

# **CHILD HEALTHCARE IN THE 21<sup>ST</sup> CENTURY AND BEYOND: The Role of Preventive Interventions, Clinical Evidence and Research**

## **Definitions**

Child health and paediatrics is the branch of medicine dealing with children and their diseases.

Child Health concerns the well child, health promotion and disease prevention in children.

Paediatrics concerns the diagnosis, investigation and treatment of diseases of children. This field is concerned with the health of children and adolescents, their growth and development including their opportunity to achieve full potential as adults.

Child health specialists and paediatricians are professionals trained in the care of children whose responsibility is to ensure children's physical, mental and emotional progress from conception to maturity. They must be concerned with social and environmental influences which have a major impact on the health and well-being of children and their families, as well as with particular organ systems and biological processes.

## **Preamble**

In this inaugural lecture I will dwell on the current state of child healthcare in Kenya and other developing countries, the current thinking on the way well and sick children should be cared for and future trends in child healthcare in the latter part of this century and beyond. This lecture will address principles and concepts on child healthcare with regard to policy concerns and minimal details on the content of the areas included in the lecture. I will reiterate the

need to put emphasis on the role of prudent guidelines and policies on child healthcare and the involvement of the individuals and communities in the care of their own health. I will also reiterate the need to increase the number and scope of peripheral health units and the role of research in improving child health care. I will highlight some of the work I have done over the years that influence policy on child healthcare in selected areas such as malaria; allergies; asthma and immunisation.

The young are often the most vulnerable and disadvantaged in society and their needs require special attention. Therefore the decisions made on their healthcare need to be more accurate and should be based on carefully and exhaustively investigated processes rather than the use of anecdotal and dogmatic evidence. The use of evidence in Paediatric healthcare does de-emphasise the use of intuition and unsystematic clinical experience by healthcare workers while managing childhood illnesses. Evidence-based medicine utilizes patho-physiologic rationale as sufficient grounds for clinical decision making and stresses the examination of the evidence from clinical research.

Evidence-based medicine requires new skills of the paediatrician, including efficient literature search and application of formal rules of evidence in evaluating the clinical literature. It is no longer enough to take the word of a consultant Paediatrician or sub-specialist as the way things are done just because he or she is an authority in a given field of Paediatrics as this has been found to be inconsistent with findings from clinical audit. The use of evidence based medicine will assist patients and their guardians understand easily and to get accurate information on illnesses affecting them. This makes it easier for paediatricians to explain the final diagnosis to patients and their guardians.

Any diagnosis needs to be supported by clinical and laboratory evidence based on best practices. The application of clinical epidemiology in clinical medicine assists in the use of the clinical and laboratory evidence in arriving at the most likely possible diagnosis using sensitivity and specificity calculations including the positive predictive value. This evidence should include autopsy and histo-pathological findings in cases of death.

### **Historical perspectives**

Paediatrics emerged as a medical specialty more than a century ago in response to increasing awareness that the health problems of children differ from those of adults and that a child's response to illness and stress varies with age. The emphasis and scope of paediatrics continue to change since it is a dynamic discipline.

The health problems of infants, children and adolescents vary widely among the nations of the world depending on a number of factors which are usually intertwined. These include:

- The prevalence and ecology of infectious agents and their hosts.
- Climate and geography
- Agricultural resources and practices
- Educational, economic, social and cultural considerations
- Stage of industrialization and urbanization.
- The gene frequencies for some disorders.

These factors will still be at play in determining the health status of children in different parts of the world for many years to come.

The 20<sup>th</sup> century saw a vast change in the practice of paediatrics following new discoveries, socio-cultural changes, and inventions which took place that included:

- Introduction of antimicrobial agents in the treatment of infections.
- Establishment of disease control programmes (prevention and treatment based).
- Management of conditions that cause handicaps in children that were hitherto untreatable – leukaemia, cystic fibrosis, neonatal disorders, congenital heart diseases, mental retardation, genetic defects, rheumatic diseases, renal disorders, metabolic and endocrine disorders.
- New approaches to management of childhood illnesses using advanced molecular biological techniques, genetics and immunology.
- Attention on behavioural and social aspects of child health, child abuse and neglect.
- Development of specialised areas of paediatrics: developmental psychology, child psychiatry, neuroscience, social paediatrics, paediatric anthropology, neonatology, environmental health, nephrology, cardiology, endocrinology etc
- Resurgence of infectious diseases and emergence of new diseases: tuberculosis, HIV/Aids, Avian influenza (H5N1), Ebola, RVF (Rift valley fever) etc.
- Emerging issues: single parent phenomenon, day care centres, poverty, maternal deprivation, parental deprivation, delinquency etc.

It is expected that towards the middle and end of the 21<sup>st</sup> century there will be newer discoveries and inventions which will most likely be in the area of genetics and the human genome, the use of technological advances in the diagnosis and treatment of childhood disorders and further super-specialisation by paediatricians to narrower areas of child health and paediatrics.

These advances will undoubtedly have positive and negative consequences to the care of children in the world especially in developing countries. The distribution and access to these technologies and specialists will continue to benefit the well endowed and the minority as is the case today. They are therefore unlikely to have any impact on infant and under-five mortality without reciprocal improvement in the healthcare facilities and resources in communities where majority of the people live whether urban or rural. With rapid urbanization, it is estimated that 50 per cent of the Kenyan population will be urban by 2030. Majority of them, up-to 70 per cent will be living in slum areas of cities without basic necessities.

### **Child Health in developing countries**

More than 90 per cent of the world's children are born in developing countries with over 3,500 deaths per day due to common and preventable illnesses such as malaria, measles, acute respiratory illnesses (ARI), poliomyelitis, tuberculosis, tetanus, HIV/Aids, malnutrition and Hepatitis B. Close to 80 per cent of the children of the world now access immunization and consequently poliomyelitis has been eradicated in developed countries. Simple measures like hand-washing, personal hygiene and oral re-hydration therapy/oral re-hydration solutions (ORT/ORS) for diarrhoeal diseases, immunization for vaccine preventable diseases, Vitamin A supplementation and health education have saved millions of lives

of children the world over. These measures when implemented concurrently with the integrated management of childhood illnesses (IMCI) strategy lead to improved health status of children.

### **Principles of child health in developing countries**

The WHO and UNICEF, formed after world war II, have played major roles in the provision of healthcare worldwide in terms of funding and policy formulation. They have also co-ordinated setting of targets for all countries worldwide and ensuring the relevance of the policies to specific regions and countries. In addition to these United Nations bodies that work closely with the Ministries of Health in various countries, health oriented non-governmental organizations (NGOs) have supplemented the activities of the governments in the provision of healthcare especially in developing countries.

The Alma Ata conference of 1977 of the World Health Assembly declared primary healthcare (PHC) as the way forward for healthcare in which all were to attain health standards (Health for all in the year 2000) by the year 2000. Although all the targets were not achieved as planned, the concept led to a focused approach to healthcare in all countries and set the targets to be achieved for all governments. Further, we should also take cognisance of the fact that all current efforts in healthcare derive their basis to a large extent from the primary healthcare concept in both developed and developing countries. The concept will continue to shape the direction of healthcare provision irrespective of which way any country will wish to go in terms of healthcare delivery and irrespective of the health system approaches and policies a country or region chooses to apply.

The Alma Ata declaration had 10 pertinent precepts to achieve the goals which still hold the key to healthcare in the world especially for developing countries. These if adopted to healthcare systems and implemented by countries will enhance the achievement of the millennium development goals. They include:

- Health is a state of complete well-being and not merely absence of disease or infirmity.
- National policies should support comprehensive inter-sectoral health systems.
- All countries should cooperate in a global health strategy.
- Better use of resources including diversion of those involved in military pursuits would facilitate in attaining year 2000 goals.
- Inequities of health within and between countries are unacceptable and are of global concern.
- Economic and social developments are reciprocally tied to health development.
- People have a right to participate in their own healthcare.
- An individual's health should permit social and economically productive life.
- PHC is essential for overall social and economic development.
- Components of PHC include personal health services, nutrition, safe water and sanitation, maternal and child health, immunization, essential drugs and related sections including agriculture, housing and public works.

The countries of the world attempted to implement the Alma Ata declaration through two main strategies:

- Development of comprehensive PHC systems that address all health issues in a community. This concept was perceived by most governments in developing countries to be expensive to implement but it was successful in developed countries when it was applied

and implemented with appropriate modifications that included establishment of well equipped and staffed primary healthcare centres that served specific families and communities.

- Development of vertical programmes that addressed specific diseases or group of diseases including – control of diarrhoeal diseases through oral re-hydration therapy (CDD/ORT), acute respiratory illnesses (ARI), expanded programme on immunization (EPI) and hospital baby-friendly initiative (HBFI). These were then provided as a package that carried the acronym GOBIFFF (growth monitoring, ORT, breastfeeding, immunization, family planning, fertility, food security). The implementation of this strategy improved the basic health statistics among children in the 1980s and 1990s both in developing and developed countries. These programmes however, undermined the implementation of the PHC concept especially in developing countries. They also did not achieve their full intended potential since they were largely and still are donor driven, especially in developing countries.

The goal of health for all and all for health has not been fully achieved in developing countries for various reasons including low allocation of funds to Ministries of Health, emphasis on curative care instead of preventive care, brain drain, inequities in health resource distribution between urban and rural areas, lack of infrastructural development, failure of inter-sectoral collaboration, inappropriate policies and poor or lack of community involvement and participation. The general principle of a healthcare service in all countries should be to take the services to the people to enable them access these services and not the people to go to the health services. This principle stimulates healthcare service utilization and access by communities.

The WHO has in the last 10 years introduced the IMCI strategy which is similar to the PHC concept but attempts to horizontally co-

ordinate the vertical programmes with emphasis on evidence-based case management of the top six causes of childhood morbidity and mortality. It is not a programme but a strategy that incorporates preventive strategies, effective case management, community healthcare and family healthcare for the six diseases. The IMCI strategy therefore addresses the need for a holistic approach to the child patient which conventional care does not cover. The child should be managed in a comprehensive manner and not just treat the presenting illness or disease. The strategy targets primary healthcare centres up-to the district referral centres because the centres are responsible for the healthcare of majority of the population. These centres however lack basic diagnostic equipment normally found in provincial and referral hospitals. The IMCI targets these centres because it offers the greatest impact through training of health workers, communities and families on the use of clinical evidence together with basic diagnostic tests to arrive at the most likely diagnosis. It also emphasizes the need to have the entire essential drug listed by the WHO in all these healthcare centres for its impact to be achieved. It envisages tertiary hospitals as the originators of the guidelines and policies to be used in the peripheral healthcare centres, based on evidence and good clinical practices.

The Ministry of Health in Kenya has developed a national health sector strategic plan (NHSSP 2005 – 2010), which incorporates the Kenya essential package of health (KEPH). This strategic plan is similar to the PHC and if implemented would meet the goals of the PHC concept.

### **Basic health indicators**

The basic health indicators are the benchmark used by the WHO and UNICEF to compare the health status of the children of the world. These indicators normally include socioeconomic, political and demographic parameters. The indicators are used to compare

and rank countries worldwide. The lower the numerical rank the poorer the health and socioeconomic status of a country. Sweden and Norway are ranked 182 while Kenya is ranked 37.

To address these disparities in health indicators, developing countries need to study the successful healthcare systems in developed countries.

The basic health indicators for Kenya in 2005 are comparable to those of western countries at the beginning of the 20<sup>th</sup> century, over 100 years ago. This is also true of the prevalence of infectious diseases. In developed countries, cases like malaria, tuberculosis and diarrhoeal diseases have since been markedly reduced to only occasional or imported cases.

To address these disparities in health indicators, developing countries need to study the successful healthcare systems in developed countries. These countries applied basic public health measures, effective case management of diseases and high infant immunization coverage for vaccine preventable diseases to rid their populations of the preventable diseases. These measures were combined with emphasis on health research and diagnostic advances. These countries also introduced the tenets of prudent governance and transparency in the running of government business leading to success in all healthcare programmes and in all other sectors of the economy. These countries therefore implemented the PHC concept in ways relevant and consistent with their levels of development and cultures which developing countries failed to do. The developed countries started primary care centres, posted family physicians to these primary care centres and allocated smaller communities to be taken care by specific primary care centres and physicians. This together with the adoption of the welfare systems for the poor, the unemployed and disadvantaged and simultaneous improvement in safe water provision and sanitation enhanced the basic health statistics in these countries.

Developing countries need to enhance inter-sectoral collaboration, good corporate governance and also invest in health related activities in order to spur socioeconomic development. Further, emphasis should be placed on improving service delivery at the community level if success is to be achieved in improving the basic health indicators in developing countries. This should be backed by research on the common diseases and enhanced human resource capacity building. This primary care expansion should be supported by enhancing the capabilities of tertiary institutions to handle referrals. These tertiary centres should therefore focus on tertiary care in order to realize their potential rather than act as primary care centres as is the case at the moment. This dual role by referral centres has diverted their priorities to dealing with matters that should be handled by peripheral healthcare units; they should be centres of excellence in research, training and clinical care guideline formulation for use by the primary care centres of the healthcare system. The current scenario hampers researchers and specialists from attending to referrals and hampers the efficiency of the referral system which is not functional at the moment. Most cases seen at tertiary and provincial hospitals need to be taken care of at the levels of dispensary, health centre and district hospital. Thus there is need to enhance the capabilities of the peripheral units in order to reverse this trend.

In order to understand the magnitude of the problem of child healthcare in Kenya I have tried to compare selected basic health indicators in Kenya with those in a country with the best basic health indicators in the world, Sweden.

**Table 1: Comparison of selected basic health indicators: Kenya and Sweden for the year 2005**

<b>Basic health Indicator</b>	<b>Kenya</b>	<b>Sweden</b>
Population – 2005	34 m	9m
World rank based on under 5 mortality rate	37	182
U5MR in 1970	150	15
U5MR in 1990	97	7
U5MR n 2005	120	4
IMR 1990	64	6
IMR 2005	79	3
Neonatal mortality rate	29	2
GNI per capita in \$	530	41060
Low birth weight %	10	4
Severe wasting (%) - for under 5s	6	0
Underweight % -for under 5s	4	0
Immunisation coverage % -infants (BCG, DPT1)	85	99
% using improved drinking water	61	100
% having adequate sanitation	43	100
Under 5 mosquito net use (%)	15	-
Under 5 treated mosquito use (%)	5	-
HIV prevalence -2005	6.1	0.2
Paediatric HIV cases 2005	150,000	0
Under 18 yrs population	17m	1.9m
Under 5 population	5.7m	490,000
Crude birth rate 2005	39	11
Crude death rate 2005	15	10
Life expectancy 1970, 1990, 2005	48,52,59,	74,78,80
Total fertility rate	5	1.7

**Key:**

U5MR -- Under 5 Mortality Rate

IMR -- Infant Mortality Rate

GNI-- Gross National Income

### **Evidence-based Medicine in child health care**

The care of sick children must be based on evidence and not guesswork or experience alone. The practice in the early part of the 20<sup>th</sup> century in which a specialist or super-specialist's opinion was considered bible truth no longer holds, as this has no scientific and statistical basis and is prone to major ethical and patient management errors that can be fatal. Furthermore when this opinion is analysed through a well conducted medical audit it may become embarrassing to the doctor and the profession at large. It is now important to use evidence in deciding on how patients are managed. This evidence is derived from the history given or obtained on the patient's illness; the clinical findings following a meticulous and systematic physical examination; relevant, feasible and cost-effective laboratory and/or radiological findings. These should be supported by current and up-to-date research findings in journals or related literature on the condition. The evidence obtained from these patient investigative processes should lead to a few or no pertinent differential diagnoses. The practice of evidence based medicine is now applicable at all levels of the healthcare system. There is need to have basic clinical, laboratory and radiological diagnostic requirements at the lowest levels of the healthcare system.

There must be capacity to carry out specific basic investigations such as microscopy for blood slides for malaria parasites and common bacteria, estimation of haemoglobin level, packed cell volume estimation, blood glucose level, blood grouping and cross matching, basic microscopy for cerebrospinal fluid (CSF), urine and stool at all levels of the healthcare system right from the dispensary level. To support these basic requirements, each healthcare centre must have the basic essential drugs for the care of all sick children suffering from the common childhood illnesses especially the six leading causes of death. The integrated management of childhood illnesses (IMCI) strategy has been introduced and implemented by

the WHO in several countries especially developing countries. This strategy utilizes evidence-based medicine in the care of children especially in the outpatient service of healthcare centres. It is now also being implemented in the management of inpatients in first level referral centres (district hospitals) using well designed management protocols that have been developed based on results emanating from clinical research, clinical trials and up-to-date journal publications.

Reduction of child mortality by two thirds in developing countries by the year 2015 is one of the Millennium Development Goals (MDG 4). Implementation of simple interventions and treatment guidelines outlined in the IMCI strategy is one way of achieving this goal. The primary care centres and district hospitals need to be strengthened through stocking of essential drugs, in-service training of health workers on evidence based medicine and introduction of comprehensive health policies on the real needs of communities. In the long term, all students in medical schools and medical training colleges must go through curricula on evidenced based medicine especially for the common diseases in their respective countries or regions.

The use of the internet for evidence from online journals and textbooks is now the norm in developed countries as these are available even in primary healthcare centres. This is the way forward for developing countries if the Millennium development goals are to be met by 2015.

This will require expansion of community based electrification, provision of safe drinking water, internet provision and deployment of sufficient health personnel in the community-based clinics that serve smaller populations.

There are over 12 million child deaths each year among the under-five of the population in developing countries. Over 70 percent of

these deaths are due to only six diseases: Malaria (7 percent), measles (8 per cent), diarrhoea (15 percent), acute respiratory illnesses ARI (19 percent), peri-natal related factors and illnesses (20 percent) and HIV/Aids (3 percent). Malnutrition, which is associated with all of the six diseases, contributes 54 percent of the deaths caused by these six conditions. All the other communicable and non-communicable conditions put together account for 28 percent of all deaths among children aged five years and below.

These six conditions can be diagnosed accurately using clinical evidence obtained through the process of accurate clinical history from the patient, a carefully executed physical examination and relevant basic laboratory and/or radiological investigations at all levels of healthcare system including primary care centres. These conditions are the target of the IMCI strategy whose objective is to reduce the under-five mortality through the application of the following strategies:

- Enable health workers assess, classify and treat sick children accurately.
- Enable health workers administer pre-referral treatment accurately and correctly and be able to refer serious cases.
- Ensure that immunization status is assessed for all children seen at the health facilities on routine basis.
- Enable health workers counsel caretakers of children on homecare of children, teach them on how to give treatment and teach them on symptoms and signs of the six conditions.
- Enable workers to assess the feeding and nutritional status of all children that pass through them and prescribe appropriate feeds.
- Provision of counselling on nutrition and feeding to caretakers of all children seen at the health facility.

The health personnel in these centres therefore need to be trained on the clinical guidelines and laboratory tests to enable them diagnose these conditions. This training will provide them with the knowledge and skills needed for the management of these conditions based on guidelines that will have been developed and availed to them. These guidelines should be made accessible to all healthcare workers at all levels of the healthcare delivery system. These guidelines and algorithms should be developed by paediatricians in the tertiary hospitals and medical schools in conjunction with the divisions of child health within the Ministries of Health of respective countries. Early detection and management of these conditions will reduce infant and under-five mortality by over two thirds.

The interventions that have been shown to reduce under-five mortality from diarrhoea, pneumonia, measles, malaria, HIV/Aids, birth asphyxia, prematurity, neonatal tetanus and sepsis include:

- Preventive interventions
- Breastfeeding
- Insecticide treated bednets/materials
- Complementary feeding
- Safe drinking water, sanitation, hygiene
- Vaccination – measles, Tetanus Toxoid (TT), Haemophilias Influenza type b (Hib), Pentavalent
- Vitamin A supplementation
- Keeping newborn babies warm
- Prevention of mother to child transmission (PMTCT) and anti-retroviral to newborns in the peri-natal period
- Antenatal care

- Clean deliveries
- Anti-malarial drugs intermittent preventive treatment (IPT) in pregnancy
- Treatment interventions
- Oral re-hydration therapy
- Antibiotics for pneumonia
- Efficacious anti-malarial drugs
- Antibiotics for sepsis
- Newborn resuscitation
- Antibiotics for dysentery
- Zinc
- Vitamin A

For this to be realized health services should be made available to all communities and all families. The services should be within a two-kilometre radius where they should be registered for their healthcare as their first contact with the healthcare system and be the centre for their follow ups. This is what has made the difference in western countries with the assistance of family physicians. This could be modified in the developing countries by using middle level health workers who have been trained in the primary care of these common ailments.

If this is realized then the tertiary hospitals, provincial and to some extent district hospitals will only deal with the remaining conditions and receive referrals from these peripheral units. This will, however, require an elaborate referral system that includes achievable transportation.

In the referral centres evidence-based medicine shall be supported by well stocked libraries with online textbooks and journals, ward based internet connections or the relevant information on CDs or VCDs and well researched treatment guidelines. This makes it imperative to have electricity or solar energy available in all these primary healthcare centres. Patients will be managed using up to date protocols and good clinical practices. In addition pharmacies, diagnostic laboratories and radiological services should be stocked and equipped to enable clinicians provide quality paediatric care. The referral centres should be connected to the peripheral centres through the internet or through the use of telemedicine facilities. This will enable online training of the health workers at the primary care centres and communication between these centres on patient care.

All the protocols and treatment guidelines will be supported by research through the conduct of randomized clinical trials, meta-analysis of multi-centre clinical trials, community trials of protocols for management of various diseases and drug trials. The World Health Organisation in its 2006 report recognizes that investing in health means investing in water, sanitation, environment, education, women's empowerment, governance and other related sectors. This means that investing in health is investing in economic development. Emphasis should be placed on the development of infrastructure and human resource training as a way of improving health situations in developing countries. The report further recommends that, research should be enhanced in pursuit of effective drugs and vaccines for the common infectious diseases in Africa such as malaria, tuberculosis and HIV/Aids. Health research is a foundation for evidence-based solutions and a foundation for provision of quality health care. The report underscores the need for developing countries to base health policies on evidence derived from health research on health systems, treatments, diagnostic processes and interventions.

This is in keeping with the concept of evidence-based medicine which is core in the discussion.

The role of the individual and communities in the responsibility of their own health cannot be overemphasized. With the improvement in information technology, knowledge transfer to individuals and communities and enhanced clinical research, these individuals and communities will be enabled to take control of their own health with the assistance of the community or family health workers. These improvements will play a major role in health information transmission using the internet and satellite technology or using CDs and VCDs containing information developed at the referral centres. This will enable informed participation in decision making on health issues by individuals and communities. Disease surveillance and monitoring will be made easy in most parts of the world. With this technology and therefore making early disease detection and implementation of prevention interventions possible and thus promoting healthy living. This will make the dream of provision of quality healthcare effective and efficient even at community levels.

Childhood diseases have declined over the years especially in developed countries due to a combination of strategies including immunization, improved nutrition, provision of adequate sanitation and safe drinking water, good general hygiene, decent housing, family planning, good maternal healthcare and effective case management of the six common childhood illnesses addressed by the IMCI strategy. Thus any government or institution that wishes to improve the basic health indicators of its citizens or workers should enhance these combined strategies since they have the greatest impact in reducing infant mortality rates. Health workers at all levels of the healthcare system must be therefore trained on the basic concepts of evidence based practice. Health units should be as close to communities as possible to enhance accessibility and be adequately staffed by these well trained health workers.

The priority areas should be urban slums and rural populations which are going to host the majority of the poor populations of the country. It is estimated that 70 percent of the world population of urban dwellers will be in slum areas by 2030 when 50 percent of Kenya's population is expected to be in urban areas. The majority of these are children.

### **The human Genome in Child health and disease**

In the decades to come technological advances and human genome research will play key roles in healthcare in developing countries as has been the case in developed countries over the last two decades.

Technology has been applied in various biological sciences that include molecular and cell biology, immunology and genetics. These have led to a better understanding of disease processes, development of various drugs and development of new vaccines including recombinant DNA vaccines. Technological advances in medicine have been observed in various areas including ultra-sonography, computer aided tomography and magnetic resonance imaging.

Genes can have powerful impact on our health through chromosomes, single gene disorders or by influencing our susceptibility to diseases. The human genome has over 20,000 genes which individually may have a role to play in some specific diseases. Archibald (1902) described the first genetically inherited disease, Alkaptonuria, an inborn error of metabolism which is inherited as a recessive disorder. Over the last century there have been over 6000 single gene disorders described, some being extremely rare. Using genetic markers it is now possible to study disease inheritance and to trace inheritance patterns of diseases to specific defects in a given gene. Some diseases are due to an interplay between the environment or environmental factors and genetics and therefore not purely of genetic cause and effect pattern.

Current ground breaking genome research will shift the balance of paediatric and medical practice in general, from diagnosis and treatment to prediction or early detection. This will enable disease management before the onset of symptoms and signs. Studies on the human genome will therefore be useful in prevention or early detection of diseases that have a purely genetic cause and effect. These studies will also be useful in the early detection and prevention of diseases where environmental factors influence genes. These advances are now used in gene therapy for the treatment of genetically related diseases by using the DNA.

We will have to be prepared for the ethical implications of these technological advances in healthcare against the potential benefits. These challenges include the potential for human cloning which has been opposed by religious organizations and world bodies like the WHO. These issues will be a challenge for the paediatricians and obstetricians in the coming decades.

### **Role of Immunisation in child healthcare**

Immunisation and vaccination are the most cost-effective public health intervention available in the world today. Vaccines have significantly prevented and reduced infant mortality among hundreds of millions of children over the last three decades.

There are over 2 million deaths per year in the world. Most of these deaths are in developing countries. In 1974 the immunization coverage in the world was 5 per cent which increased to 20 per cent on introduction of the expanded programme on immunization (EPI) in 1980 and reached 80 per cent in 1990. This declined in some countries after the 1990s to 60 per cent or less due to economic difficulties and withdrawal by donors from funding these activities.

Countries should enhance routine immunization activities and introduce mass immunization activities against epidemics of vaccine preventable diseases with the aim of control, elimination and

eradication. These immunization strategies will increase herd immunity and therefore reduce the population of susceptible individuals and the microbial load in the community.

New vaccines against other conditions such as viral influenza, rotavirus, meningitis and pneumococcal infections should be promoted to reduce morbidity and mortality.

In keeping with the concept of evidence-based medicine, studies on immunization indicate that establishment of community-based health units manned by sufficient and well trained health workers who are easily accessible lead to increased immunization coverage. This addresses access related factors. This increase in coverage is positively correlated with the number of nurses a given community can easily access and less so for doctors. These findings have been corroborated by work done in School of Medicine, Moi University in which over 250 health workers in 39 districts have been trained since 2004. Baseline data was collected on immunization coverage before their training followed by an assessment three years later. Preliminary results indicate that the immunization coverage in these districts registered significant increases than in areas where the health workers were not trained. We plan to repeat the assessment at the end of phase one of this training programme in February of 2008 (see Table 2).

It is therefore imperative to empower communities by taking these services to them as close as possible and provide the needed well trained human resources in addition to vaccines and other logistics. Scattered and well developed tertiary health institutions would not make this type of impact. The role of these tertiary health institutions would be to ensure that training modules and guidelines on vaccines and immunization are developed by their relevant experts in immunization and child health.

Development of vaccines against malaria, HIV and other viral conditions including Ebola, Rift Valley Fever, Avian Influenza(H5N1), Severe Acute Respiratory Syndrome(SARS) should be the agenda for the remaining part of the 21<sup>st</sup> century and beyond. However they have to be accessible and affordable to all communities for them to have an impact on the specific disease control.

The application of genetic engineering in vaccine development has reduced the adverse effects profile of vaccines and enabled combined vaccines to be developed. This has made the administration of vaccines easier for children whereby one vaccine injection vial contains five to six vaccines. This technology offers the possibility of reducing the prevalence of some non-communicable diseases through vaccination especially those that have a microbe as an associated causative agent such as certain cancers, diabetes mellitus, rheumatic heart disease and nephritic syndrome.

Studies carried out at the MUSOM in 2003 revealed immunization coverage in the various districts in western Kenya as shown in Table 2.

**Table 2: Immunisation coverage in Western Kenya in 2003**

<b>NYANZA PROVINCE</b>										
District	BCG	Birth Polio	Penta 1	Polio 1	Penta 2	Polio 2	Penta 3	Polio 3	Measles	Dropout Rate
Bondo	72	43	72	61	61	55	51	48	43	40.2
Gucha	102	73	84	86	80	85	78	84	75	10.7
Homa Bay	91	52	87	83	69	69	64	63	50	42.4
Kisii	104	87	85	88	82	85	75	81	80	6.16
Kisumu	107	76	98	98	86	89	75	79	64	35.2
Nyamira	106	100	110	101	106	103	107	100	91	16.8
Nyando	75	0	69	56	60	61	46	51	44	36.3
Rachuonyo	70	42	71	70	53	56	46	48	41	42.4
Suba	105	69	85	86	64	68	57	58	58	31.8
<b>WESTERN PROVINCE</b>										
District	BCG	Birth Polio	Penta 1	Polio 1	Penta 2	Polio 2	Penta 3	Polio 3	Measles	Dropout Rate
Bungoma	93	22	78	81	68	74	56	64	59	24.1
Butere	101	46	99	91	87	89	74	75	68	30.8
Mumias										
Kakamega	100	40	94	91	80	81	68	73	59	37.2
Mt Elgon	97	18	88	90	82	81	72	74	69	22.3
Teso	78	28	81	80	77	77	71	73	64	21.5
<b>RIFT VALLEY PROVINCE</b>										
District	BCG	Birth Polio	Penta 1	Polio 1	Penta 2	Polio 2	Penta 3	Polio 3	Measles	Dropout Rate
Baringo	83	0	75	79	70	79	65	75	74	1.22
Bomet	82	54	63	63	65	63	55	59	52	17.7
Bureti	107	85	99	100	96	100	86	90	88	11.8
Iten	71	63	59	64	55	63	53	61	60	-2.4
Kajiado	70	54	69	68	65	64	60	58	51	25.7
Kapenguria	82	52	71	69	63	61	54	54	43	39.6
Kericho	102	77	93	90	84	87	81	83	74	20.7
Koibatek	64	64	61	60	60	60	57	57	59	3.35
Laikipia	83	58	75	72	74	73	72	70	64	14.2
Lodwar	107	74	107	99	95	90	81	76	73	31.7
Marakwet	96	61	86	85	81	83	73	75	66	23.3
Nakuru	117	99	94	97	87	95	77	87	78	17
Nandi North	87	59	77	79	75	80	67	72	63	18
Nandi South	71	39	63	65	57	62	49	55	47	26
Narok	57	30	56	50	52	52	43	48	39	30.4
Samburu	89	46	84	90	77	85	64	72	64	23.8
Trans Mara	94	45	92	91	85	87	72	74	60	34.8
Uasin Gishu	96	76	89	87	87	83	82	80	67	24.7

### **The future roles of departments of Child Health and Paediatrics in child healthcare**

The Department of Child Health and Paediatrics in Moi University is one of the key departments in the School of Medicine as it is charged with the responsibility of teaching Child Health and Paediatrics to undergraduate and postgraduate students. The department is expected to mould doctors with good clinical practice and impart up-to-date information in the care of children. In addition the department, through its teaching and technical staff, is responsible for the care of children. Currently, children comprise over 60% of the population of Kenyans in the catchment population in western Kenya that currently stands at 12 million.

This department together with others existing in Nairobi University and those that are in their formative stages must take the challenge of providing affordable quality healthcare to the children of Kenya. They must lead in the generation of guidelines and interventions on the prevention and management of all childhood illnesses especially those responsible for the high morbidity and mortality. They must promote good clinical practices through the use of evidence in their daily practice. This evidence should be based on research on the various diseases in the areas of causation, epidemiology, diagnostic techniques and procedures, clinical trials and management options. They must participate in the dissemination of these guidelines to the provincial and, district hospitals, health centres and dispensaries. They must transform the teaching hospitals to centres of excellence and models of ethical and professional child healthcare and to be real and ideal referral centres.

### **Development of the departments**

The departments should lead in the problem solving approach to training, relevant essential health research and provision of healthcare for children within their catchment areas. These departments must have general paediatricians, paediatricians with sub-speciality

training and those with fellowships. The departments should encourage their staff to pursue higher levels of training in respective fields of Paediatrics that relate to the molecular basis of diseases to enable them develop guidelines on disease prevention and treatment. Further, these departments should lead in the development of management guidelines of all children diseases in the region.

### **Roles of General Paediatricians**

General paediatricians are trained paediatricians usually with the second degree after the undergraduate programme. They handle all aspects of child healthcare (social paediatrics, preventive health care, treatment of all diseases, basic psychological and psychiatric care in children, diagnosis of paediatric surgical, obstetrics and gynaecological conditions, child abuse and neglect etc).

### **Role of Sub-specialists**

These are paediatricians who have chosen specific areas of paediatrics after their second degree and either obtain a third degree or a fellowship. There are several sub-specialities in paediatrics that one may choose including neonatology, neurology, cardiology, gastroenterology, nephrology, infectious disease, nutrition, haematology, oncology, developmental paediatrics, genetics, anthropology, pulmonology, ophthalmology, ENT, dermatology etc. These sub-specialists tend to concentrate on these areas of paediatrics at the expense of general paediatrics and therefore there is a danger of sub-specialists overriding general paediatricians in numbers and this affects the distribution of paediatricians in the country. These sub-specialists tend to be located in cities and larger towns and are normally hospital based.

### **Preventive care by the specialists and sub-specialists**

It is imperative that all paediatricians must be involved in health promotion and disease prevention. Neonatologists must be involved in the prevention of the causes of the high peri-natal deaths arising from prematurity, birth asphyxia, low birth weight, neonatal sepsis

etc instead of being involved only in the treatment of these conditions. This is an area that should be emphasized in the training of general paediatricians and sub-specialists.

Paediatric cardiologists other than concentrating in high technological diagnostic procedures and treatment protocols must participate in the interventions aimed at preventing heart diseases in children to reduce the cardiac disease burden in the community that ends up in the referral healthcare facilities. Most of the heart diseases in children (congenital and acquired) can be prevented through the implementation of interventions like education of communities on preventive measures that include early detection and treatment of sore throats that cause rheumatic heart diseases, avoidance of teratogenic substances in pregnancy that may cause congenital heart diseases, early detection of heart diseases in children through community surveys and implementation of immunization programmes against the causative agents of rheumatic fever (pneumococcal vaccine, haemophilus influenza b vaccine etc).

Paediatric nephrologists should spearhead preventive measures that aim at reducing the occurrence of conditions that lead to acute and chronic renal failure. They should be able to assist in the prevention of acute glomerulonephritis, pyelonephritis, obstructive nephropathies through implementation of preventive strategies that include immunization, early detection through screening techniques and procedures and rapid treatment of predisposing conditions like dehydration, infections, heart failure, diabetes etc.

Paediatric neurologists must be able to participate in programmes that prevent birth trauma, meningitis, cerebral malaria and early detection and prevention of organic diseases that lead to neurological complications.

Only in this way will the role of the Paediatrician lead to the reduction of infant and under-five morbidity and mortality that would eventually contribute to the achievement of the Millennium Development Goals by 2015.

### **Malaria in children**

Malaria affects over 300 million people and accounts for over 3 million deaths per year worldwide and accounts for over 30 per cent of all outpatient attendance in Kenyan health facilities. It is responsible for about 7 per cent of all deaths among children aged five and below.

In an effort to contain this malady, we at School of Medical, Moi University have conducted various research and service-oriented projects that address the efficacy of anti-malarial drugs including drug resistance, pathogenesis of cerebral malaria and treatment options. These studies have directly and indirectly influenced policy on malaria treatment in Kenya.

In 1994 a comparison of Chloroquine, Fansidar, Halofantrine and Amodiaquine in the treatment of uncomplicated malaria was done through a randomized trial in which we established that none of these drugs was 100 percent efficacious. Halofantrine was the most efficacious at 82 percent, followed by Fansidar at 62 percent, Amodiaquine at 55percent and Chloroquine which was the first line treatment then, was only 29 percent efficacious. We did recommend that Chloroquine should be withdrawn as the first line treatment and also advocated for the introduction of combination therapy since no single drug was found to be 100 percent efficacious.

In 1998 when the Artemisinin drugs started to evolve in malaria treatment outside China, we were among the first in Kenya to conduct a clinical trial to test the effectiveness and efficacy of this group of anti-malarial drugs.

We compared rectal dihydroartemisinin hydrochloride with Intravenous quinine in the treatment of severe malaria and established that rectally administered Artemisinin dihydrochloride was as efficacious as Intravenous Quinine. We also found that Artemisinin was safer than Quinine and had a faster parasite clearance time than Quinine but the fever clearance time was similar between the two drugs.

In 2001 we compared a truncated Intravenous Quinine followed by oral Malarone on one arm with Intravenous Quinine followed by oral Quinine on the other and found that the two study arms were similar in efficacy but the Malarone arm had a better safety profile. However we established that the Malarone arm had better parasite and fever clearance times although the differences were not statistically significant. Malarone is however out of reach to most Kenyans and is not in the open market yet.

Between August 2006 and July 2007 we compared Coartem, which is now the first line drug for malaria treatment in Kenya, and an Artemisinin combination drug, CDA (Chlorproguanil – Dapsone – Artesunate) with encouraging results which may be the future Artemisinin canberiasia therapy (ACT) in the treatment of uncomplicated malaria in addition to Coartem. The data of this trial is being analysed.

Between 1998 and 2002 we studied children with cerebral malaria in the highlands of Kenya and looked at its pathogenesis and some clinical aspects in comparison to patients with uncomplicated malaria. We established that:

- Cerebral malaria in the highlands presents as an acute illness affecting well nourished children especially those aged between 3 and 10.

- Children with cerebral malaria normally do not go into shock as evidenced by the fever pattern in which they develop fever in convergence (in which the core temperature is close to skin temperature with the difference between them being less than 7 deg C). Children in shock normally develop a fever in dissociation (in which the difference between core and skin temperature is more than 7<sup>o</sup> C).
- The children presenting in deep coma have higher tumour necrosis factor alpha (TNF- $\alpha$ ) than those with lighter coma. TNF alpha is thought to be responsible for the pathological features seen in cerebral malaria.
- The higher the parasitaemia level the higher the TNF alpha levels.
- Poor prognostic indicators include hypoglycaemia, coma, hyper-parasitaemia, lactic acidosis and presence of convulsions.

### **Malaria control**

To tackle the high morbidity and mortality due to malaria in children, preventive strategies offer the best impact. These preventive strategies must be supported by the availability and accessibility of efficacious anti-malarial drugs. The use of efficacious anti-malarial drugs reduces chances of drug resistance.

The control of malaria can be attained by a combination of the various strategies. The possible outcomes of the various combinations of strategies have been analysed by health system analysts and found that a combined use of effective case management together with vector control is the most effective but it may not be economically viable because it is relatively more expensive. The most cost-effective is the combination of effective case management and use of insecticide treated bednets or materials. However mass chemotherapy with an efficacious anti-malarial drug would be the best way out for control and eradication of the parasite in the population when

combined with the use of insecticide treated bednets or materials. The use of indoor residual spraying in combination with mass drug administration has been found to be expensive. Mass drug administration should include all persons with the parasite. To ensure this, community screening for parasitaemia has to precede mass chemotherapy in communities and all patients in health facilities must be treated effectively and be parasite free on discharge.

These control measures would be more effective and have a significant impact if carried out simultaneously in several neighbouring countries. This is more so for the combination of effective anti-malarial mass drug administration and use of insecticide treated bednets or materials over a given period. This would reduce the parasite load in the population, reduce the transmission between the vector and humans and reduce the vector burden in the environment especially indoors. This is the essence of international collaboration in disease control, elimination and eradication as advocated by the World Health Organisation. This would be a viable venture in the East African federation and other regional blocks.

The strategies for the malaria control that have been promoted include:

- Effective case management with efficacious anti-malarial drugs including mass chemotherapy for all those with the parasite in the population.
- Vector control and eradication.
- Halting transmission – use of insecticide treated bednets, repellants, protective clothing etc.
- Interference with breeding and breeding sites.

- The malaria vaccine would provide the greatest impact if an efficacious vaccine is discovered. Efficacy levels of 80 percent are desirable in achieving the desired impact.

This search for the malaria vaccine has been elusive over the years with several vaccines tried but found to have varied efficacy levels. No vaccine has so far been found that would meet the impact level expected or match the use of the existing control strategies discussed above in terms of reduction in malaria prevalence, morbidity and mortality. Over 30 clinical trials in phase one to phase three have been conducted so far on a similar number of trial vaccines. Some volunteers have been found to be completely protected against malaria when subjected to infected mosquitoes and followed up for three to six months. Some volunteers have developed partial protection as shown by a delay in the onset of malaria infection when exposed to malaria infected mosquitoes when compared to unvaccinated persons subjected to infected mosquitoes.

The malaria vaccine technology roadmap, a global strategy, was launched in Bangkok in December 2006 with the objective of getting an efficacious vaccine with an efficacy of over 80%, against clinical disease, to be in widespread use by 2025. The vaccine to be developed should be protective for over 4 years. The roadmap is a consortium of malaria vaccine researchers, funding agencies and malaria experts drawn from 35 countries of the world.

Researchers in the Bloomberg School of Public health, Johns Hopkins University, USA have established a genetically engineered mosquito that is resistant to the malaria parasite in the laboratory. This genetically engineered mosquito cannot maintain the malaria parasite in its system. They have established that this transgenic mosquito lives longer and produces more eggs than the wild type mosquito. The researchers envisage that if produced in large numbers and released to the environment, they would therefore not carry the

parasite after biting infected humans. This transgenic mosquito's population must however be higher than that of the wild mosquito in order to achieve malaria control. When the transgenic mosquito was exposed to mice malaria (*f. berghei*), after nine generations, the transgenic mosquito population grew to 70 per cent against 50 per cent for the wild mosquito. This was attributed to a higher survival rate by the transgenic mosquito and its ability to lay more eggs than the wild mosquito. However when this was tested by feeding the two types of mosquitoes on non-infected blood, no differences were observed between the two mosquito types. This is encouraging research and we await the implementation outside the laboratory. The role of this mosquito in the transmission of other mosquito transmitted diseases such as Rift Valley fever is however unknown and needs to be kept in mind as the research on the transgenic mosquito continues to be carried out.

### **Trends in asthma prevalence in children**

Asthma is a common chronic disease of both children and adults. The aetiology of asthma is still poorly understood but genetic, environmental and dietary factors seem to play a major role individually but more so in combination.

Asthma and allergies are on the increase in developing countries and prevalence is approaching levels seen in developed and industrialized countries. This increase in prevalence of asthma in developing countries, could be attributed to changing lifestyles especially diets, environmental pollution due to increased industrialization and mechanization and reduced exposure to microbes due to use and misuse of antimicrobials. Furthermore, the enhanced attempts at infectious disease prevention, including the use of vaccines may be partially responsible because now less children get exposed to the microbes due to the presence of antibodies in the immune system and an established cell mediated immunity following vaccination. This is evidenced by the rising prevalence in

developing countries and an observed reduction in the former Soviet states in Eastern Europe where the lifestyle changed to levels previously seen in developing countries since the fall of the Soviet Union.

Cigarette smoking has been associated with increased prevalence of asthma. This is applicable to direct smoking by adults or older children or to exposure to environmental smoke. Environmental smoke is also known as secondary smoking whereby persons inhale cigarette smoke from a smoker. In children, parental smoking is the main source of environmental smoke. Studies have shown that prevalence of asthma among children of smoking parents is higher than among those of non-smoking parents. It is also higher where both parents are smokers than where one parent is a smoker. It has also been found that urinary cotinine levels are higher among children of smoking parents than those of non-smoking parents. Children with high urinary cotinine levels have higher prevalence of asthma than those with lower urinary cotinine levels.

The prevalence of asthma in a few selected countries is shown in Table 3. It shows the variations between urban and rural populations and developing and developed countries. There is a trend of increasing prevalence in developing countries with the gap between the developing and developed countries in some instances becoming narrower than before. It should therefore be noted that before the end of the 21<sup>st</sup> century the prevalence may level off with a possibility of the prevalence in some developing countries rising higher than in developed countries.

The prevalence of asthma in Kenya has risen over the last six years in both Nairobi and Eldoret. The Nairobi site used urban schools for both the 1995 and 2001 prevalence studies while the Eldoret site used the rural schools at both periods of the study. These studies were carried out using the same questionnaire in over 56 countries

over a total of 150 study sites with each site recruiting a minimum of 3000 children. The studies were done in the same schools in 1995 and 2001 for the same age groups.

These increases in asthma prevalence could be due to environmental factors including pollution, dietary adjustments in the populations and possibly less exposure of the younger generations to microbes due to easy access to antimicrobials. This latter assertion has been thought to be the reason for the lower asthma prevalence in Latvia and Lithuania when compared to other western countries.

The International Study on Allergies and Asthma in Children (ISAAC) is a worldwide study that has brought together world experts on allergies and asthma since 1994. Kenya is the headquarters to the Anglophone Africa region and has two sites, Moi University, School of Medicine, Eldoret and KEMRI, Nairobi.

**Table 3-7 Trends in prevalence of asthma among children in 1995 and 2001 for age groups 6-7 year and 13-14 year**

Country	6-7 year	13-14 year	1995	2001
Kenya – Eldoret	-	-	16.6	18.0
Kenya – Nairobi	-	-	11.1	15.5
South Africa	3.3	5.6	11.7	13.0
Nigeria	7.9	9.4	6.3	7.2
China	15.5	10.2	10.8	9.3
Singapore	10.7	15.1	15.9	13.9
Thailand	5.7	7.5	5.6	6.7
India	13.2	21.4	16.1	18.8
Brazil	19.1	20.0	20.2	22.3
USA	9.3	10.2	12.0	9.7
Sweden	4.1	9.6	7.2	10.5
Latvia	2.6	6.6	3.3	6.7
Lithuania	-	-	8.9	22.7
Romania	4.6	12.8	8.0	17.5
Germany	7.8	14.2	15.2	9.0
Portugal	26.7	20.9	26.7	26.6
United Kingdom				

### **Trends in allergies in children**

Allergies are common disorders of both children and adults. The aetiology of these disorders is still poorly understood but genetic, environmental and dietary factors seem to play a major role individually but more so in combination. The common allergic conditions in children are eczema (allergic dermatitis), allergic rhinitis affecting the nasal mucosa and allergic conjunctivitis affecting the conjunctiva of the eyes. The other allergies include allergic alveolitis which includes asthma and other allergies of the skin and intestinal mucosa. These latter forms of allergic disorders have not been considered in the current discussion of allergies.

Allergies are on the increase in developing countries and prevalence is approaching levels seen in developed and industrialized countries. This increase in their prevalence could be attributed to changing lifestyles especially diets, environmental pollution due to increased industrialization and mechanization and the reduced exposure to microbes due to use of antimicrobials and preventive measures. The latter is evidenced by the rising prevalence in developing countries and an observed reduction in the former Soviet states in Eastern Europe where the lifestyle changed to levels seen in developing countries since the fall of the Soviet Union.

The prevalence of these allergic conditions in Kenya has risen over the last six years in both Nairobi and Eldoret. The Nairobi site used urban schools for both the 1995 and 2002 prevalence studies while the Eldoret site used the rural schools at both periods of the study. These studies were carried out using the same questionnaire in over 56 countries over a total of over 150 study sites. The studies were done in the same schools in 1995 and 2001 for the same age groups.

Eczema or atopic dermatitis has a varied geographic variation in prevalence as is the case with other allergic conditions. Allergic rhinitis and conjunctivitis were considered together in studies carried out for purposes of excluding infectious types of rhinitis and

conjunctivitis. Rhinitis occurring together with conjunctivitis that are itchy are more likely to be allergic than to be due to infection. The prevalence of the various allergies in a few selected countries is shown in Table 4. It shows the variations between urban and rural populations and between developing and developed countries. There is a trend of increasing prevalence in developing countries with the gap between developing and developed countries in some instances becoming narrower than before. It should therefore be noted that before the end of the 21<sup>st</sup> century the prevalence levels may level off with a possibility of some developing countries prevalence rising higher than in developed countries. The increased prevalence of allergic disorders could be due to environmental factors including pollution, dietary adjustments in the populations and the possibly less exposure of the younger generations to microbes due to easy access to antimicrobials. This latter assertion has been thought to be the reason for the lower asthma prevalence in Latvia and Lithuania when compared to other western countries.

**Table 4: Trends in prevalence of eczema among children in 1995 and 2002 for age groups 6-7 year and 13-14year**

<b>Country</b>	<b>6 -7 '95</b>	<b>6 -7 '02</b>	<b>13-14 '95</b>	<b>13-14'02</b>
Kenya Eldoret	-	-	13.2	28.2
Kenya Nairobi	-	-	18.5	20.3
South Africa	-	-	9.6	16.7
Nigeria	9.4	6.8	38.4	19.4
China	-	-	10.3	12.4
Singapore	1.3	8.2	4.0	5.5
Thailand	21.5	25.3	0.6	1.3
India	3.9	4.0	5.9	7.7
Brazil	13.2	13.1	10.3	8.4
USA	-	-	1.0	1.4
Sweden	30.7	38.6	48.0	48.3
Latvia	-	-	5.4	7.3
Lithuania	1.4	3.5	1.8	2.2
Romania	-	-	3.7	3.0
Germany	13.7	14.7	10.0	13.6
Portugal	11.1	14.1	11.4	12.3
United Kingdom	27.6	36.1	12.7	16.1

## **Ethics in Paediatric care**

The ethical issues in the child healthcare are more complex than in The following ethical issues are faced by adults both in clinical practice and in research involving children. What role should children play in decisions on the way they should be managed by doctors and other healthcare personnel? How much information about the child should be disclosed to the parent or guardian? Should the doctor decide for the child or should it be the parent or guardian? Who should give consent for a child to participate in research involving human subjects? These ethical issues become more complex with children aged five and above, more so during adolescence. Research protocols have started to involve children above twelve years in providing their own written consent and parents or guardians provide consent for children below 12 years.

## **Conceptual issues**

- **Autonomy** of the child to make own decisions. Children aged between 5 and 12 are able to make simple decisions about their health and participation in research and have feelings about certain activities and procedures that concern them.
- **Competence** – the ability of the patient to understand the possible consequences of their decisions and the available options and alternatives is possible with adolescents, who are still under the care of the parents or guardian. This creates potential conflict between the child and the guardian if the child is not happy with the decision taken on his/her behalf without any reference to him or her.
- **Beneficence** – the objective of any health intervention is to do no harm and to advance welfare in line with the Hippocratic principles. However there is always potential for harm in healthcare and patients need to balance between potential harm and good when provided with healthcare options.

- **Paternalism**-Refers to interference with the liberty of another person for his or her own benefit. It has been assumed that it is the responsibility of the parents to act on behalf of their children including adolescents with limited exceptions. Paediatricians have also believed that it is their duty to be paternalistic with the belief that their responsibility is to promote patients' health but not their autonomy. This may be justifiable where the benefits are quite clear but questionable when the benefits of the actions or the harm are not known or are minimal.
- **Truth telling** – is a moral duty of every community especially in Paediatrician-patient relationships where trust is essential to the imbalance of power between the physician and the patient. Physician may intentionally omit information to the patient for the purpose of manipulating the patient.
- **Confidentiality** – patients need the trust of their physicians not to disclose information about their illness to others. If this is guaranteed then the doctor is almost sure of getting detailed accounts of the illness from the patient and this will enable the doctor to arrive at an informed decision on how to manage the patient including the need to isolate the patient in case of an infectious condition. The only exception to this may be in a court of law where the doctor may be compelled to disclose details of a patient.
- **Conflict of interest**-.the interest of parents always overrides that of the child in many ways, but more obvious when the death of the child is sanctioned in cases of incurable terminal illness or life is unduly prolonged. There should therefore be an ethical team that handles these cases in health institutions whose role should include:

- Omniscience        where decisions should be made based on all readily available facts.
- omni percipience    the decision taken has empathically taken into account the feelings of those involved.
- disinterest         the decision is not based on vested interest by the doctor or parents.
- dispassion         the decision is not made under conditions whereby emotions obscure critical thinking.
- consistency         ethical reasoning in which similar cases are decided similarly at all times.

### **Summary of way forward for child healthcare**

Integrated management of childhood illness (IMCI) is a strategy that countries need to validate within their own contexts and implement, as it fosters a holistic approach to child health and development. It is built upon successful experiences gained from effective child health interventions like immunization, oral re-hydration therapy, management of ARI and improved infant feeding. The core intervention of IMCI is the integrated management of the six leading causes of childhood deaths – ARI, diarrhoeal diseases, measles, malaria, HIV/Aids and malnutrition. The strategy reduces wastage of resources and avoids duplication of efforts that may occur in a series of separate disease control programmes. The essential pillars include improvement in the management skills of health personnel, improvement in health systems and in family and community practices.

The role of research in child healthcare will become more significant in future as more families get few children and the children become more precious than they were in the earlier centuries. The paediatrician and health worker managing children will need to be

well equipped with knowledge and evidence to arrive at the correct diagnosis and appropriate management to be able to inform the family on the child's illness, treatment and possible outcome.

The research will be based on clinical evidence from best clinical practices, online journals in the internet and from results of clinical trials, including meta-analysis.

Prevention forms the key to reduction of child mortality and morbidity through the application of efficacious public health and specific disease interventions. Interventions aimed at prevention and effective management of only six diseases (ARI, Malaria, Diarrhoeal diseases, Malnutrition and HIV/Aids) that are responsible for over 70% of child deaths will reduce infant and under-five mortality by two thirds by 2015.

Malaria remains the leading cause of morbidity and mortality among children. The malaria parasite has developed resistance to most anti-malarial drugs and there are limited options for anti-malarial therapy at the moment. Newer anti-malarial drugs should be developed and combination therapy especially Artemisinin containing combinations, should be used. Use of monotherapy for malaria should be discouraged especially those in the Artemisinin category. There is need to apply cost-effective preventive measures together with effective case management in the pursuit of its control and eradication. The search for an efficacious malaria vaccine should be scaled up.

In the coming decades asthma, allergies and other non-communicable diseases are poised to be among the leading causes of morbidity and mortality among children in the world and more so in developing countries. Efforts should be made through research to establish the predisposing and causative factors for the rising prevalence of these conditions. Preventive measures should be put in place to halt the

increase. These should include reduction in smoking habits, dietary adjustments, reduction in environmental pollution and development of appropriate drugs. Genetic studies may be useful in early detection and genetic predisposition that will enable institution of preventive measures.

There is need to put in place measures that aim to prevent and control factors responsible for the non-communicable diseases in children to avert their rise in prevalence in children. These measures should include smoking ban, dietary control, environmental protection, reduced pollution and vitamin supplementation.

Paediatricians should lead the way in the formulation, development and implementation of preventive strategies and interventions to the common childhood illnesses and should not wait for the patients in hospitals and clinics.

When Child health attains high coverage in a country or population, general Paediatrics becomes less of a burden and super-specialist needs become significant.

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