing pain over the cheek or forehead.

Unless there is copious purulent rhinorrhoea, the clinical examination is generally unremarkable. Endoscopy is the best method of examination[8]. Mucopus present in the ostiomeatal complex is indicative of infection in the anterior ethmoidal, frontal and/or maxillary sinuses. Stream of mucopus flowing down the anterior sphenoidal wall to the posterior choana is a sign of sphenoidal and/or posterior ethmoidal sinusitis. In minimal sinus disease, the endoscopic findings may be normal[9].

On plain radiography, opacity of the sinus due to pooling of secretion supports the diagnosis of sinusitis. Air-fluid level in the sinus cavity is also suggestive of sinusitis. Often the mucosa in the maxillary sinuses is reported as thickened. This feature can be found in normal persons as well as in patients with sinusitis. The ethmoidal sinuses cannot be evaluated accurately on plain radiography[5,9]. A normal plain radiograph does not exclude the diagnosis of sinusitis.

CT scan is more accurate in diagnosing sinusitis than plain radiograph. Opacity in the individual air-cells of the ethmoidal sinus can be imaged. The CT scan of paranasal sinuses is usually done in the coronal rather than axial sections because the coronal CT scan serves better as a guide for the surgeon during endoscopic surgery and portrays better the anatomy of the ostiomeatal complex[9]. CT scan should only be done when indicated because of significant exposure to irradiation.

Bacteriological culture of the mucopus from the nasal passage is not accurate due to contamination by nasal commensals. Mucopus aspirated by antral puncture gives a more reliable result.

TREATMENT

1) Medical

All patients should be treated medically when first diagnosed to have sinusitis. The principles of medical therapy are:-

a) decongestion of the oedematous mucosa by systemic decongestants and topical sympatheticomimetic nasal drops to improve drainage

b) to reduce the viscosity of mucopus by mucolytics

c) broad spectrum antibiotics to cover both Gram positive and negative organisims. Additional antibiotic against anaerobes is given when sinusitis is odontogenic, if the pus is malodorous and where the response to earlier antibiotic therapy is poor

d) any predisposing condition would be treated. Patients are strongly advised to cease smoking. Allergic rhinitis is controlled with topical steroid.

The patient is reviewed regularly on his progress. Surgery is needed if the medical therapy fails or if there is recurrent sinusitis.

2) Surgery

The surgical procedures for treatment of sinusitis range from antral washout to sinus exenteration. Except for the antral washout to remove pus from the maxillary sinus and for diagnosis, surgery is never the first line of treatment in sinusitis.

a) Antral Washout (Lavage)

In antral washout, an outpatient procedure done under local anaesthesia, the antrum is punctured by a trocar and cannula in the inferior meatus transnasally. The antrum is lavaged by the instillation of normal saline through the cannula to remove the pus. It may be used as a diagnostic procedure to determine the presence of pus. Antral washout removes the inflammatory load in the antrum and aids in the resolution of infection in the other sinuses as well as ameliorates the symptoms.

b) Caldwell-Luc Operation

This was commonly done in the past to treat maxillary sinusitis. The maxillary sinus is entered through its anterior wall via a gingivo-labial incision in the oral cavity. The diseased mucosa is stripped off. An inferior antrostomy is done to drain the maxillary sinus. This operation fails to address the source of infection located in the anterior ethmoidal air-cells[2]. The cavity becomes obliterated by granulation tissue and subsequently fibrous tissue. Recurrent disease is not uncommon. Today, Caldwell-Luc operation is no longer the surgical treatment of choice for maxillary sinusitis.

c) Functional Endoscopic Sinus Surgery (FESS)

FESS is presently the surgical procedure of choice in treating sinusitis. The anterior ethmoidal sinus, particularly the infundibulum of the ethmoid, is commonly the origin of infection in sinusitis which may involve the maxillary and frontal sinuses secondarily. FESS aims to eradicate the infection at this site by exposing the infundibulum through the removal of the uncinate process (hiatotomy), exenterating the anterior ethmoidal air-cells, removing obstructing air-cells in the frontal recess area to improve frontal sinus drainage and enlarging the maxillary ostium. If needed, the posterior ethmoidal and sphenoidal sinuses can be exenterated. The diseased mucosa in the sinuses is not removed but is permitted to heal by draining and ventilating the sinuses, hence the description "functional"[2]. Endoscopes are used to visualise the surgical field intranasally to minimise the complication rate. Compared to other ethmoidal sinus operations, FESS has the best access to the infundibulum area of the ethmoid with the least trauma.

CONCLUSION

Rhinogenic sinusitis first begins in the anterior ethmoidal air-cells and from there spreads to involve the other sinuses. The symptoms of sinusitis can be rather non-specific. The use of intranasal endoscope has improved the diagnostic yield and aids the evaluation of the disease progress. CT scan is more sensitive in diagnosing sinusitis than plain radiography but must be done with the right indication. Medical treatment is still the first line of

treatment. Antral washout is done to remove pus from the maxillary sinus. Only when there is failure of medical treatment or recurrent sinusitis despite aggressive treatment is FESS indicated.

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ORIGINAL

CHILDHOOD IMMUNIZATION IN SINGAPORE

M M Thein, MBBS (Rgn), DCH (Glas), DTCH (Liv), MSc (MCH) (Lond)

Abstract:

Worldwide, immunization programmes have reduced to neglibility the incidence of serious and often fatal diseases of childhood. Immunization is a primary health care activity both at the general practitioners' clinics or at government maternal and child health clinics. This article describes the immunization schedule for Singapore and reviews the mechanisms of protective immunity, contraindications, adverse reactions to expect as well as how to deal with children who have missed out on receiving vaccines at the recommended time.

Keywords:

immunization, vaccines, Singapore

A. PRINCIPLES OF IMMUNIZATION

1. Introduction

Immunization can be defined as the process of protecting a person from a specific disease or diseases through inoculation of a specific antigen. We immunize children to prevent mortality and morbidity from specific infections. There are six particular diseases which share two outstanding features in common; they kill young children; and young children can be protected against them by immunization. The six killer diseases of children are measles, pertussis, diphtheria, tetanus (neonatal tetanus), poliomyelitis and tuberculosis.

When an individual is given poliomyelitis vaccine he is protected against getting poliomyelitis. But the incidence of poliomyelitis in the community is unlikely to fall very much if only a small proportion of newborn children receive their vaccine. This is because there are still enough susceptibles (people who have no resistance to the organism because they have not been immunized or have not had the natural infection) for the natural infection to keep on passing around in the community. The same applies to other vaccines. If immunization by vaccines is to be an effective means of controlling communicable diseases, then

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at least 75 or 80% of the whole population and 75 or 80% of the newborns have to be successfully vaccinated. When there are very few susceptibles left, the natural infection cannot keep going in the community and the incidence of disease will gradually get less and less until it reaches a very low level. When a high proportion of people are immunized like this, even those few people who have not been vaccinated also get some protection because the disease becomes so uncommon. This is called herd immunity and it is mainly effective for those diseases that pass from man to man such as measles, poliomyelitis and pertussis.

Sometimes vaccination is stopped in a community that has been well vaccinated and where the incidence of a particular disease has fallen to a low level. Then there is a real danger of an epidemic occurring amongst all the new susceptibles being born. This is why it is so important to keep vaccination programmes going from year to year once they have been started.

2. Smallpox Showed the World the Way

Dr Jenner's discovery of vaccination eventually resulted in the global eradication of smallpox, something he himself predicted at that time. Dr Edward Jenner, an Englishman, first demonstrated vaccination in 1796. He discovered that "inoculating" people with pus from an infection on the teats of cows (cowpox) protected them from smallpox with no risk. To distinguish his method from "inoculation" he called it "vaccination" derived from the Latin word for cow. At that time people did not know why vaccination worked, only that it did. Subsequent investigation of this phenomenon led to the science of immunology that we know today.

The French scientist Louis Pasteur, paying homage to Dr Jenner's breakthrough in London proposed in 1881, that the word "vaccination" be extended in meaning to cover all forms of active immunization. Thus we now speak of polio vaccine, measles vaccine, and so on even though none of them has anything to do with a cow.

Smallpox was conquered, not so much through mass vaccination of all the world, but by being backed into a corner everytime it raised its head; the moment a case appeared, a mobile health team visited the locality and vaccinated everybody so that the infection was no longer transmitted. Finally, the last little pockets of resistance were wiped out. Eradicated continent by continent, smallpox made its last stand in Somalia, East Africa in 1977. Ali Maow Maalin, the world's last victim of smallpox made a complete recovery. His was the last naturally occurring outbreak[1].

3. Active and Passive Immunization

There are two forms of immunization namely, passive and active immunization.

3.1 Passive Immunization

Passive immunization is used for short term protection against a limited number of infections such as tetanus, diphtheria; the antibodies may be given to the child ready made as in serum given to patients who are ill with diphtheria or tetanus.

Babies receive antibodies from the mother through the placenta and breast milk. Colostrum in particular contains large amounts of antibodies. Most of the antibodies in colostrum and breast milk remain within the baby's intestine, coating the surface of the lining cells and not being absorbed. Thus they prevent bacteria and viruses from sticking to the lining of the intestines and finding their way into the cells and blood stream. This is the reason why breast fed babies suffer much less from diarrhoea and other infectious diseases. Figure 1A shows the advantages and disadvantages of passive immunization.

3.2 Active Immunization

Active immunization aims to induce a significant duration of immunity without producing the disease. In this, the child makes his own antibodies. In order to start the production of antibodies, it is necessary for the person to be infected with the disease or given a vaccine which contains the bacteria or their products in a harmless form. Active immunization, whenever brought about by illness or vaccines lasts a long time, often throughout life. Some antigens require three or more doses to achieve satisfactory immunity; others, particularly the live vaccines, may achieve long term immunity with a single dose. Figure 1B shows the advantages and disadvantages of active immunization.

FIG 1A: Advantages and Disadvantages of Passive Immunization

Advantages

Immediate protection

Disadvantages

1. Protection only brief
2. Risk of serum sickness
3. Active immune response to some vaccines inhibited
4. Protection frequently given too late.

FIG 1B: Advantages and Disadvantages of Active Immunization

Advantages

Prolonged or permanent protection

Disadvantages

1. Protection delayed
2. Risks related to using live organisms
3. Difficulty getting vaccine to at-risk populations
4. Only weak immune response produced in some young hosts

4. Types of Vaccines Used for Active Immunization

4.1 Live Vaccines

Vaccines made of live bacteria or viruses that have been modified enough not to cause a severe infection but still similar enough to the original bacteria or viruses for the body not to be able to tell the difference, are called live attenuated vaccines. Active immunization with live vaccine usually provides good protection after only one dose of each kind of vaccine. The live vaccines currently in wide use are BCG, measles, mumps, rubella & polio and they are all very active.

Because the polio vaccine actually contains 3 different types or strains of the polio virus, it is necessary to give it 3 different times so each strain will have several opportunities to stimulate antibody production. Fig 2A shows the advantages and disadvantages of live vaccines.

4.2 Killed Vaccines (Inactivated Vaccines and Toxoids)

These vaccines are made out of dead bacteria or by modifying the toxins that some bacteria produce. (They have also been changed enough not to cause the person to become sick.)

4.3 Triple Vaccine DPT

The diphtheria and tetanus part of the vaccine is made from the toxoids from these bacteria. The pertussis part is made from dead

bacteria. Because dead vaccines do not stimulate antibody production as well as live vaccines, DPT is given at least three times to give adequate protection and later booster doses are needed. Fig 2B shows the advantages and disadvantages of killed vaccines.

FIG 2A: Advantages and Disadvantages of Live Attenuated Vaccines

Advantages

1. Produce controlled infections that emulate natural immunity
2. More likely to provide long-lasting or permanent immunity than killed vaccines

Disadvantages

1. Risk of vaccine-induced disease in recipient
2. Risk of spreading vaccine strain to secondary host

FIG 2B: Advantages and Disadvantages of Killed Vaccines

Advantages

1. No risk of vaccine-induced infection
2. May use purified antigens
3. Safe for immunocompromised hosts
4. Safe for pregnant hosts

Disadvantages

1. Immunity unlikely to be prolonged or permanent
2. Less likely to induce protective immunity than live attenuated vaccines

The different vaccines used for active immunization are shown in Table 1.

TABLE 1: Vaccines Used for Active Immunization

Type	Viral	Bacterial
Live	Poliomyelitis (Sabin) Measles Mumps Rubella Smallpox Yellow Fever Varicella Zoster	Tuberculosis (BCG)
Inactivated	Poliomyelitis (Salk) Influenza Hepatitis B	Pertussis Pneumococcal Meningococcal H Influenzae Plague Typhus Typhoid Cholera
Toxoids		Diphtheria Tetanus

5. Cold Chain and Good Storekeeping

5.1 Maintaining the Cold Chain

Special attention should be paid to the "Cold Chain" concept. This attempts to ensure that all vaccines are maintained at the correct temperature at all stages of transport and storage from the manufacturer to the child. The vaccines must stay cold all the way. All vaccines must be stored in a refrigerator between 4°C and 8°C. The person in charge of the immunization programme must checked that the temperature everyday is between 4°C and 8°C.

No food or drinks must be in the refrigerator. There must be no vaccines kept in the door of the refrigerator. The vaccines must be in the main compartment of the refrigerator. Live vaccines can be stored in the freezer compartment but toxoids like DPT and Tetanus cannot be put in the freezer. To avoid confusion, all vaccines should be stored in the main compartment of the refrigerator at the same temperature between +4°C to +8°C.

5.2 Good Storekeeping

When new vaccines come, they should be put behind the old vaccines in the refrigerator so that the old vaccines can be used first before their expiry date. This is the "first in, first out" principle of storekeeping and is another very important rule for good vaccine storage.

B. CHILDHOOD IMMUNIZATION SCHEDULES

No immunization schedule is ideal. The World Health Organization (WHO) Expanded Programme of Immunization recommends that each country determine its own schedule to best fit its own needs[2]. A guiding strategic principle of any immunization programme is that protection must be achieved prior to the time infants are at high risk from a disease. For example, form one quarter to one half of all new poliomyelitis cases occur in infants from 6-12 months of age with some cases occurring in those as young as 3 months. Infants are susceptible to pertussis soon after birth. The recommended childhood immunization schedule of Singapore is presented in Table 2.

TABLE 2: Recommended Childhood Immunization Schedule, Singapore

Age	Immunization
At birth	BCG
	Hepatitis B (1st dose)
1 month	Hepatitis B (2nd dose)
3 months	DPT, Polio (1st dose)
4 months	DPT, Polio (2nd dose)
5 months	DPT, Polio (3rd dose)
6 months	Hepatitis B (3rd dose)
12 months and above	Measles, Mumps, Rubella (MMR) from 1/1/90
18 months	DPT & Polio (1st Booster)
6 years	BCG (those with no previous vaccination)
	DPT & Polio (2nd Booster)
12 years	BCG (Mantoux Negative)
	DPT & Polio (3rd Booster)
	Rubella (both boys and girls)
16 Years	BCG (Mantoux Negative)

Other Schedules

If the child has arrived from another country and will be staying in Singapore for 6 months or more, change to the local recommended schedule. If there is doubt about which, if any, immunizations have been given, start a complete immunization programme. If the child has not had any immunizations and is aged 12 months or more, the priority is to give MMR first. Polio and DPT can be given at the same time as MMR immunization, in separate injection sites or allow an interval of 3 weeks.

C. CONTRAINDICATIONS TO IMMUNIZATION

Contraindications to immunization can be divided into general contraindications to immunization and specific contraindications.

I. General Contraindications to Immunization

General contraindications to immunization in childhood is shown in Table 3.

Table 3: General Contraindications to Immunization in Childhood[3].

1. Current illness – usually febrile
2. Anaphylactic reaction to previous dose
3. Immunosuppression – relative contraindication

   Does not include local steroids or short courses of systemic steroids.

1. Intercurrent Illness

Do not immunize a child if the child has an acute febrile illness. Any child who is currently "ill" should not receive any vaccine. However if the child is clearly in the recovery phase of an illness then immunisation may be carried out.

2. Anaphylaxis

An anaphylactic reaction to previous dose of vaccine is an absolute contraindication to further doses of that vaccine. This is rare but, as with the injection of all foreign proteins, is a real and significant risk. Anyone administering vaccines should be able to recognise anaphylaxis and if they cannot deal with it themselves, should have someone on site who can. These reactions may be delayed by a few minutes so it is advisable that children stay in the clinic for 20 to 30 minutes after immunisation. This is particularly important with measles immunisation.

3. Immunosuppresion

Children with poor immune responses, such as those with leukaemia or other cancers, who are receiving chemotherapy, should not receive live vaccines. Children receiving high doses of corticosteroids or those on prolonged courses of oral steroids should not be immunised with live vaccines until three months after completion of treatment[4].

(The live vaccines are: BCG, measles, poliomyelitis, rubella and MMR, but specialist opinion may recommend the administration of alternative killed vaccines. It is essential to ensure that siblings and close contacts of such children have received their full immunization schedule. However, these children, their siblings and household contacts, should only receive inactivated poliomyelitis vaccine.)

Local administration of steroids, including inhaled steroids, is not a contraindication to vaccination; nor

are short courses of systemic steroids.

II. Specific Contraindications

1. *Hepatitis B*

   There are no specific contraindications.

2. *Diphtheria, Pertussis, Tetanus*

   Do not give pertussis vaccine if there was a severe local or general reaction to a preceding dose of vaccine[5].

   The signs of a severe reaction are:

   Local reaction – redness and swelling greater than half the circumference of the limb which received the injection.

   General reaction – fever of 39°C or more within 48 hours of immunization; generalised collapse; convulsions within 72 hours of immunization and prolonged inconsolable crying or screaming.

3. *Oral poliomyelitis vaccine*

   Children receiving high doses of corticosteroids but specialist opinion may recommend the administration of alternative killed vaccines.

4. *Measles, Mumps, Rubella (MMR)*

   Do not give MMR if the child has a history of allergy to neomycin or kanamycin or a history of anaphylaxis due to any cause. If the child is allergic to egg, give egg free MMR.

Misconceptions

There are many misconceptions concerning contraindications to immunization. The common ones are shown in Table 4.

Table 4: Misconceptions Concerning Contraindications to Vaccination

Mild "cold"
Child "snuffly"
Prematurity
Concurrent antimicrobial therapy
Breastfeeding
Non-specific allergies
Family history of seizures or sudden infant death syndrome
Family history of adverse reactions to immunizing agents
Static central nervous disease

Source: Paediatric Vaccinations: Update 1990, The Paediatric Clinics of North America[4].

III. Special Considerations

1. *Special Considerations for Pertussis Immunization[5]*

   a. Children who have had cerebral damage in the neonatal period.

   b. Children with a history of convulsions.

   c. Children whose parents or siblings have a history of idiopathic epilepsy.

   For these children, the risk from the vaccine may be higher than normal but the effects from whooping cough disease itself could be more severe. Neurological complications are considerably more common after whooping cough than after vaccination.

2. *Special Considerations for MMR Vaccine*

   Children with febrile convulsions or children whose parents or siblings have a history of idiopathic

epilepsy, should be immunized against measles, mumps and rubella but they need protection against the common, mild febrile reaction to the injection which can occur 7-10 days later and which may last for 2-3 days. Parents should keep a feverish child as cool as possible, and could give paracetamol during the 5-10 days following immunization.

Immunoglobulin, as used with measles vaccine must not be given with MMR vaccine, since the immune response to rubella and mumps may be inhibited.

3. *Special considerations for poliomyelitis vaccine*

   1. If a child is having diarrhoea do not give poliomyelitis vaccine but delay immunization at a later date when child is well.

   2. If the baby vomits within one hour of receiving the vaccine, repeat the dose on the following day.

4. *Special considerations for children for whom a live vaccine is contraindicated*

   Inactivated poliomyelitis vaccine (IPV) should be given to children for whom a live vaccine is contraindicated such as those with immunosuppression from disease or therapy.

5. *Specific considerations for HIV-positive children*

   These children may receive live poliomyelitis vaccine, at the discretion of the clinician in charge but excretion of the vaccine virus in the faeces may continue for longer than six weeks. Strict personal hygiene is advised, especially careful handwashing after changing nappies[6].

   HIV - positive children with or without symptoms should receive all vaccines except BCG vaccine. No harmful effects have been reported following immunization with live attenuated vaccines for measles, mumps, rubella and poliomyelitis in HIV - positive children, who may be at increased risk from these diseases.

D. IMMUNIZATION PROCEDURE

1. History -Taking

A good history must be taken for suitability for immunization. Before each immunization the health of the child should be assessed by the nurse or the doctor and also by asking the parent if the child is well. Minor coughs or colds should not postpone immunization but a feverish acutely unwell child should not be immunized that day. There is no evidence that immunizing an acutely unwell child is harmful; it just makes it difficult to differentiate between a possible reaction to the vaccine and the signs of the acute illness.

2. Informed Consent

Parents should be informed about the benefits and risks of immunization. Either a written consent or a verbal consent should be obtained before each immunization

3. Giving the Immunization

Immunization is given by doctors or nurses.

- Check expiry dates on the vaccines and the storage conditions.
- Check the dose and name of the vaccine against the child's clinic card.
- The skin should be clean and dry before giving the immunization.

4. Route of Administration

The routes of administration for different vaccines and their dosages are shown in table 5.

TABLE 5: The Vaccines, Routes of Administration & Dosages

Vaccine	Route of Administration	Dosage
BCG	intradermal injection	0.05 ml (infants) 0.1 ml
DPT	intramuscular injection	0.5 ml
Poliomyelitis (Sabin)	oral	3 drops
Poliomyelitis (Salk)	intramuscular injection	0.5 ml
Hepatitis B	intramuscular injection	0.5 ml
Measles, Mumps, Rubella (MMR)	deep subcutaneous injection or intramuscular injection	0.5 ml

5. Interval Between Doses

In Singapore, the intervals between doses for DPT, poliomyelitis is monthly for the primary course. Should the child present at a later age than 3 months old, the immunization will still be spaced at monthly intervals. The same principle applies to hepatitis B immunization. Thus a child who did not receive his/her first dose at birth, will be given the initial dose and a second dose a month later and third dose, five months later.

6. Interrupted Immunizations

Interrupted immunization need not be restarted. The remaining dose or doses should be given as if the prolonged interval had not occurred. If the child has missed the primary doses for triple vaccine and poliomyelitis and is now over 7 years old, only DT and poliomyelitis immunization will be given.

7. Unimmunized Children

Children not immunized in the first year of life may be started on a course of primary immunization any time before the age of 7 years. The schedule should be modified for these children so that they are properly protected against as many of the communicable diseases as possible. Thus it is recommended that they receive MMR, DPT and oral poliomyelitis initially at different sites and routes and that they receive subsequent DPT and OPV at 8 week intervals. This should be continued until the child has received three doses each of DPT and OPV. For children starting or continuing vaccinations after age 7 years, pertussis vaccine should be omitted.

8. Simultaneous Administration of Vaccines

Some physicians believe that active response to one vaccine may interfere with the host response to another vaccine, but large field studies have demonstrated that this notion is not true. DPT and MMR have given good responses to each of the components in these combined vaccines[5]. Moreover, all these combinations (DPT, OPV and MMR) can be given simultaneously without interfering with each other[7].

In general, inactivated vaccines can be given simultaneously at separate sites if indicated. An inactivated vaccine and a live viral attenuated vaccine may also be administered simultaneously. Individual live virus vaccines should be given at least one month apart where possible to

prevent diminished response to the second vaccine.

9. Recording

It is very important that all immunizations are recorded and dated both on clinic records and in child's health booklet.

10. Notification

Notification of immunization is also very important. In Singapore, notify to the Central Immunization Registry, Maternal and Child Health Department, Ministry of Health, No. 26 Dunearn Road, Singapore. After every immunization (each one) it should be notified, not after all have been completed. The Central Immunization Registry staff will update it.

E. REACTIONS TO IMMUNIZATION

Reactions are rare but it is important to be aware of the possibility.

1. Immediate reactions

Very occasionally (approximately 1 in 300,000 administered vaccine doses), a child will collapse within seconds or minutes after being given an immunization. The exact cause of the collapse is frequently hard to ascertain, as there are difficulties in differentiating between breath-holding, vaso-vagal attacks, and anaphylactic reactions. The usual signs are pallor, limpness or apnoea. If the child collapses and then rapidly recovers, this is probably a vaso-vagal or breath-holding attack. However, with anaphylaxis, in which the child may loose consciousness, or develop urticarial skin lesions or wheezing, rapid action is required.

Action and Management

a. Treat for shock, lie the child down and maintain the airway.

b. Administer adrenaline by intramuscular or deep subcutaneous injection, slowly over 10 to 15 seconds.

The dosage of adrenaline is given in Table 6.

Table 6: Dosage of adrenaline 1:1000 (1 mg/ml)[5]

Age (years)	Dose (ml)
<1	0.05
1	0.1
2	0.2
3–4	0.3
5	0.4
6–10	0.5
11–16	0.7
Adult	1.0

c. While doing items (a) and (b) ask someone to dial 995 and call for an ambulance.

d. Apply cardio-pulmonary resuscitation (CPR) as necessary, and maintain until the ambulance team arrives and takes over and sends the child to hospital.

e. Record the reaction in the child's notes.

(A child resuscitation pack should be available in immunization clinics or be carried by doctors and nurses doing mobile clinics. It should include a box containing 2 x 1 ml ampoules of adrenaline 1:1000 (1 mg/ml), 4 x 1 ml syringes, 4 x 23G needles. Also included should be an airway/mask suitable for children and specific instructions concerning the treatment of anaphylactic shock in children.)

2. Non-Specific Reaction

2.1 Mild reactions

About 15 per cent of babies have a mild reaction to immunization in the first 48 hours following

injection, with either redness and soreness around the injection site or a slight fever and irritability. These mild reactions are not a contra-indication for further immunization.

2.2 Severe Reaction

Very rarely, within 72 hours following immunization, a baby may be extremely lethargic, or have a convulsion or have a very red, swollen injection site around more than half the circumference of the limb. This reaction must be reported and if this is after the triple vaccination (Diphtheria, Pertussis and Tetanus), then further immunization should not contain pertussis.

3. Specific Reactions

3.1 Mild Reaction to MMR Immunization

This occurs in approximately 30 per cent of children, 7-10 days after injection, and is like a very mild attack of measles with fever, malaise and sometimes a rash. This reaction usually lasts 24-48 hours and the vaccine virus is not transmitted to contacts.

3.2 Mild Reaction to Rubella Immunization

Between 3 and 10 per cent of children may experience a mild reaction following rubella immunization, which may include fever, sore throat, rashes and joint pains, 1 to 3 weeks after immunization.

F. SUCCESS OF CHILDHOOD IMMUNIZATION PROGRAMME

1. Uptake by Target Population

Immunization uptake levels can be used as a measure of the effectiveness of the Childhood Immunization Programme.

2. Reduction of Childhood Communicable Diseases

Monitoring the incidence of childhood communicable diseases and the very low incidence of these diseases is also a measure of the effectiveness of the Childhood Immunization Programme.

3. Eradication of Poliomyelitis, Diphtheria, Measles and Congenital Rubella

The World Health Organisation has its aim of eradicating these diseases. (Throughout Europe by the year 2000. In other parts of the world, to eradicate poliomyelitis by the year 2000 and eliminate neonatal tetanus by the year 1995 and to reduce measles cases by 90%.)

As smallpox has showed the world the way and has led to the worldwide eradication of a serious and lethal disease, we as health professionals have a responsibility in our own capacity either in service delivery, health education, administration and programme planning and in any other way to help achieve the goals of eradicating the serious communicable childhood diseases by immunization, surveillance, good treatment and management. Evaluation of programmes, research and development is also needed.

The World Health Organisation (WHO), the United Nations Development Programme (UNDP) and the United Nations Children's Fund (UNICEF) have joined forces and launched an intensified US$150 million international effort for research of vaccine development at a meeting of experts in New York on September 1990 in a major step towards realising what they called their "ideal vaccine" - a single dose "children's vaccine" that could save millions of children in the developing world[8]. Meanwhile, we should work on what we have and try to achieve a good coverage. By

understanding the immunologic principles and concepts guiding the use of vaccines, in understanding the mechanisms of protective immunity, contraindications, adverse reactions associated with immunization as well as the practical aspects and current approaches, we will be able to achieve more.

G. CONCLUSION

Immunization is an effective means of primary prevention. With the expanded immunization programme (EPI), children can be protected against the six killer diseases of children namely measles, pertussis, diphtheria, neonatal tetanus, poliomyelitis and tuberculosis. The successful implementation of this programme requires a proper storage and maintenance of the vaccines to ensure efficacy, a thorough knowledge of immunization procedure, contraindications, reactions as well as notification and reporting on the part of the practitioner.

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ORIGINAL

Thyroid Disease And Pregnancy

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INTRODUCTION

Thyroid disorders are more often encountered in women than in men and commonly, young adults are affected. It is therefore not unusual to encounter thyroid disorders amongst women in the reproductive age group. The consideration of thyroid disorders in relation to pregnancy would include the problems of thyroid disease and their effects on fertility, pregnancy and the fetus/neonate. Post-partum thyroid disease is also increasingly being recognised and its diagnosis and treatment requires attention as well.

HYPERTHYROIDISM AND PREGNANCY

Hyperthyroidism occurring in pregnancy is occasionally encountered. Its prevalence is quoted at 0.5 to 2 cases per 1000 pregnancies[1]. In the vast majority of cases, hyperthyroidism is due to Graves' disease. Most of these cases are diagnosed to be thyrotoxic before pregnancy but some 30% of cases requiring treatment during pregnancy are only discovered during pregnancy[2].

Diagnosis of hyperthyroidism

The diagnosis of mild hyperthyroidism can be difficult during pregnancy. The symptoms and signs of thyrotoxicosis – heat intolerance, tachycardia and diffuse goitre – are masked in pregnancy where the same signs can be found without hyperthyroidism.

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Thyroid function test results may vary through the pregnancy. In the first trimester, the increase in estrogens and increased synthesis of thyroid binding globulins cause an increase in total serum thyroxine levels. Total thyroxine level may be 2-4 ug/dl higher than in non-pregnant women. Free thyroxine index (FTI) corrects for some of this alteration, but can still be increased as well. In the first five weeks of pregnancy, the increase in FTI is also contributed to by high levels of HCG (Human Chorionic Gonadothrophins). HCG has some stimulatory effects on the thyroid due to its structural similarity with TSH, sharing a similar alpha sub-unit. Thereafter, FT4 and FT3 fall back to the normal range and even lower in the third trimester.

Graves' disease, if present before pregnancy, may have a slight exacerbation in the first few weeks of pregnancy, possibly contributed to by high HCG levels. Thereafter, there is a tendency for the disease to ameliorate. This is consistent with the general tendency of all autoimmune diseases to remit during pregnancy with a propensity for resurgence after delivery.

In practice, when hyperthyroidism is suspected, the measurement of FTI and sensitive TSH can distinguish most cases of hyperthyroidism from normal. Even with raised binding protein levels, a total thyroxine level of more than 190 nmol/l (15 ug/dl) is suggestive of hyperthyroidism. A suppressed level of sensitive TSH collaborates the diagnosis of hyperthyroidism. It is still somewhat debatable whether the TRH test is useful in pregnancy. Some authors will argue that this test is safe and can help exclude hyperthyroidism in equivocal cases. TRH can cross the placenta and may

affect the fetal hypothalamic-pituitary axis. Overall, with the availability of sensitive TSH, the TRH test probably contributes little in diagnosis of hyperthyroidism in pregnancy.

Hyperemesis gravidarum may present a special diagnostic challenge. Hyperthyroidism itself can cause vomiting. Hyperemesis gravidarum, usually defined as vomiting of sufficient severity to require hospitalisation and intravenous fluid therapy, occurs in the first trimester when there is modest elevation of thyroid hormone levels. A third of these patients may have elevated T4 levels but on follow-up, they revert to normal in the second trimester[3,4]. Symptomatic treatment suffices in most instances and thyroid function is repeated to confirm the transient nature of the elevation.

Management of hyperthyroidism

In the majority of cases, hyperthyroidism is known before pregnancy. In these cases, the problem is to control the disease and decide whether to stop the treatment if the patient is planning a pregnancy.

Patients with overt thyrotoxicosis may have menstrual irregularities but most cases of mild to moderate thyrotoxicosis are still fertile[5]. Some form of contraception should be used if thyrotoxicosis is uncontrolled or if pregnancy is not desired. Uncontrolled thyrotoxicosis is associated with higher fetal wastage and fetal abnormalities[6,7].

Patients with thyrotoxicosis before pregnancy should have the condition controlled with anti-thyroid drugs. The question of whether to stop anti-thyroid drugs before conceiving is usually taken in consultation with the patient. Some patients are very concerned with the risk of teratogenic effects of drugs and do not want to be on any drugs. This has to be balanced with the risk of a relapse occurring before or after conceiving. Patients who have a history of frequent relapses are at high risk and the option of surgery before pregnancy may be considered. Radioactive iodine is not recommended because after the use of radioactive iodine, avoidance of pregnancy for a period of one year is advisable. Patients who have been on anti-thyroid drugs for less than six months are also at high risk of relapse, although this may only occur in the post-partum period. Most patients who are euthyroid and who have been on anti-thyroid drugs for more than six months can probably have drug treatment terminated before pregnancy if the patient desires. Alternatively, drug therapy can be continued till pregnancy is diagnosed or even throughout pregnancy as the risk is actually quite minimal (vide infra).

For patients with uncontrolled hyperthyroidism during pregnancy, the first option is to control it with anti-thyroid drugs. Thionamides are the mainstay of treatment. The choice is between methimazole (the active component of carbimazole) and propylthiouracil. There has been some concern over the possibility of methimazole being associated with congenital skin defects[8,9,10]. However, these reports were of cases arising from a limited number of pregnancies. A large series of 234 infants born to mothers treated with methimazole failed to show this association[7]. Other authors have also analysed the frequency of congenital skin defects and found that association with methimazole consumption is absent[11]. Overall, although there have been reports of congenital skin defects, the association with methimazole consumption may be fortuituous and the use of methimazole in pregnancy has been generally safe. Propylthiouracil has in addition a theoretical advantage of being less liable to cross the placenta although both these drugs are capable of causing fetal hypothyroidism if the dosage is excessive. If the patient is already on methimazole prior to pregnancy of before pregnancy is diagnosed, it is probably unnecessary to switch to propylthiouracil. If hyperthyroidism is newly diagnosed during pregnancy one may choose to start propylthiouracil at least on the theoretical advantages it has over methimazole.

In using anti-thyroid drugs during pregnancy, the strategy is to start with a moderately high dose (say 30 mg methimazole per day or 300 mg propylthiouracil per day) and quickly tail this down to a maintenance dose as soon as hyperthyroidism is controlled. Regular checks on thyroid function should be performed throughout pregnancy and the thyroxine level

kept at around the top normal range to avoid overtreatment and fetal hypothyroidism.

The use of "block and replace" regime (giving both thyroxine and anti-thyroid drugs) is gaining popularity but its use in pregnancy is not recommended. This is because anti-thyroid drugs cross the placenta but thyroxine dose not do so in appreciable amounts.

There is some concern of neonatal transient hyperthyroidism from maternal antibodies[12]. High titres of thyroid stimulating antibodies predict a higher risk of neonatal thyrotoxicosis. However, this test is still not widely available. The other approach which should be adopted in any case, is to screen the neonates for hyperthyroidism at birth as well as in the ensuing weeks as the first test may not reveal any abnormality. Neonatal hyperthyroidism from maternal antibodies is transient (lasting 1 to 5 months) but may require treatment with anti-thyroid drugs.

Surgery (Sub-total thyroidectomy) is the other option for treating hyperthyriodism during pregnancy. However, this should be performed in the second trimester and only after control of hyperthyroidism with anti-thyroid drugs. It is difficult to evaluate the efficacy of surgery in comparison to medical therapy. The aim is to avoid uncontrolled hyperthyroidism or hypothyroidism from overtreatment, both of which can lead to poorer outcome of the pregnancy. Both these problems may occur with medical and surgical treatment and studies comparing the two have not conclusively shown one to be superior. The best safeguard is constant monitoring of thyroid function tests throughout pregnancy. Surgery is therefore usually reserved for patients who are difficult to control with drugs or who are allergic to anti-thyroid drugs. The use of beta-blockers is probably safe during pregnancy but is often not necessary as hyperthyroidism can usually be controlled with thionamides alone.

HYPOTHYROIDISM AND PREGNANCY

Hypothyroidism during pregnancy is less often encountered than hyperthyroidism. Most cases are due to autoimmune hypothyroidism (eg Hashimoto's thyroiditis) while others are due to ablation of the thyroid by surgery or radio-iodine treatment. Overt hypothyroidism is associated with subfertility[13]. As in the case of hyperthyroidism, mild or moderate cases are still fertile. Untreated hypothyroidism in pregnancy is associated with a higher risk of spontaneous abortion, congenital malformations and stillbirths.

Diagnosis of hypothyroidism

The diagnosis of primary hypothyroidism is usually not difficult. A low T4 and FTI with elevated TSH usually clinches the diagnosis. In the first trimester, elevation of the thyroxine level may cause mild cases to have normal T4 levels but with elevated TSH.

Management of hypothyroidism

Once the diagnosis of hypothyroidism is made, thyroxine replacement therapy is started, If the diagnosis is made before pregnancy, adequate replacement is recommended before planning a pregnancy. The usual dose is 100 to 150 ug once daily. There is usually no problem with starting thyroxine at the maintenance dose right away. The adequacy of replacement is assessed by measuring the thyroxine and TSH levels. On initiation of therapy, TSH may remain elevated for a month or more. The TSH level is a better predictor of compliance as a normal T4 level may be achieved even if the thyroxine is only taken a few days before the blood test.

If hypothyroidism is diagnosed only during pregnancy, prompt replacement of thyroxine is necessary. There is no evidence that T3 is more efficacious than T4. The dose requirement during pregnancy is usually similar - 100 to 150 ug daily. If the patient is already on thyroxine replacement, adjustment of the dosage is usually not required during pregnancy though thyroid function tests should be done to monitor the thyroxine and TSH levels.

As in the case of hyperthyroidism, the neonate should be screened for thyroid problems at birth. Maternal antibodies (TSH binding antibodies) may cause transient neonatal hypothyroidism[14]. This resolves in a few months. Even though it is transient, thyroxine replacement should be started but the need to continue is assessed later.

In utero therapy for fetal hypothyroidism is usually not required unless the fetal thyroid is ablated by radioiodine accidentally. In utero therapy with amniotic fluid injections[15] and intramuscular injections[16] of T4 have been tried. The use of thyroxine analogues which can cross the placenta better has also been reported[17]. Fortunately, maternal hypothyroidism does not usually lead to fetal hypothyroidism and these forms of therapy are seldom required.

Post-Partum Thyroid Disorders

The immunological tolerance period during pregnancy ends with the delivery of the neonate. In fact, there is a tendency for autoimmune diseases to have a rebound or relapse in the post-partum period.

The frequency of post-partum thyroid disorders varies but their existence is increasingly being recognised. The problem tends to occur in those who have a past history or family history of thyroid disease. Post-partum Graves' disease represents 10 - 15% of the cases of post-partum hyperthyroidism but the majority of cases are due to post-partum thyroiditis (PPT).

Post-Partum Thyroiditis

The reported prevalence of PPT varies from 2 to 16%[1]. This variation may be due in part to the degree of vigilance in diagnosing this condition. PPT is characterised by transient hyperthyroidism followed by transient hypothyroidism and finally returning to a euthyroid state in the majority of cases. The hyperthyroid phase occurs about 2 - 3 months post-partum and is due to painless thyroiditis. The low uptake on thyroid isotope scan is typical and diagnostic. Hyperthyroidism is mild and requires no treatment or beta blockers alone may suffice.

A hypothyroid phase may follow after transient hyperthyroidism. This phase is more likely to be symptomatic and sometimes the presentation is psychiatric (depression)[18]. Thyroxine replacement may be necessary for up to six months and long-term follow-up to detect permanent hypothyroidism is recommended. Long-term hypothyroidism may occur in about 25% of PPT[19].

Other Thyroid Problems in Relation to Pregnancy

Nodular Goitre

A nodular goitre discovered during pregnancy can be treated in a similar fashion as in non-pregnant women. Thyroid function is usually normal. In solitary nodules, the concern is with the possibility of malignancy. Fine needle aspiration biopsy is the most useful investigation and is safe and easy to perform during pregnancy. Isotope thyroid scans are contraindicated.

If a malignancy is suspected from the cytology result, excision biopsy or thyroidectomy can be performed in the second trimester.

Diffuse Goitre

Although it has always been quoted that the ancient Egyptians diagnosed pregnancy by trying a reed around a woman's neck, the actual prevalence of a diffuse thyroid enlargement occurring in pregnancy is quite variable. Reported prevalence of goitre in pregnancy varies from 5% to 70%[20]. The variation appears to correlate with the local prevalence of iodine deficiency. Areas with higher incidence of relative iodine deficiency report greater prevalence of goitre in pregnancy.

The discovery of a goitre during pregnancy especially in areas where iodine is replete requires further investigations to detect any underlying thyroid disorder. Thyroid function tests and thyroid antibody levels are usually necessary.

Anti-thyroid Drugs and Breastfeeding

Anti-thyroid drugs are excreted in breast milk and conventional wisdom has been to either avoid thionamides in lactating mothers or avoid breastfeeding if the former is necessary. However, a few recent reports have shown that breastfeeding while on anti-thyroid drugs is safe[21,22]. It appears that the infant thyroid function is not affected if the dose is low (below 30mg of Carbimazole daily).

Hence anti-thyroid drugs are not an absolute contraindication for breast feeding especially if

the dose used is low. The risk however should be explained to the mother and the infant's thyroid function monitored if breastfeeding is to continue for a few months.

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The Family Physician's Advice to Travellers: Fitness to Travel, General Health Measures, Prevention of Jet Lag and Immunisations

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With today's boom in air and sea travel, more and more people are going abroad on business or for holidays. For most people, travel has become almost an everyday occurrence and exposure to new climates and environments, where potential health hazards and unfamiliar diseases prevail, are therefore a matter for concern, especially to family physicians and primary care doctors.

Also, an ever-increasing number of temporarily or permanently incapacitated, invalid, handicapped, and ill persons have been using air transport for business, vacation, repatriation, or when seeking specialised treatment abroad.

Bearing all these in mind, a would-be traveller, whether healthy or incapacitated, should visit his family or company doctor and dentist for advice before embarking on any trip overseas.

I. ADVICE TO THE HEALTHY WOULD-BE TRAVELLER

A) General Health Measures with a View to Protecting your Health while Travelling

(i) The Preparatory Steps in Planning for Overseas Travel

Of particular importance is organising vaccinations (immunizations) and malaria prophylaxis. For your patient who is on long-term medication for any chronic illness – give him enough supplies to last his trip, also a letter summarising his illness, allergies and medication he is on. If your patient has a pacemaker, give him a letter to that effect; advise a check-up by a dentist as a toothache can occur at high altitudes, the common causes being abscesses, mechanically-imperfect fillings and inadequately-filled root canals. For nervous travellers, a mild sedative or tranquilliser, e.g. Valium, is very helpful.

(ii) Maintaining Good Health While Travelling

Cut down on smoking before and in-flight to reduce dehydration. Maintain fluid levels in-flight by drinking plenty of water and soft uncarbonated drinks. Moderate your food and alcoholic intake. Wear loose-fitting and comfortable clothes and shoes.

Food & Drinks:

Advise your patient to be careful about what is eaten or drunk whilst in areas where the standard of hygiene is not high. Here the greatest source of danger is uncontrolled drinking water. Therefore do not drink any water that is not boiled; even tap water is not safe in some parts of the world. In one study on health hazards for travellers, even brushing teeth with tap water was a risk

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factor for diarrhoea. Bottled water or drinks are safest if carbonated, as carbonated drinks are less likely to have been bottled from local sources and their low pH may also inhibit bacterial growth. Do not put ice cubes into drinks as the ordinary ice may be contaminated.

Avoid cold meats, salads, salad-creams and shellfish. Peel all fruit. Avoid food from street vendors and do not eat food that has been precooked or reheated, or has been on display. Unpasteurised milk and dairy products are a potential health hazard and should be avoided.

Traveller's Diarrhoea

Traveller's diarrhoea, caused by enterotoxin-producing strains of Escherichia coli is probably the most common intestinal ailment of travellers. Other pathogens involved are Salmonella, Vibrio cholerae, Giardia lamblia and Entamoeba histolytica.

The diarrhoea often starts within a few days of a person arriving in a country. It is accompanied by abdominal pain and sometimes nausea and vomiting. Fever is unusual and the attack usually passes off within a day or two even without treatment. It is important to maintain an adequate fluid intake. If the diarrhoea is accompanied by fever and blood or mucus in the stools, then medical advice should be sought. Antidiarrhoeal agents should be used as a last resort; also antibiotics are useless if the cause is a virus and have the disadvantage that they increase susceptibility to other bowel infections.

(iii) Jet Lag

The spread of air travel and the crossing of time zones increase fatigue for the traveller who arrives at his destination at a local time quite out of phase with his circadian rhythms, i.e. air travel can upset your body's physiological and psychological rhythms, such as waking, eating, defecating and sleeping. These rhythms are partially governed by environmental "cues" such as darkness, light or temperature; and rapid travel across several time zones can alter them, resulting in jet lag. As a result, the traveller can feel tired during the new day time and be unable to sleep at night. Meal patterns and regular body functions may also be affected. This jet lag is often accentuated by lack of sleep, the stress of travelling and excessive alcohol intake.

Symptoms of Jet Lag

1) General discomfort
2) Sleep disturbance
3) Reduced mental and physical performance
4) Altered bowel habits, and
5) Disturbed eating patterns

How to Counteract / Overcome the Effects of Jet Lag

1) Try to time your arrival at your destination to coincide as nearly as possible with your normal bedtime.
2) Go to bed as soon as possible after landing, even if only for a few hours
3) Take adequate quantities of non-alcoholic drinks during your journey
4) Reduce smoking during your journey
5) Avoid overeating
6) Make use of every opportunity to take some exercise

In relation to this topic, advise your patient to have a 24-hour rest period after a 5-hour time change. Do not, on a business trip, go straight to a meeting or reception on arrival after a 5-hour time change. Neither should any work be done for the first 24 hours after a 5-hour time change, or 48 hours after a 9-hour time change, as reaction time and decision time are slowed down during these periods.

B) Immunization, Vaccinations and Prophylaxis

Travelling abroad exposes one to the risk of infections from diseases not normally encountered, and immunizations and prophylaxis are effective measures against such diseases.

Today, few immunizations are compulsory, like yellow fever and cholera, but most are advisable. Smallpox vaccination is no longer required. It is important that immunizations begin at an early date, as some are not valid until several days after the actual immunization is done; it is also possible that all immunizations required cannot be done at the same time. Ideally, at least four weeks should be allowed for arranging immunizations to maximum benefit.

Yellow Fever

This is required by all travellers to countries in which yellow fever activity has been reported within the past 10 years, and the yellow fever endemic areas of Central Africa and northern parts of South America. Points of note are:

(i) The final destination of travel may not require a yellow fever vaccination certificate, but you may need one if travelling via a country that does, otherwise you may be quarantined for up to six days – the incubation period of the disease.

(ii) The yellow fever vaccination and certificate do not become valid until 10 days after the vaccination and they remain valid for 10 years. However, the booster dose at the end of 10 years takes effect immediately.

(iii) Yellow fever vaccine is a live attenuated virus and its take may be affected by other live attenuated vaccines such as oral polio or rubella. These vaccines should not be given within three weeks of yellow fever vaccination. However, typhoid vaccine is an inactivated vaccine and can be given before yellow fever vaccine.

Cholera

The currently available vaccine is not very effective – it produces partial immunity for a very short time and causes considerable systemic side effects. Due to its low efficacy, WHO does not actually recommend it any more. However, some countries like Pakistan, Sudan, Lesotho and Pitcairns require a valid vaccination certificate for travellers coming from infected areas.

Immunizations should be at least six days before entering countries where vaccination is required and certificates remain valid for six months. Two injections are given at an interval of two weeks at least.

Typhoid

Typhoid immunization is not required for entry into any country but is recommended for travellers going to areas where the disease is prevalent, such as Asia, Africa and Latin America. There are two vaccination methods:-

(a) Oral (Vivotif capsules)

To be taken on an empty stomach, one capsule, irrespective of age, on day 1, 3 and 5. The whole procedure should be finished some days before starting malaria prophylaxis, and must not be taken during any antibiotic treatment or chemoprophylaxis, as it might impair the activity of the vaccine. Protection commences 2 weeks after taking the last capsule and lasts for at least 3 years. Other inoculations including live vaccines may be administered at the same time. This vaccination has no side effects except for rare and transient slight diarrhoea.

(b) Injection

Two to three intramuscular injections at intervals of 10 days to 4 weeks. Slight local reactions are common; general symptoms of fever and headache can occur.

The oral vaccination method is preferable, as it gives longer protection as compared to the six months of the injections.

Polio

As polio is still prevalent in many countries, we should ensure that the traveller is fully immunized against this disease.

Tetanus

All travellers should be immunized against tetanus.

Rabies

Rabies is most common in wild animals and is transferred to humans through saliva. It is widespread throughout Asia, Europe and America. Do not take risks with animals overseas, as it is unwise to approach or handle sick or unusually tame animals. If licked on broken skin or mucous membranes, or if bitten or scratched, the traveller should immediately wash the affected part thoroughly with soap and water or any disinfectant. If bitten by a wild dog or animal in endemic areas, immediate post-exposure prophylaxis should be sought. This consists of infiltration of the wound and intramuscular injection with human rabies immunoglobulin (HRIg), followed by vaccination with human diploid cell rabies vaccine on day 1, 3, 7 and 14. Boosters may be required after one and three months.

Meningococcal Meningitis

This vaccine may be indicated if one is travelling through rural areas in Brazil, Egypt, Chad, Ghana, Nepal, Niger, Nigeria, Mali, Mongolia, Saudi Arabia, Sudan and Vietnam. (Dosage: A subcutaneous injection of 0.5 ml of vaccine per person.)

Hepatitis A Prophylaxis

For protection, injection gamma globulin should be given; protection only lasts for 3 to 6 months.

Hepatitis B

We are all familiar with the immunisation programme of three injections
(1st injection, then 1 month later
2nd injection, then 5 months later
3rd injection).

It is recommended for

1) travelling to high prevalence areas – China, S E Asia, Africa
2) travellers who need regular injections, transfusions and haemodialysis

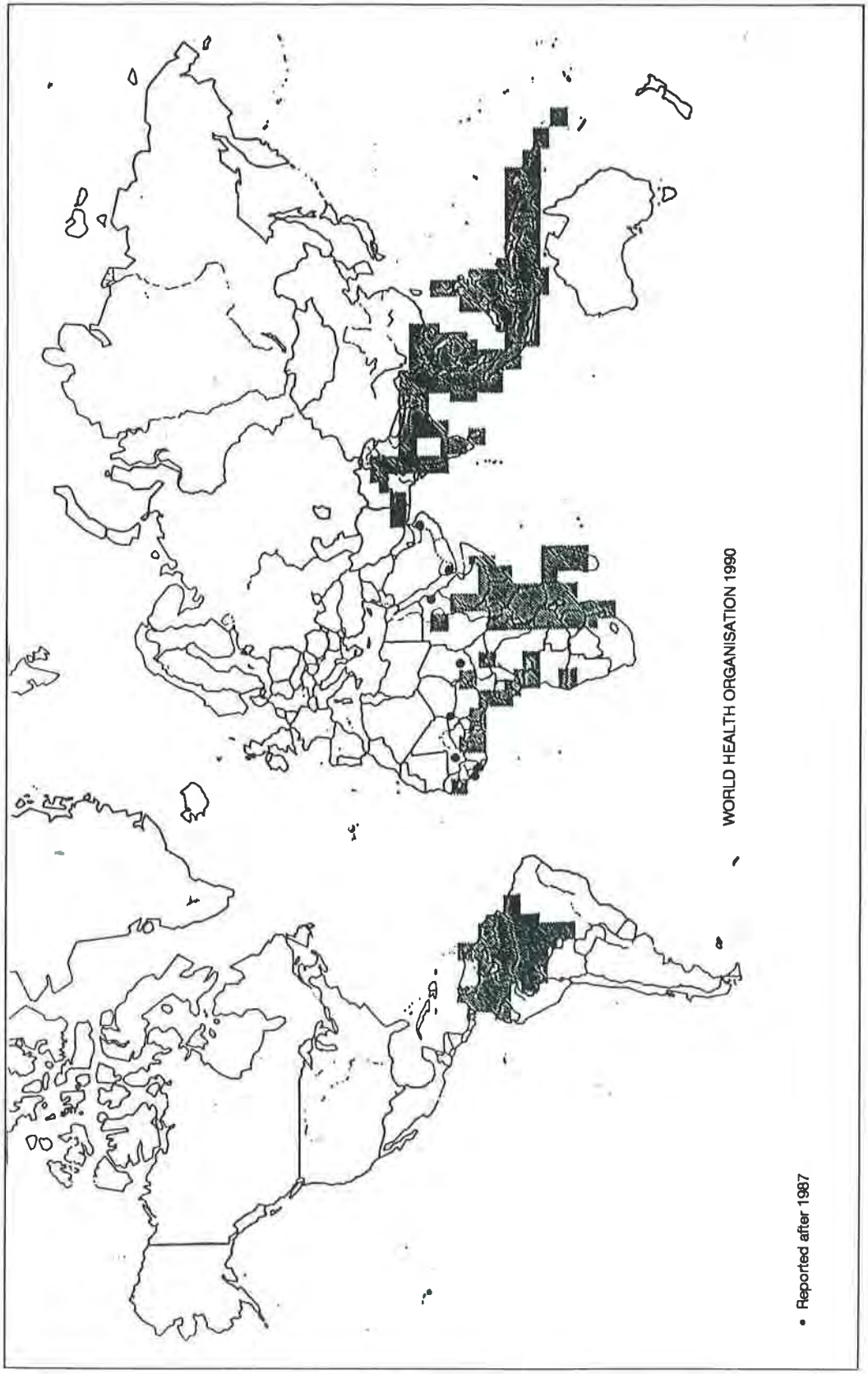
Malaria Prophylaxis

There is no vaccine against malaria, so use of prophylactic antimalarial tablets is essential. According to the Epidemiological News Bulletin of June 1991, there were 213 malaria cases reported in 1990, and all the cases were imported. The majority of the infections were contracted in South East Asia (63%) and the Indian subcontinent (30.6%), and comprised 44.4% local residents who had gone abroad and 16.7% tourists. A number of outbreaks were reported among separate group of local residents who visited holiday resorts in South East Asia without any chemoprophylaxis. Further, the prevention and treatment of Falciparum malaria are becoming more difficult because the resistance of the parasite to antimalarial drugs is increasing and becoming more widespread, especially in Papua New Guinea, the Pacific Islands, South East Asia, India, Africa and South America (see Map 1).

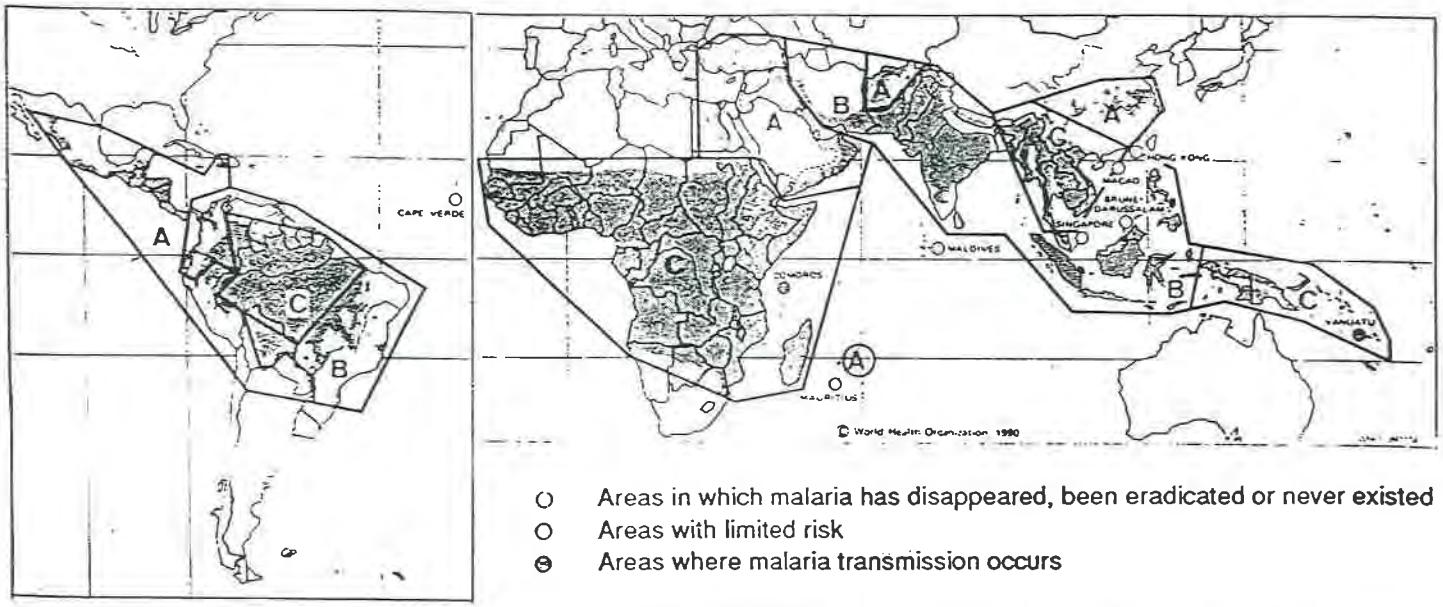
There are two types of prophylaxis – exposure prophylaxis and chemo-prophylaxis. Exposure prophylaxis is common sense health care and simply means protection from biting mosquitoes by sleeping under mosquito netting, wearing long sleeved clothings, using mosquito repellents containing N.-diethyltoluamide (DEET). Not all travellers to countries where malaria exists should automatically be prescribed prophylaxis. This is especially true for tourists and business travellers who will only visit urban areas that are malaria-free. The drug regimens for prophylaxis and treatment of malaria as recommended by WHO are as shown in Map 2 and Table 1:

1) Before advising on type of chemoprophylaxis, the following questions have to be addressed:-
    i) Which countries are to be visited? This is important as certain countries have Chloroquine resistant malaria and appropriate drugs have to be prescribed. Although the country to be visited

MAP 1: Areas where chloroquine-resistant Plasmodium falciparum has been reported



MAP 2: Areas of risk of malaria transmission in the world and recommendations for drug prophylaxis



- ○ Areas in which malaria has disappeared, been eradicated or never existed
- ○ Areas with limited risk
- ⊖ Areas where malaria transmission occurs

Zone	Characteristics	Recommendations concerning prophylaxis and/or stand-by treatment
A	In zone A, risk generally low and seasonal; no risk in many areas (for example urban areas). P. falciparum absent or sensitive to chloroquine.	either: chloroquine prophylaxis without stand-by treatment, or (in case of very low risk): no prophylaxis, with chloroquine stand-by treatment (to be used only when prompt medical attention is unavailable).
B	Low risk in most of the areas of zone B. Chloroquine, with or without proguanil, will protect against P. vivax; it may fail to prevent infection with P. falciparum, but may still alleviate the severity of disease.	prophylaxis: chloroquine + proguanil or: chloroquine alone (if proguanil is not available) or (in case of very low risk): no prophylaxis + always carry one of the following for stand-by treatment (to be used under medical guidance or when prompt medical attention is not available): quinine or sulfadoxine-pyrimethamine or sulfalene-pyrimethamine or mefloquine or halofantrine.
C	In Africa, risk high in most areas of zone C; except in some high altitude areas. Risk low in most areas of this zone in Asia and America, but high in parts of the Amazon basin (colonization and mining areas). Resistance to sulfadoxine-pyrimethamine in zone C in Asia, variable in zone C in Africa and America.	prophylaxis: mefloquine or: doxycycline or: chloroquine + proguanil (if mefloquine and doxycycline are unavailable or contraindicated) or (in case of very low risk): no prophylaxis If no prophylaxis or prophylaxis with chloroquine + proguanil, carry one of the following for stand-by treatment (to be used under medical guidance or when prompt medical attention is not available): quinine or mefloquine or halofantrine.

TABLE 1: Drug Regimens for Prophylaxis and for Treatment of Malaria

Drugs			Adult dose	
Generic name	Common trade names		For prophylaxis	For treatment[a]
Chloroquine	Aralen Avloclor Nivaquine Resochin	100 or 150 mg (base)	300 mg (base) = 3 tablets of 100 mg or 2 tablets of 150 mg once a week, on the same day each week or 100 mg (base) = 1 tablet of 100 mg daily for six days per week	600 mg (base) on the first and second days, and 300 mg (base) on the third day (total 10 tablets of 150 mg or 15 of 100 mg)
proguanil	Paludrine[b]	100 mg	200 mg = 2 tablets once a day	not applicable
sulfadoxine-pyrimetamine	Fansidar	500 mg + 25 mg	not applicable	1500 mg + 75 mg = 3 tablets in one dose
sulfadoxine-pyrimetamine	Metakelfin	500 mg + 25 mg	not applicable	1500 mg + 75 mg = 3 tablets in one dose
mefloquine	Lariam Mephaquin	250 mg	250 mg = 1 tablet once a week (on the same day each week) for up to 8 weeks (no extension without medical advice)	1000 mg (4 tablets) or 15 mg/kg of body weight, whichever is lower, in one dose
quinine		300 mg	not applicable	600 mg (2 tablets) 3 times a day for 7 days (total 42 tablets)
dosycycline[c]	Vibramycin	100 mg	100 mg = 1 capsule one a day, for up to 8 weeks (no extension without medical advice)	not applicable
halofantrine[c]	Halfan	250 mg	not applicable	500 mg (2 tablets) in one dose + 500 mg after 6 hours + 500 mg after 6 more hours (total 6 tablets in 12 hours)

a This does not cover all aspects of treatment; it includes the regimens that can, under exceptional circumstances, be used for self-treatment.

b Recommended only in association with chloroquine.

c There is relatively little experience with these drugs and knowledge of their efficacy and toxicity is limited.

has malaria, if the intending traveller is only going for business meetings and will spend all his time in the business centre and his hotel, the risk of exposure to malaria infection is minimal, hence no prophylaxis need to be recommended.

ii) Drug allergies are important as Fansidar and Doxycycline are sulphur-based drugs and Tetracycline respectively and are contraindicated in patients with allergies to Sulphur and Tetracycline.

iii) Is there a history of epilepsy? Here Mefloquine is contraindicated.

iv) The occupation of the traveller and purpose of travel to foreign country are also relevant. Those travellers whose occupations are such that fine co-ordination and spatial discrimination are needed, e.g. drilling engineers, scuba-divers and pilots must not be prescribed Mefloquine.

v) The intended date of departure is also relevant. Most anti-malarial drugs require a week before there is adequate protection. If the departure date is less than one week from the time of consultation, then daily prophylaxis with Doxycycline is the drug of choice. Otherwise Mefloquine or Chloroquine which is taken weekly would be prescribed.

vi) For women who are pregnant or likely to become pregnant during overseas travel, the drug of choice should be limited to Chloroquine alone or Chloroquine and Proguanil.

vii) Children should not be prescribed Doxycycline prophylaxis as this may discolour their permanent teeth. The prophylaxis of choice for infants and very young children is Chloroquine and Proguanil (or Chloroquine alone where there is no risk from P falciparum).

2) Drugs should then be taken with unfailing regularity throughout the period spent in the area of malaria risk, and continued for 4 weeks after leaving the area.

II ADVICE TO TRAVELLERS WHO ARE INCAPACITATED FROM ILLNESS OR PHYSICAL IMPAIRMENT; ASSESSMENT OF FITNESS TO FLY.

A) Incapacitated Passengers

Commercial airlines have always endorsed the principle that physical impairments or infirmities and illnesses should not interfere with an individual using air transport unless such travel should run counter to medical advice.

Who, then are "incapacitated" passengers?

Passengers are defined as "incapacitated", "handicapped" or "disabled" when their physical condition or medical disorder (including mental illness) requires airlines to give them individual attention (on emplaning and deplaning, during flight, in an emergency evacuation, during ground handling at airports) which is not normally extended to other passengers. Consequently, the airlines have come up with guidelines for "incapacitated" passengers.

(i) Conditions where Medical Clearance is Not Required

1) Handicapped passengers who in principle can attend to their own needs prior to, during and after a flight but who might be helped by some extra attention (elderly passengers, arthritic or rheumatic passengers, the deaf and the blind).

2) Passengers who are in need of specific diets during a flight and did request these in advance.

3) Passengers in need of assistance on the ground, during embarkation and during debarkation (WCHR-cases, wheelchair patients with impaired walking especially for long distances or WCHS-cases, wheelchair patients who can only walk short distances or are unable to climb stairs).

4) Passengers requiring extra leg-room or leg-rests but who are able to move about unaided in the aircraft cabin during flight.

5) Uncomplicated pregnancy without previous history of premature delivery, up till 4 weeks prior to the expected date of delivery. In case of complications or previous history of premature delivery, up till 8 weeks prior to the expected date of delivery.

(ii) Conditions where Medical Clearance is Required

1) Passengers requiring special ground handling and special assistance during the flight because they are unable to walk (WCHC-cases, wheelchair patients who have to be carried from wheelchair into passenger seat).

2) Pregnancy, uncomplicated and without previous history of premature delivery, less than 4 weeks before the expected date of delivery. Complicated pregnancy or previous history of premature delivery, less than 8 weeks before the expected date of delivery.

3) Passengers who will need extra oxygen during flight.

4) Passengers with physical disabilities which require special medical or nursing care during a flight or intermediary ground stops (injections, intravenous drips, specific nursing and feeding).

5) Passengers who have no control over bladder and/or bowel function.

6) Passengers who recently suffered from disorders in the function of the heart, who recently underwent major surgery or who are recovering from recent serious diseases.

7) Passengers with behavioural problems which require attendance by an escort or medication.

8) Passengers who are unable to use a normal passenger seat.

(iii) Passenger Categories which Require Medical Department Approval

1) Stretchers – For those passengers who cannot make use of a normal passenger seat. (All passengers carried on a stretcher require an escort.)

2) Oxygen – For those passengers suffering from physical conditions warranting the need for extra oxygen in high-altitude flight conditions.

3) Escorts – For all passengers who are considered to be unable to take care of their own needs during a flight. Depending on the nature of the disability the escort can be a family member or other layperson, a trained nurse or a physician. In some cases more than one escort may be required, depending on the nature of the disability and the duration of the flight.

(iv) Passengers with Medical Conditions that are Unacceptable for Air Travel

1) Passengers with communicable diseases such as active tuberculosis, and the acute stages of poliomyelitis, hepatitis, typhoid fever, salmonellosis, shigellosis, measles, chickenpox, rubella.

2) Moribund passengers, and passengers suffering from diseases or conditions of which it can be expected that the stress of the transport as such is beyond the

capability of the passenger – the complication of a death in flight must be avoided.

3) Expectant mothers
   - after the 35th week for international flights
   – after the 36th week for short domestic flights

4) Air travel is not recommended for
   – Post-natal mothers within the first 7 days after delivery
   – New-born babies within the first 7 days after birth

5) Premature babies will be considered as medical cases and medical clearance for air transport must be obtained.

6) Patients with uncontrolled cardiac failure

7) Recent myocardial infarction patients

8) Patients who are "offensive to see and smell"

9) Patients who have had recent air encephalography and unabsorbed pneumothorax

10) Patients with recent ear prostheses

11) Passengers whose physical and/or mental condition could jeopardize the safe execution of a flight or the punctuality thereof

12) Passengers whose physical or mental condition might affect the health, safety and comfort of passengers and crew (no control of bladder and bowels, even with special provisions, uncontrollable smells, uncontrollable behaviour)

Passengers with clinical conditions that may be adversely affected by the stresses of air travel and therefore needing careful assessment before a flight is attempted.

Cardiovascular Diseases

Conditions likely to give trouble are congestive heart failure, myocardial ischaemia, pulmonary hypertension and severe systemic hypertension with complications. Myocardial ischaemia is a particular problem if there is evidence of recent myocardial infarction.

Patients who recently suffered from coronary occlusion will generally be accepted three weeks after onset, provided the prognosis is uncomplicated and the patient is fully mobilised and allowed to walk and climb stairs.

Respiratory Diseases

Those with chronic bronchitis, emphysema, bronchiectasis and cor pulmonale are at risk to the effects of hypoxia and supplementary oxygen may be necessary for these passengers. Pneumothorax is contraindicated for air travel.

Blood Disorders

Severely anaemic patients may not tolerate the slight hypoxia; a haemoglobin level of 7.5 g/dl is regarded as the lowest acceptable level for air travel.

Gastro-Intestinal Diseases

Recent gastro-intestinal surgery may be affected by the expansion of gas in the gut during the flight and similarly abdominal wounds may be subject to stress. Such cases should generally not fly until at least 10 days after surgery, and if recovery has been complicated by paralytic ileus this period may need to be extended.

Gastric or Duodenal Haemorrhage

Recent gastric or duodenal haemorrhage may be reactivated by gut distension and, in such cases, 3 weeks should elapse after a major haemorrhage before air travel is considered. Also gas expansion may cause difficulties in controlling colostomies and ileostomies.

Neurological Diseases

Here neurological conditions with cerebral hypoxia need special attention, e.g. cerebral infarction from thrombosis or haemorrhage

is regarded with caution. Epileptic attacks are also more common during air travel, not only because of hypoxia, but also fatigue, excitement and disturbance of routine with irregular medications have to be considered.

Ear, Sinuses and Jaws

The common cold, sinus and ear infections, bronchitis or pneumonia untreated can give rise to problems from difficulties with equalisation of pressure in these cavities. But more serious problems would arise in patients who have had recent middle ear surgery, e.g. stapedectomy.

Recent facio-maxillary surgery with fixed wiring of the jaws is a contraindication to air travel because of the risk of vomiting.

Psychiatric Conditions

The mentally ill have trouble as passengers, especially the dangerous psychotic who may be a risk to himself and others in the close confines of an aircraft cabin. Such psychotics before allowed to fly must be well sedated and have a doctor medical escort. Further, there are those psychotics and psychoneurotics for whom air travel may be very stressful and who may become bewildered or lost during the journey.

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CASE STUDY

TREATMENT COMPLIANCE IN PSYCHIATRIC PATIENTS

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Summary:

Non-compliance with treatment can be encountered in dealing with different illnesses. This study looks at drug compliance among a group of Schizophrenic patients. Readmissions to four psychiatric wards were noted for a one month period (n = 102). The noncompliant group was identified (n = 65) and studied in detail. Two-thirds of this group (63.1%) were on both oral medication and depot injection. The majority (69.2%) received no treatment supervision at home and 73.8% stopped medication altogether. Some of the reasons patients gave for this included side-effects, time factor and doubts about the treatment. Management of treatment compliance is discussed.

Keywords:

Treatment compliance, Psychiatric patients.

INTRODUCTION

Treatment compliance refers to the patients' ability to follow the physicians' instructions regarding treatment and it implies the need to understand the nature of the illness and treatment[1]. When a patient does not follow the suggested treatment schedules, then the patient can be described as non-compliant.

Non-compliance with medication can manifest in different ways. Malahy and Schwartz categorised it as follows:

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(a) errors of omission

(b) errors of purpose

(c) errors of dosage

(d) mistakes in timing or sequence

(e) taking additional medications not prescribed by the physician[2,3].

The problem of compliance is encountered in different settings and in dealing with different types of illnesses. For example, there are patients who need to take courses of antibiotics, epileptics who need to maintain optimal antiepileptic drug levels and patients on long-term medication for chronic illnesses like diabetes. Likewise, it is an important issue in psychiatry where treatment is often long-term and some patients often lack insight into their illness and the need for treatment. This paper

studies drug compliance in a small group of schizophrenic patients admitted to a local psychiatric hospital.

METHOD

In this uncontrolled descriptive study, all readmissions with a diagnosis of schizophrenia (International Classification of Diseases 9) to four acute psychiatric wards were studied for a one month period (14/6/89 to 13/7/89). There were 102 readmissions to the four wards, for that period. The demographic profile of the sample was noted (Table 1) and the non-compliant group, which consisted of sixty-five patients, was studied in detail. The non-compliant group was identified through history taking from relatives, direct information from the patient and evidence from outpatient records that patient defaulted treatment.

Although it is often suggested that 'partial compliance' should be taken into consideration, this was not done in this study because of the difficulties in actually trying to determine this as a separate group.

RESULTS

Demography

Table 2 shows the distributions by race, sex and age of the non-compliant group for the period studied. The racial distribution reflects that of the readmissions. Notably, nearly all the Malay patients who were readmitted were non-compliant with treatment.

The majority (46 patients, 70.8%) were single, 17 (26.2%) patients were married and 2 (3%) were divorced. The majority were in the 30-39 years age group, followed by the 20-29 years age group. This again reflected the higher number of readmissions in this age group.

Most of the patients had some form of education: 22 (33.8%) had primary education, 20 (30.8%) had secondary education, 13 (20%) had been to vocational school; only 10 (15.4%) had no education. There were twice as many unemployed (44 patients, 67.7%) as there were patients in employment (21 patients, 32.3%). The majority (58 patients, 89.2%) lived with their families; 5 patients (7.7%) stayed alone and 2 (3.1%) were in Homes.

TABLE 1: Demographic Profile of Schizophrenic Readmissions between 14/6/89 and 13/7/89

Race	Chinese		Malay		Indians		N
Sex / Age	Male	Female	Male	Female	Male	Female	
< 19	2	1	0	0	0	0	3
20 – 29	13	13	2	3	1	0	32
30 – 39	23	12	0	4	1	0	40
40 – 49	6	5	1	0	3	0	15
50 – 59	4	4	0	0	2	0	10
> 60	1	1	0	0	0	0	2
Total	49	36	3	7	7	0	102
	85		10		7		

TABLE 2: Demographic Profile of Non-Compliant Patients admitted between 14/6/89 and 13/7/89

Race	Chinese		Malay		Indians		N
Sex / Age	Male	Female	Male	Female	Male	Female	
20 – 29	11	8	2	3	0	0	24
30 – 39	13	9	0	4	1	0	27
40 – 49	3	3	0	0	1	0	7
50 – 59	2	2	0	0	2	0	6
> 60	1	0	0	0	0	0	1
Total	30	22	2	7	4	0	65
	52		9		4		

Medication

Forty-one patients (63.1%) were on both oral medication and depot injections. 16 patients (24.6%) were only on oral medication and 8 patients (12.3%) were only on depot injections.

Medications was supervised only in 20 patients (30.8%); 45 patients (69.2%) were unsupervised. A closer look at the latter group revealed that 38 patients (58.5%) refused supervision, 3 patients lived alone and for 4 patients, relatives found it inconvenient to supervise their treatment.

Compliance

The majority of the patients (48 patients, 73.8%) stopped medication altogether. 3 patients reduced the dosage prescribed and 4 patients, the frequency of taking tablets. The reasons given for non-compliance were varied and are listed in Table 3.

The families of 36 (55.4%) of the 65 patients did not condone the non-compliance with treatment. 3 patients lived alone and the families of 26 of the 65 patients (40%) condoned their non-compliance. In this last group, 10 of the patients' families claimed the patients were better and felt they did not need to continue treatment. 6 patients' families complained about side-effects the patients experienced. 5 families had no time to bring the patient for follow-up and 5 felt that 'too much medication was not good'.

Yet 59 (90.8%) of the non-compliant patients could recall that they were advised on the

TABLE 3: Reasons Given by Patients for Defaulting Treatment

Reasons	No. of Patients
Felt better	23
Side-effects with medications	12
No time to come for follow-up	8
"Taking too much medication"	7
Lack of insight and denial of illness	15

importance of medication and compliance by the doctor at their last admission. The other six patients were not sure of this.

CONCLUSION

There are a combination of factors like patient, illness, doctor, medication and treatment setting which contribute to non-compliance (see Table 4). Blackwell[4] found that significant omission of medication occurs in between 25% and 50% of outpatients. Although Porter[5] concluded that it was not easy to identify the non-compliant patient and saw every patient as a potential defaulter, a high degree of suspicion and awareness of the problem can help identify and manage it early.

TABLE 4: Risk Factors of Non-Compliance

Sex (females > males)
Lower socio-economic groups
Social isolation
Chronic illnesses
Multiple doses and multiple drugs
Poor doctor-patient relationship
Poor continuity of care

Generally, the problems of non-compliance is commonest in the lower socio-economic groups and females more than males. Porter also found that social isolation (living alone) was a risk factor among general practice patients on chronic medication. Psychiatric and geriatric patients are at a greater risk and need supervision to ensure they take their medication. Yet in our study, although the majority of the non-compliant group lived with their family, 40% were not supervised. Not only educating the patient but also the family and/or carer is important.

The high degree of non-compliance among Malay patients may be related to their socio-cultural beliefs and use of faith-healers. Marriage and the presence of a supportive spouse would have a positive effect on compliance. Again educational status may determine compliance through better understanding of the illness and less dependence on faith-healers.

Treatment regimen is an important consideration. Most of our patients were prescribed a combination of oral medication and depot injections to reduce non-compliance. There is also a register of patients on depot injections which further helps to pick out defaulters. However, studies have shown that compliance is reduced when multiple drugs are prescribed or given in frequent doses. This is especially so with elderly or confused patients. Even labelled instructions can be misunderstood. Boyd[6] found that up to 60% of non-compliant patients made errors of interpretations. In psychiatry, although the development of depot neuroleptics has helped to significantly improve compliance, Johnson and Freeman[7] found that 15% to 20% of patients receiving depot injection defaulted treatment within the first six months. In our group, a similar number (8 patients, 15%) on depot injections also defaulted treatment.

It has also been shown that patients default when they feel treatment is inadequate or inappropriate. Wilcox et al[8] found that the highest default rate in psychiatric outpatients was among depressed patients treated with chlorpromazine. Side-effects with medication or even the fear of these, can also lead to treatment non-compliance. The problematic side-effects commonly noted with neuroleptics include tremors, acute dystonias and akathisia. Information on side-effects can combat the anxieties that arise when experiencing side-effects and decrease the risk of non-compliance. Also the stigma attached to mental illness can lead patients to avoid further follow-up and treatment once they feel they have improved.

Non-compliance can be detected in various ways but none is satisfactory at present. Tablet estimates can be done or patients questioned about tablet taking. But both these methods are unreliable. Pullar and Feely[9] described the use of a table container which incorporates a microprocessor to record the date and time of every opening (assuming of course that the

patient takes the right number of tablets each time). The addition of an inert compound, which is easily detected in urine and/or blood, to the medication as a chemical marker, has been suggested. But drug markers are expensive and impractical. Drug detection tests of the urine and/or blood although available are again expensive and time-consuming. Clinic attendance records or even the clinicians' overall impression of compliance have been suggested to help recognise the problem.

Management of non-compliance, although difficult, is possible. Drug regimen, patients' attitudes and clinic management are amenable to change. However, both the patients and physicians' motivation is equally important. It is also important where possible to include the patient's family and other care-givers in the management. Educating the patient and family about the illness and medication is a primary need. Not only can they help supervise medication at home but also help motivate patients, especially those on long-term treatment.

ACKNOWLEDGEMENT

To A. Prof S H Teo, Medical Director, Woodbridge Hospital

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MEMORANDUM TO THE EDITOR

SHORT FAMILY THERAPY IN AMBULATORY MEDICINE

From: Alon Margalit, MD, Isaschar Eshet, MA, Giora Almagor, MD, FRCGP

Alon: My experience as a family medicine resident exposed me to the new horizons of the biopsychosocial model. Despite my good intentions, I was doubtful that my patients could benefit from this model within the constraints of 10 to 15 minutes available for a consultation. Exploring new possibilities, I discovered the ideas of Milton Ericson, Michael Balint, Ian McWhinney, Dorothy and Baird, Sawa Medalie, Susan McDaniel and Tom Campbell which helped me to change.

I was fortunate to be assisted by a clinical psychologist who specialized in family therapy and medical psychology, Isaschar Eshet. We became good friends and have enjoyed a collaborative professional relationship.

Isaschar: For many years I have sought ways to exploit my psychology skills outside the citadel of academia. Fortunately, I was able to bring my experience in family therapy to good use in primary health care teams in the community.

Three years ago, in a memorable telephone conversation, Alon and I discovered each other! Alon and I work together as co-therapists with his patients at the community clinic. I have been impressed by the family physician's skill in effectively combining medicine and family therapy in a 10–15 minutes patient encounter. It seems that our shared collaborative approach offers a unique example of handling patient encounters.

It is the art of medicine!

Lately Giora Almagor who is Alon's first trainer in Family Medicine and acts today as Senior Officer in WONCA (World Organization of Family Doctors) joined our team. Giora contributes with his clinical, as well as organizational experiences. Giora is now spending his sabbatical year as a visiting professor to the Department of Family Medicine at McMaster University.

Giora: As a result of my experience with many different family medicine teaching programs in different countries, I joined Alon and Isaschar with a realization that this approach offers a better way to practise and teach Family Medicine. We discovered SFAT-AM (Short Family Therapy in Ambulatory Medicine) through a course of watching video sessions which we taped during regular doctor–patient–family consultations. We are convinced that these are effective techniques for family therapy in the family practice setting for 3–6 sessions of 10–15 minutes duration.

On all of the above we have learned the importance of dividing the consultation's session with the "difficult" patient and family, in a stepwise strategy. This method creates

opportunities to find appropriate tools for each of these steps. This stepwise strategy can be learned by the family physician.

We teach the method to our senior residents and family physicians and we get enthusiastic, encouraging feedback.

A year ago Alon visited 12 Family Medicine Departments in the USA and Canada. He lectured and showed a videotape demonstrating SFAT-AM techniques. The observers showed interest and willingness to co-operate in research and developing the teaching aspects.

Giora presented SFAT-AM as a video in conferences on General Practice / Family Medicine in Florence, Barcelona and Paris. With feelings of great satisfaction and achievement, we began to write a monograph as a professional and experimental book with some review articles. The monograph describes in detail the doctor–patient–family encounter. It includes: interpretation through our case presentations, narration, and protocols from the fields of family therapy, behavioural and strategic oriented thinking. With the help of Hava Katz – Senior Family Therapist, author with others of "Doctors and their feelings", and supervisor of the on-going peer supervision tutor group in our Family Medicine program – we adapted the original video to the various levels of knowledge for teaching.

We have developed a series of courses in this field to be run in Israel and various places in the world. The course creates an opportunity for Family Physicians / General Practitioners to see the day–to–day work in a new and refreshing light. The participants will get a "cookbook" at the end of the course.

All three of us receive a lot of support from our teaching colleagues in the Vocational Training Family Medicine program in Israel. We search for international co-operation and opportunities to develop research to establish SFAT-AM.

We are making arrangements to present our experience at the WONCA world conference in Family Medicine in Vancouver in May 1992 and other occasions. During these we should distribute a booklet which contains the abstract of our work and some practical examples. We hope to publish the complete monography by the beginning of 1993.

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THE USE OF INSULIN IN NIDDM

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INTRODUCTION

Diabetes mellitus is a very common disease and we encounter it almost everyday in our medical practice whether you are a general practitioner or an endocrinologist. However our understanding of the disease is still far from complete and treatment is far from satisfactory, particularly in non-insulin dependent diabetes mellitus (NIDDM). We have also been taught that NIDDM is the milder form of diabetes and as the name suggests, it does not require any insulin for treatment. Our own practice and patients have shown both these to be wrong and this has since been confirmed by others.

NIDDM is certainly not easier to treat as those of us who have managed these patients testify. We are often faced with NIDDM patients that are at the maximum dosage of oral hypoglycaemics and the diabetic control is still poor despite good dietary control. We often blame the patients for not being compliant with their diet or drugs or both. In the hospital, we often take it upon ourselves to check the patient's drawers for food and exclaim with great excitement when we find any trace of food wrappers or bread crumbs. The poor patient vehemently denies taking any extra food, which may or may not be the truth. However the clever doctor is not easily fooled and often believes sincerely that the patient's poor control is due to his dietary indiscretion. We would rather blame the patient than to admit that we do not know what to do with our patients.

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However we now know that it is not true that NIDDM patients never require insulin. Neither is the patient who was previously well controlled on oral hypoglycaemics apt to remain permanently so. There may come a time when even the best of our NIDDM patients becomes uncontrolled despite the strictest dietary habits. In this article, I would like to discuss the rational use of insulin in NIDDM patients and how it should be used. The use of insulin must be based on definite pathophysiological principles. Others who claim that it is an art, peculiar to the prescribing physician, do so to cover up for their ignorance of accepted concepts.

PATHOPHYSIOLOGY OF NIDDM

1. Hyperglycaemia in NIDDM

Hyperglycaemia in NIDDM is due to both insulin resistance and a relative insulin deficiency. The cause of insulin resistance is multifactorial and includes problems with insulin binding, activation of preceptor kinase, recruitment of glucose transporters and activation of glycogen synthase. The abnormalities in insulin secretion includes the loss of first phase response to glucose and loss of glucose potentiation of beta cell response to their stimuli and subtle alteration in the temporal response to meals.

In the early stages of NIDDM, insulin response to meals may be normal and in fact often hyperinsulinaemic to overcome the insulin resistance. At a later stage, the response becomes markedly diminished as a

result of beta cell exhaustion. Both cross-sectional[1] and longitudinal studies[2] have indicated that insulin resistance usually precedes or is at least quantitatively more important than insulin deficiency in the early phases of NIDDM. It is only in the later stages that insulin deficiency becomes a more significant factor. Hence it makes sense to administer insulin when insulin deficiency is the predominant cause of hyperglycaemia. In contrast, administration of insulin when insulin resistance is the predominant factor may be less useful than measures to improve insulin secretion such as sulphonylureas drugs.

2. Excess Hepatic Production of Glucose

Hyperglycaemia in the fasting state in NIDDM patients is due to excess hepatic production of glucose from gluconeogensis[3]. Postprandial hyperglycaemia is a direct result of impairment in glucose utilisation after a carbohydrate load[4]. This understanding indicates that when insulin therapy is needed in NIDDM, one of the first priorities is to reduce excessive hepatic production and normalise fasting plasma glucose. This lowers the base from which post-prandial glucose increments occur and thereby improve the entire diurnal glucose profile. Hence in the initial phase of starting insulin therapy, good diabetic control may be achieved with a single nocturnal insulin dose. When insulin deficiency becomes more advanced, these patients may require insulin as many times as any IDDM patient.

3. Hyperglycaemia and Tissue Toxicity

Prolonged hyperglycaemia may be toxic to insulin target tissues and aggravate insulin resistance. It may also act on beta cells to further diminish their capacity to respond to stimulation. This mechanism of glucose toxicity may be due to glycosylation of membranes, receptors or enzymes. This may explain why glucose control improves on starting insulin therapy and beta cell dysfunction may improve and at a later stage, the patients may be able to revert back to oral hypoglycaemics.

INDICATIONS FOR INSULIN THERAPY IN NIDDM

Insulin therapy can be broadly classified into two main groups; those that require temporary insulin and those that require long-term insulin. Of the first group are patients who are pregnant, those requiring major surgery and those with serious infections. The pregnant patient in particular requires strict glucose control for optimum well-being of both mother and foetus, and oral hypoglycaemics are not acceptable. Similarly in patients requiring surgery and those with serious infections insulin must be given vigorously to maintain near-normal glucose level. The second group of patients are those who have exhibited primary or secondary failure despite good dietary control. Primary failure is defined as a NIDDM patient who has never achieved good control with oral hypoglycaemics despite good dietary habits. Secondary failure is defined as one who has achieved good control for some time and then deteriorates despite continued compliance with drugs and diet. In drug failure, the attending physician may pursue two course of actions. He could change entirely to insulin therapy or opt for a combination of insulin with oral hypoglycaemic therapy.

THE DIFFERENT MODALITIES OF INSULIN THERAPY

1. Nocturnal Insulin Therapy

Administering NPH insulin or human ultralente insulin at bedtime either alone or in combination with a sulphonlyurea drug has been advocated. The nocturnal insulin results in a suppression of nocturnal hepatic glucose production without exposing the patients to the effects of exogenous insulin for the rest of the day. The lower fasting blood glucose also lowers the glucose toxicity on receptors and improves the tissue response to the sulphonlyureas. In our own practice, we have found that we can achieve as good a control with a nocturnal dose of intermediate acting insulin such as IZS lente. This decreases the risk of hypoglycaemia, which is more significant in our population of patients who are not as well versed in the symptoms of hypoglycaemia. Our starting dose of IZS lente is often 10 units, increasing in a

stepwise fashion. The use of a single nocturnal dose of insulin is indeed appealing to our patients as it would not hinder their daytime activities and also allow family members who may be working during the day to administer the insulin before bedtime. We have also found that it helps initiate patients and their relatives to the techniques of insulin injections and prepare them to accept this form of treatment should the need arise at a later stage to switch patients completely to insulin therapy.

2. **Combination Insulin / Sulphonlyurea Therapy**

In the advanced stages of NIDDM, a single nocturnal dose of insulin may not be sufficient to achieve good control due to the increasing insulin deficiency. Such patients may require to be put on twice–a–day insulin therapy. It is only natural at this stage to consider whether the oral hypoglycaemics should be discontinued or should one consider a combination of insulin with oral hypoglycaemics? What is the rationale behind combination therapy?

As mentioned earlier, the hyperglycaemia in NIDDM is due to both insulin resistance and a relative insulin deficiency. The sulphonlyurea does not only increase insulin secretion but it also potentiates the insulin action and reduce insulin resistance. By keeping the patients on sulphonylureas, we hope to decrease the insulin resistance and to maintain euglycaemia with the minimum amount of insulin. Studies have now shown that prolonged hyperinsulinaemia itself can accelerate atherogenesis, thereby increasing the coronary risks. Hence the insulin therapy is not without its complications and before the attending physician keeps on increasing the insulin dose to achieve euglycaemia, he should also have this in perspective.

3. **Long-Term Insulin Therapy**

In the advanced stages of NIDDM, insulin deficiency becomes the predominant factor and control is difficult with only single or twice-daily doses of intermediate acting insulin. In such instances, the patients should be switched completely to insulin therapy and short acting insulin should be used in combination with the intermediate acting insulin twice to three times a day as in the IDDM patients. Such patients would be labelled as insulin-requiring as distinct from the insulin dependent diabetics.

COMPLICATIONS OF INSULIN THERAPY

The use of insulin therapy in NIDDM patients would be fraught with the same complications as in IDDM patients. These include local complications such as lipoatrophy, lipohypertrophy and erratic absorption from different injections sites. Other systemic complications include hypoglycaemia, Somogyi phenomenon and dawn phenomenon. However in addition to those effects common to IDDM patients, the NIDDM patients also suffer from the side effects of hyperinsulinaemia as a result of insulin therapy. Hyperinsulinaemia is known to accelerate atherosclerosis, increase sodium retention and its accompanying hypertension, and lead to hypertriglyceridaemia[5]. Furthermore, insulin therapy is also known to stimulate appetite and thus increase the problem of obesity which is already rampant in NIDDM patients. The exact mechanism is unknown but could be due to appetite stimulation or simply improvement of the metabolic control and availability of carbohydrates for storage into fats.

CONCLUSION

It is no longer correct to view NIDDM as a less serious form of diabetes and hence the attending physician be willing to tolerate poorer control in such patients. Neither is it correct to think that NIDDM is easier to treat. We have seen NIDDM patients developing as much complications as IDDM patients as a result of poor diabetic control. The NIDDM patients may require insulin therapy at some stage of their disease, whether it be during acute infections, major surgery or when they become insulin deficient at a later stage of their disease. The proper use of insulin in such patients would help to maintain good control and delay the onset of diabetic complications. The use of insulin must be based on a proper understanding of the progression of the disease and the

pathophysiology of the disease states so that insulin is not withheld unnecessarily and neither is it used without justification.

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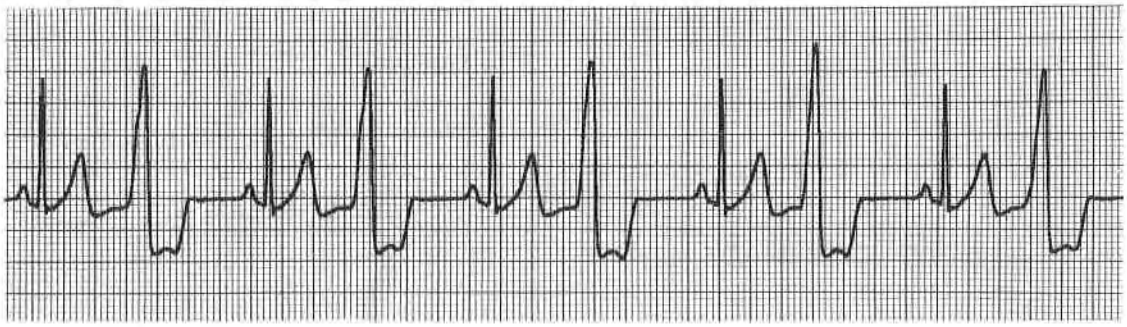
ECG QUIZ

Contributed by Dr Baldev Singh
MBBS (S'pore) M Med (Int Med) MRCP (UK)

The ECG shown below belongs to a 28-year-old lady who complained of chest pain and palpitations. She had none of the major coronary risk factors. Physical examination was essentially negative except for a short systolic murmur.

What is the ECG diagnosis? What additional investigations would you consider appropriate and how would you treat her?



ANSWERS TO ECG QUIZ

The ECG shows ventricular bigeminy. Every other beat is a ventricular ectopic beat from the same focus. The murmur was in fact mid-systolic and a 2D Echocardiogram confirmed the present of a prolapsing mitral valve. A 24 hour Holter recording was done and this showed frequent unifocal PVCs, and runs of ventricular bigeminy. She was treated with small dose of Propranolol and her symptoms improved.

WORLD HEALTH ORGANIZATION PUBLICATIONS

NEW BOOK ANNOUNCEMENTS

Effective Choices for Diagnostic Imaging in Clinical Practice

Report of a WHO Scientific Group *Technical Report Series*, No. 795, 1990, 131 pages ISBN 92 4 120795 7

This book provides a concise, didactic guide to the place of diagnostic imaging in the management of some 90 common clinical problems. Adhering to the principle that no patient should be exposed to inffective or clinically useless radiation, the book concentrates on information that can help the medical practitioner know when diagnostic imaging is indicated and then decide on the exact steps and procedures to follow. Throughout the book, the usefulness of different imaging techniques is evaluated within the context of the many other clinical and laboratory examinations that may be required to establish a diagnosis or direct the course of clinical management. Problems that can be solved without the use of diagnositc imaging are clearly indicated.

The book is structured on an anatomical basis, with separate chapters covering the chest, abdomen, and head, the cardiovascular, musculoskeletal and central nervous systems, obstetrics and gynaecology, and trauma. Within each chapter, recommended lines of action are presented for each of the most common clinical problems.

Because of the wide range of professional skills and facilities available in different parts of the world, alternative approaches to the management of each clinical problem are given in line with three different levels of imaging equipment, moving from standad radiography and ultrasonography to sophisticated facilities equipped with magnetic resonance imaging, position emission tomography and immunoscintigraphy.

Advice on the choice of an appropriate diagnostic tool is consistently guided by the need – for reasons of quality patient care, costs, and the risk of radiation damage – to use ionizing radiation sparingly and thus to restrict imaging to those cases where useful diagnostic information can be expected. To this end, readers are alerted to cases where imaging will not be helpful, where the benefits that will result have significant limitations, or where a less expensive or less dangerous method will provide equally reliable guidance. Specific recommendations range from the place of magnetic resonance imaging in the assessment of myocardial infarction to the warning that ultrasonography can distinguish between cystic and solid breast masses, but cannot exclude cancer.

Infant Feeding – The Physiological Basis

edited by J Akre 1990, 108 pages ISBN 92 4 068670 3

This publication establishes the scientific basis for addressing the many questions that surround the appropriate feeding of infants during their first year of life. Apart from confirming the unique advantages of breast milk as the only truly universal source of infant nourishment, the evidence reviewed challenges several widely held assumptions, including the occasions when proprietary formulas are needed, the most appropriate time to introduce complementary foods, and the best feeding regimen for low-birth-weight infants.

The book has six main chapters covering the prenatal and postpartum period, the physiology of human lactation and the mechanisms by which breast milk confers protection against infection and allergies, health factors which may interfere with breastfeeding, complementary feeding and the special needs of two particularly vulnerable groups: low-birth-weight infants and young children during periods of acute infection.

The value of this information, which can be used to review feeding practices and develop appropriate guidelines, is further enhanced through the inclusion of annexes presenting practical indications for evaluating the adequacy of support for breast-feeding in maternity wards and for studying the weaning process within the context of programmes intended to improve the nutritional status of infants and young children.

Integrating Maternal and Child Health Services with Primary Health Care – Practical Considerations

by *R H Hart, M A Belsey* and *E Tarimo* 1990, 92 pages ISBN 92 4 156138 6

This book addresses the need to link services for the care of mothers and children to other components of primary health care. Services for family planning are also considered. Intended for use by programme managers, the book offers a practical and conceptual framework for evaluating existing services, detecting inefficiencies, avoiding common pitfalls, and planning improvements that build on the many lessons learned from experiences with primary health care services throughout the world.

The main part of the book serves as a detailed guide to the planning and organization of services aligned with the principles of primary health care. Adopting a problem-oriented approach, sections concentrate on the staff, equipment, supplies, and resources needed for the daily operation of a clinic. Details range from advice on ways to streamline daily record keeping to an organizational framework for planning the work of a clinic according to five main work stations. Readers are also alerted to specific problems areas where lack of careful planning will compromise efficiency, increase costs, or introduce risks to the health of patients.

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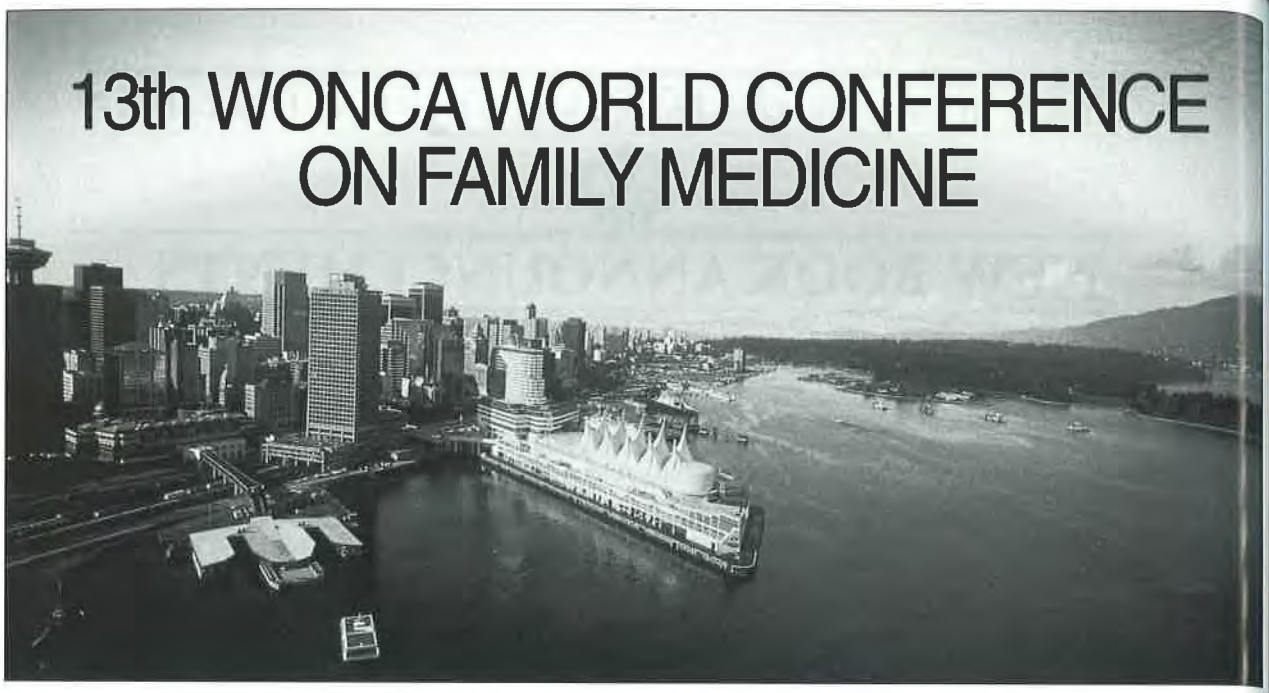

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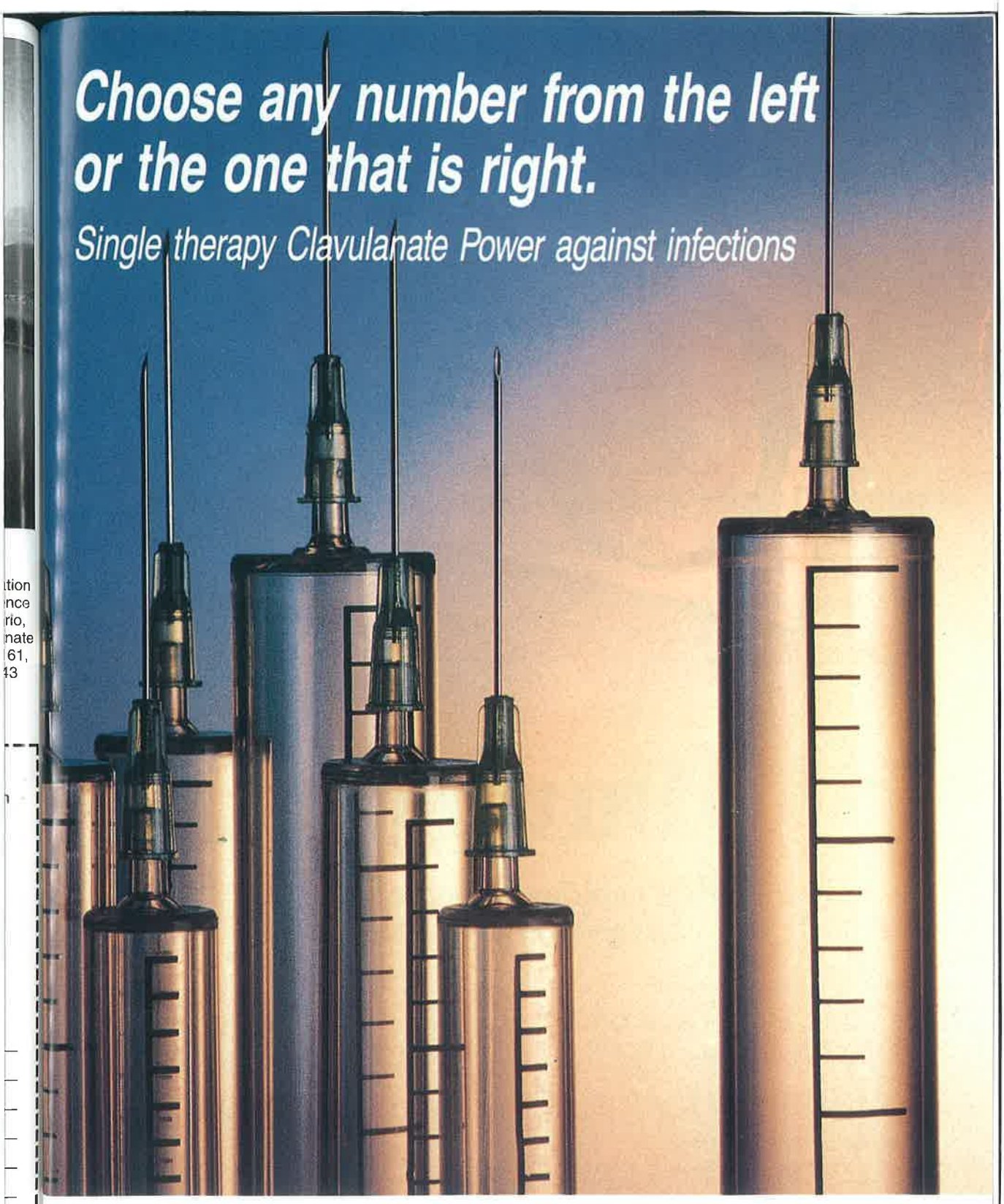

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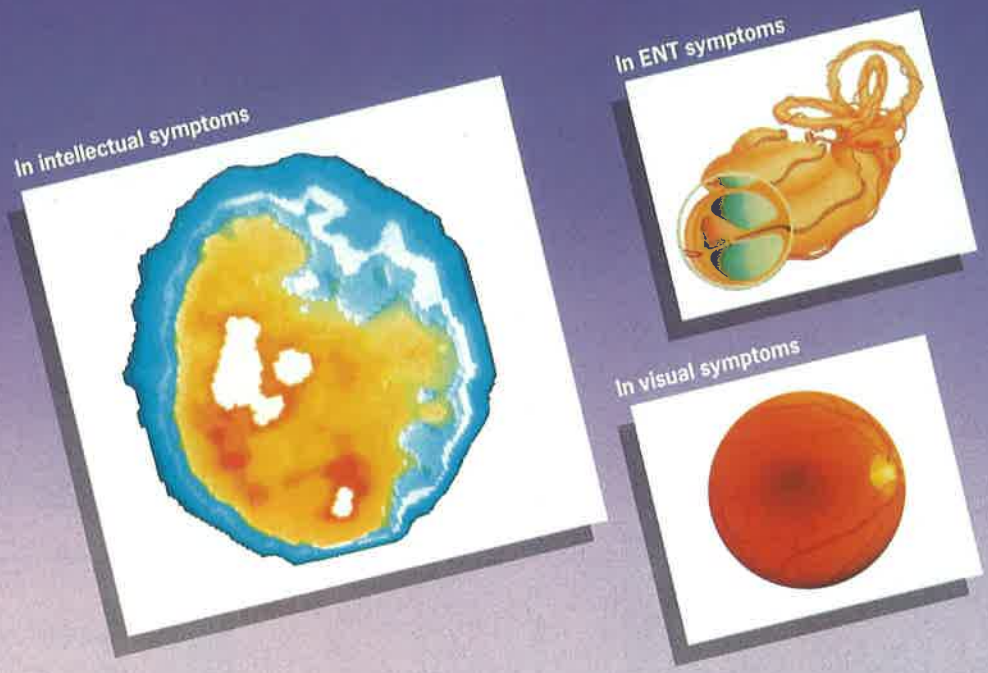

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