



Health services for children in western Europe

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Western European health systems are not keeping pace with changes in child health needs. Non-communicable diseases are increasingly common causes of childhood illness and death. Countries are responding to changing needs by adapting child health services in different ways and useful insights can be gained through comparison, especially because some have better outcomes, or have made more progress, than others. Although overall child health has improved throughout Europe, wide inequities remain. Health services and social and cultural determinants contribute to differences in health outcomes. Improvement of child health and reduction of suffering are achievable goals. Development of systems more responsive to evolving child health needs is likely to necessitate reconfiguring of health services as part of a whole-systems approach to improvement of health. Chronic care services and first-contact care systems are important aspects. The Swedish and Dutch experiences of development of integrated systems emphasise the importance of supportive policies backed by adequate funding. France, the UK, Italy, and Germany offer further insights into chronic care services in different health systems. First-contact care models and the outcomes they deliver are highly variable. Comparisons between systems are challenging. Important issues emerging include the organisation of first-contact models, professional training, arrangements for provision of out-of-hours services, and task-sharing between doctors and nurses. Flexible first-contact models in which child health professionals work closely together could offer a way to balance the need to provide expertise with ready access. Strategies to improve child health and health services in Europe necessitate a whole-systems approach in three interdependent systems—practice (chronic care models, first-contact care, competency standards for child health professionals), plans (child health indicator sets, reliable systems for capture and analysis of data, scale-up of child health research, anticipation of future child health needs), and policy (translation of high-level goals into actionable policies, open and transparent accountability structures, political commitment to delivery of improvements in child health and equity throughout Europe).

Introduction

The health care needs of Europe's children are changing as a result of variations in the diseases, disabilities, and social factors that affect their lives. Infectious diseases have become easier to prevent or cure, and non-communicable diseases increasingly dominate paediatric practice. Health services have not adapted sufficiently to these changes and, in some instances, fail to deliver high-quality care. European health systems need to develop new models of care to meet children's current and evolving health needs. Although rare disorders, such as childhood cancers, cardiac anomalies, and some neonatal problems need highly specialised care (provided in selected centres), common problems—eg, asthma, diabetes, behavioural disorders, mental health problems—can be cared for in the community to enable children and their families to live as normally as possible. Development of better systems will probably need reconfiguring of services across the interfaces between hospitals, primary care, and public health. However, these changes are very difficult to achieve because the boundaries between specialties and health-care delivery organisations are often points of contention in both health-care professionals and policy makers. Although the 15 pre-2004 countries of the European Union (EU15) face common challenges, they are responding in different ways, which show their differing histories, organisational structures, financing systems,

Key messages

- Child health systems in Europe are not adapting sufficiently to children's evolving health needs, leading to avoidable deaths, suboptimum outcomes, and inefficient use of health services.
- If all the 15 pre-2004 countries of the European Union had child mortality closely similar to that of Sweden (the country with the best rate), more than 6000 deaths per year could be prevented.
- Chronic care models for children are needed to improve care and outcomes for non-communicable diseases, and ensure better quality of life for children and families. Several countries have made progress in development of chronic care services, and offer lessons for others.
- First-contact care services and outcomes for children in Europe are highly variable. Flexible models, with teams of primary care professionals trained in child health working closely together, might offer a way to balance expertise with access.
- Child-health indicator sets with reliable and uniform systems for data collection would ease efforts to monitor needs and improve services.
- Awareness of the importance of investment in the earliest years is growing. Individual countries and European-Union-wide organisations should strengthen investment in child health and health services research.
- Politicians and policy makers should do more to translate high-level goals for child health into implemented policies with accountability structures to ensure delivery. Investment in social protection policies for the earliest years and the most vulnerable children will improve health, reduce inequities, and accumulate advantages throughout the life course.

and professional roles. These variations provide many opportunities to learn from others' experiences, especially because some countries are achieving much better outcomes than are others.¹

In this paper, we review child health and the determinants of child health in the EU15 and evidence for how well health-care needs are met by services. We will then examine different approaches to important aspects of paediatric practice—namely, services for children with chronic disorders and first-contact care—because, together with public health and social determinants, health services are essential to improve children's health. These variations between countries provide learning opportunities. We focus on countries that have had better outcomes than others, because such countries show what can be achieved, and on countries that have assessed attempts to reconfigure services to meet needs, because they can show how to achieve changes. Finally, we set out a plan to improve the health of Europe's children.

Child health in Europe

Child survival has improved greatly in the past three decades in all EU15 countries as a result of improvements in public health, health care, and wider societal factors (figure 1; appendix). A concomitant shift in the distribution of causes of childhood deaths has occurred (figure 2)—specifically, deaths from infections and respiratory causes have fallen while the proportion attributable to non-communicable diseases has risen. In 2009–10, the most frequent causes of death in children aged 1–14 years in the EU15 were injury and poisoning, cancer, and “other” (largely congenital anomalies and neurological disorders).² Morbidity in children is also dominated by non-communicable diseases, accounting for 79% of disability-adjusted life-years lost (figure 3). Of the non-communicable diseases, the most common three causes of morbidity are neuropsychiatric disorders (mainly depression), congenital abnormalities, musculoskeletal disorders (lower-back pain), and respiratory diseases (mainly asthma).³

These data for morbidity and mortality in Europe conceal wide variations in child health between and within countries. Striking inequities can be noted in children's life chances and health outcomes, resulting from a complex interaction of cultural, social, and economic forces, including differential risk exposure and access to high-quality health care.⁴ Health status and a country's wealth (as measured by gross domestic product) are clearly associated, and this association is likely to be related to access to resources and equity of distribution (appendix).

If all countries in the EU15 could reduce their child mortality to that of Sweden (the best-performing country), more than 6000 excess deaths could have been prevented in 2010 (table). This goal is achievable. Many aspects of child health are affected by government policies, especially policies that affect the distribution of resources, employment, housing, education, and health care. Thus,

countries with high spending on social protection for families generally have low rates of child death (appendix).

The extent of child poverty and inequality in Europe is not always realised. In Sweden, 1·3% of children live in deprivation, whereas in Portugal 27·4% of children live in households that cannot afford to eat three meals per day.⁵ In view of the lag in availability of data, the situation is probably even worse because of the financial crisis.⁶ Aggregate figures for whole countries conceal socioeconomic inequalities that particularly affect children from ethnic minorities. The Roma people are Europe's largest minority population, and continue to be subject to discrimination in many parts of Europe; child health outcomes, such as preterm birth, incidence of communicable diseases, and death, are often much worse in the Roma than in the majority population.^{7,8} Other

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See Online for appendix

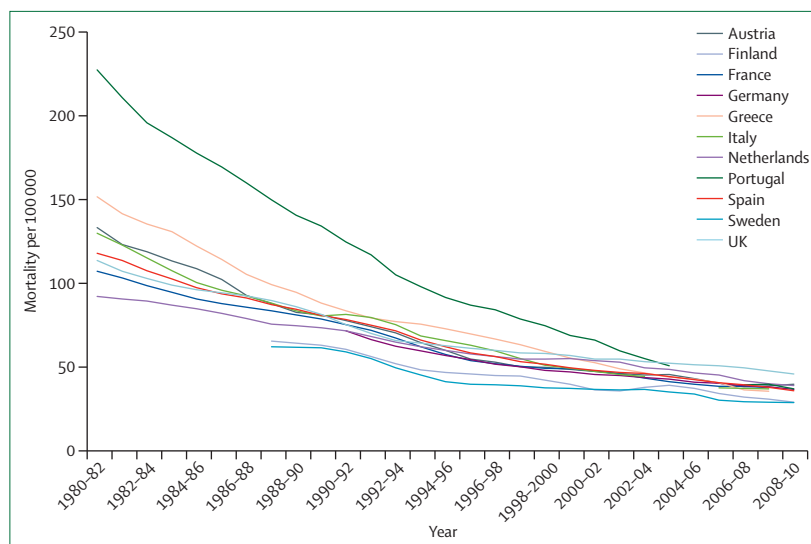


Figure 1: Trends in mortality in children aged 0–14 years in 11 European Union countries, 1980–2010
Source: WHO Mortality Database, 2012.² Data are directly standardised rates.

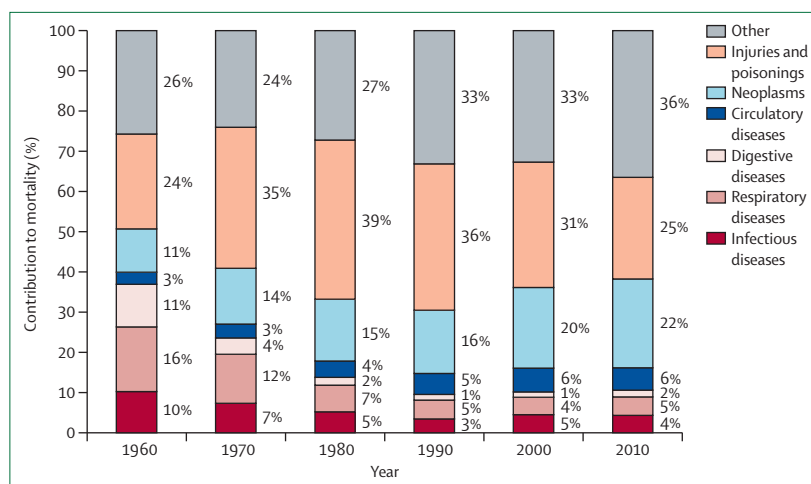


Figure 2: Shifting relative causes of mortality in children aged 1–14 years in the 15 pre-2004 countries of the European Union, 1960–2010
Source: WHO Mortality Database, 2012.²

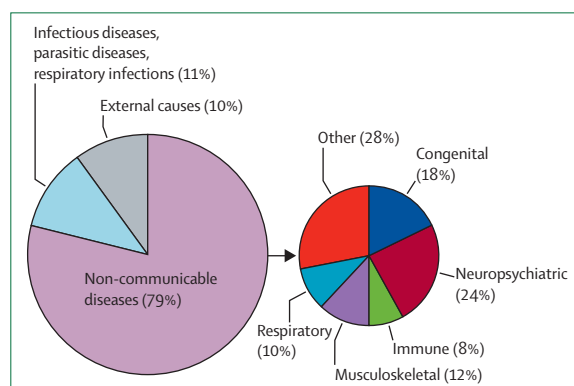


Figure 3: DALYs in children aged 0–14 years in western Europe, 2004

Source: Institute for Health Metrics and Evaluation.³ Data show proportion of DALYs attributed to disease groups for children aged 0–14 years. Data exclude perinatal and maternal DALYs. DALYs=disability-adjusted life-years.

	Mortality (directly standardised rate)	Yearly excess deaths compared with Sweden
Sweden	29.27	0
Luxembourg	26.50	0
Finland	30.27	9
Spain	37.40	545
Greece	37.86	135
Germany	37.88	815
Italy	38.07	683
France	38.25	962
Austria	39.09	106
Ireland	39.78	98
Netherlands	40.66	292
Portugal	40.73	176
Denmark	42.69	121
UK	47.73	1951
Belgium	47.77	304

Source: WHO Mortality Database, 2012.⁷ Directly standardised rate data show all-cause mortality per 100 000 children aged 0–14 years and are 5 year means for 2006–10, except for France and Luxembourg (2005–09), Denmark (2002–06), Belgium (1998–99; 2004–06), Italy (2003; 2006–09); and Portugal (2003; 2007–10). Data for excess deaths are absolute numbers. An estimated 6198 deaths would have been avoided if the child mortality rate across the 15 pre-2004 countries of the European Union was the same as that in Sweden.

Table: Child mortality rates in the 15 pre-2004 countries of the European Union and excess child deaths compared with Sweden

children at particular risk are those in migrant families who are not legally entitled to live in their countries of residence; such children face additional discrimination in many countries. Failure to enact policies that support disadvantaged children and their families, particularly in their earliest years, has long-lasting consequences, including missed opportunities to interrupt the accumulation of disadvantage through the life course and prevent transmission to the next generation.⁴

Many specific measures can be taken to protect children—a fact shown by data for mortality from injuries and violence. External causes of death are much

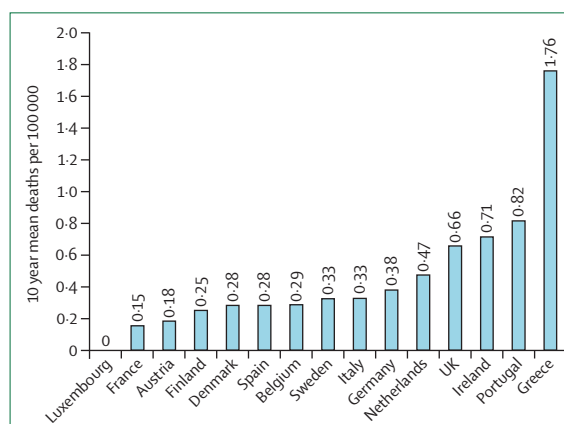


Figure 4: Deaths from pneumonia in children aged 0–14 years in the 15 pre-2004 countries of the European Union

Source: WHO European Mortality Database, 2012.¹³ Data are directly standardised rates. 10 years means are for 2000–10, except for data for Belgium (2004–06); Denmark (2000–06); France, Greece, and Italy (2000–09); and Portugal (2000–04 and 2007–10).

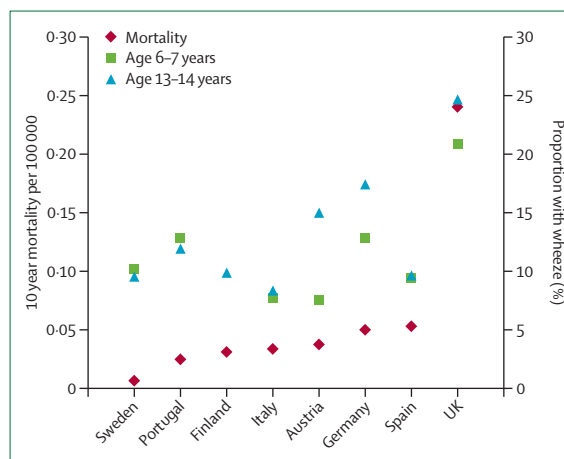


Figure 5: Asthma mortality rate in children aged 0–14 years, and proportion aged 6–7 and 13–14 years with wheeze, in eight western European countries

Source: WHO European Mortality Database,¹³ 2012, and Anderson and Colleagues.¹⁴ Data are for 2000–10, except for data for Belgium (2004–06); Denmark (2000–06); France, Greece, and Italy (2000–09); and Portugal (2000–04; 2007–10). Mortality data are directly standardised rates.

more common in children in poor families and in poor countries than in children in richer families and in richer countries.⁹ Northern European countries—eg, Sweden and the Netherlands—have achieved sustained reductions in child deaths from road traffic injuries through legislation and measures directed at reduction of traffic speed, separation of vehicles from other road users, and mandating of safety equipment (such as child restraints). France reduced rates of childhood drowning by legislating pool safety.¹⁰

Meeting health needs

Health services for children, as an important and modifiable determinant of health, are the main focus of

this paper. The rate of deaths from disorders that are amenable to health care is a measure of effectiveness.¹¹ Two common illnesses show variability in outcomes and thereby scope for improvement. Pneumonia is the most common serious bacterial infection in children presenting in primary care,¹² and deaths in childhood from this disease should be avoidable in most cases. However, death rates vary substantially within the EU15, from 0 to 1.76 per 100 000 (figure 4). Mortality from asthma, a chronic disease common in childhood, varies substantially between countries, even after adjustment for the incidence of wheeze as a proxy indicator for prevalence of asthma (figure 5). However, mortality is not the only consideration; research in several countries has shown that as many as two-thirds of hospital admissions for asthma in children could be avoided with better preventive care, including asthma action plans, improved asthma education, and reduction of risk factors (eg, parental smoking).^{15,16} National differences in mortality from these health-care-amenable illnesses suggest that scope for improvement of management and outcomes is great.

Learning from experience in delivery of care

European health systems have been slow to adapt to the changing patterns of childhood morbidity and mortality. Although there is a broad consensus that many non-acute health services could shift from hospital-based to community-based delivery, thus improving access and responsiveness and reducing costs, most countries have yet to do so. Such changes, however, should not compromise the provision of highly specialised and acute emergency care. The challenge is to find innovative ways to address and reach these complex and potentially competing goals. We reviewed selected aspects of child health services that might help to differentiate countries that are doing well from those that are doing less well (panel 1). We draw attention to learning points from countries with good outcomes or from those that have made progress in, and assessed, health service reform. We do not discuss highly specialised aspects of care because such services are provided in broadly similar ways throughout the EU15, and the health-care professionals who work in such specialties frequently collaborate through international networks.

Care of chronic disorders

Care of chronic disorders in adults has been high on the policy agenda in many European countries for the past decade, exemplified by the widespread use of elements of the chronic care model.¹⁸ The research informing chronic care has shown that several factors are consistently associated with successful health-care delivery for adults—namely, shared practice with common guidelines; conducive organisational arrangements, such as colocation of health and social services; information sharing; supportive financial processes; administrative

Panel 1: Methods

We restricted our analysis to the 15 pre-2004 countries of the European Union (EU)¹⁷ in view of the scarcity of data for other countries and space constraints, and, more importantly, to draw meaningful comparisons between nations with similarly structured health-care systems and outcome measures. We restricted the scope to child health services that helped to differentiate health-care system performance in European countries, especially in the community setting, and excluded rare disorders that need highly specialised care. Although we acknowledge that there are wider determinants, such as social and cultural factors implicated in causation and devising of solutions, in-depth discussion is beyond the scope of this paper.

This paper builds on work about child health services in Europe. We did comprehensive reviews of the medical literature; search strategies differed for each topic but included searching PubMed and relevant reports published by WHO, the UN, EU, and Organisation for Economic Co-operation and Development, and European professional societies.

We define children as people aged 18 years or younger. However, because of poor data availability, some comparisons are restricted to children younger than 14 years. We focused discussion on children older than 1 year because health needs and services for infants often implicate factors outside the scope of this paper—eg, maternity services. However, some analyses inevitably are for the age range 0–14 years; more comprehensive data, when possible, is provided in the appendix.

To compare the 15 pre-2004 countries of the EU, we focused on WHO child mortality data because of reliability and availability. Morbidity data, although desirable, can be unreliable for international comparisons, and are infrequently available. Many comparisons were limited by poor availability of data. When specific examples about services are provided, they were selected from countries that have good outcomes, and from countries that have made progress in development of services or analysed what has been done.

support; common training and education opportunities; and shared values with, and effective leadership by, respected individuals (appendix).

By contrast, systems to deliver care to children with chronic disorders have attracted little attention. Panel 2 provides information about a range of models in the EU15. A key finding is that close cooperation between services, as has been developed in Sweden and the Netherlands, does not arise spontaneously but requires supportive policies backed up by adequate funding.

First-contact care

One of the greatest challenges facing health professionals working with children is how to distinguish potentially serious illness from minor problems. 17–57% of patients attending emergency departments have problems that are judged to be non-urgent or minor by clinicians and could have been dealt with in primary care.^{28–32} However, the high death rate from some acute disorders (eg, meningococcal and respiratory diseases) in some countries suggests that there are also children who need acute specialist care but do not get such care sufficiently quickly.^{1,33} The challenges associated with first-contact care are further exemplified by childhood cancer. Prompt diagnosis is crucial but can be difficult because cancer is rare. Cancer will be diagnosed in roughly 3–5 children in a health district (with a population

Panel 2: Models of care for children with chronic disorders**Sweden**

Chains of care supplement multiprofessional primary care centres, where general practitioners, paediatricians, and children's nurses work closely together. The system was developed as a response to fragmentation of care resulting from excessive decentralisation of services with professionals working in separate organisations. Early assessments showed problems with weak incentives for collaboration, perceived challenges to power structures, and conflicting values in participants (especially physicians). Implementation was eased by giving patients roles as active participants, allowing sufficient time for change, developing supportive policy and financing instruments, and maintaining motivation by focusing strongly on quality improvement.¹⁹

France

Patients with disorders from a specified list—so-called *affections de longue durée*—receive coordinated care according to national standards. Children with chronic disorders receive personal treatment plans with lists of investigations and interventions covered by health insurance. Enrolled children receive routine care for the specified disorder from a specialist service, although parents can choose any doctor for acute exacerbations. Coordinated planned care is through multidisciplinary appointments in health centres or specialist institutes.

Netherlands

Transmural care, a collaborative, integrated system of care delivered by professionals working together within and outside hospitals, in mutual agreement and according to patients' needs, is provided. Health professionals have explicit individual and shared responsibilities—eg, specialist nurses manage hospital admission and discharge planning. Assessments of transmural care have been mixed; evidence of discontinuity between primary and secondary care persists, and organisational integration did not always lead to clinical and service integration.²⁰ The Dutch model is evolving, with greater attention to the importance of financial incentives to collaborative working.

UK

The UK system is based around clinical networks, Team Around the Child, and the Quality and Outcomes Framework. Various formal and informal networks have been set up, but few assessments have been done. Consensus views of the difficulties encountered include resistance to change, little evidence of benefits, financial disincentives to cooperation (promoting competition instead of collaboration), and organisational boundaries preventing cooperation between providers.²¹ Team

Around the Child is a programme run by the UK Department for Education that focuses on children with complex social and educational needs, and has little input from the health sector. It has been criticised for being overly bureaucratic.²² The Quality and Outcomes Framework is a pay-for-performance system in general practice that incentivises chronic care treatment of adults, but contains almost no measures for children.^{23,24}

Italy

In Italy, the quality of services for children with long-term health-care needs differs widely across regions. The best models foster integration across a continuum of care, from primary care, which is provided by family paediatricians, to general hospitals and referral centres; they also provide social and educational support through specific agreements between health authorities, municipalities, and school authorities. Assistenza Domiciliare Pediatrica is a bridge between specialist centres, community services provided by health districts, and family paediatricians, ensuring that as much care as possible is delivered at home. The system is increasingly widely implemented and focuses on chronic disorders necessitating parenteral nutrition, oxygen therapy, physiotherapy, or frequent blood sampling, for example.²⁵

Germany

In Germany, general paediatricians with an interest in a particular chronic disease—eg, asthma, allergies—provide care in practices or hospitals. Specialised paediatricians, who coordinate care for children with complex or rare chronic illnesses, work in teams with other professionals, such as nurses, dietitians, and physiotherapists. Pneumologists, for example, care for children with all forms of severe respiratory illness, including infections, asthma, and cystic fibrosis. Pathways are organised on the basis of individual patients, and children rarely have several appointments in different places and on different days. Children with developmental disorders, epilepsy, behavioural disorders, learning difficulties, and all forms of chronic diseases who have additional psychosocial problems receive care through social paediatric centres staffed by multidisciplinary teams of paediatricians (mostly specialised in neuropaediatrics), psychologists, physiotherapists, occupational therapists, speech therapists, and social workers. Social paediatric centres are usually colocated with hospitals to ease transfer of acutely ill children. Coordinated multidisciplinary care in Germany is helped by funding packages of care with a single provider organisation rather than the standard fee-for-service model.²⁶ ModuS is a teaching programme for patients and families that aims to integrate management of chronic disorders into everyday lives.²⁷

of around 330 000) per year, so the likelihood of a general practitioner (GP) encountering a child with cancer is low, and depends on the type of service.³⁴ Primary care paediatricians who look after children only will be more likely to have experience of rare diseases than will a typical

GP, for whom children represent roughly 25% of patients. On average, GPs will encounter a child presenting with cancer once every 20 years.³⁴ Achievement of a safe and effective balance between skills and access, while avoiding over-investigation, is challenging.

We will focus on four important issues for children's first-contact care: organisation of services; professionals and training; skill mixing; and out-of-hours care. European countries differ strikingly in their organisation of children's (non-hospital) first-contact services. Three main models exist, and are based on whether primary care general physicians, primary care paediatricians, or combinations of both are primarily responsible for care. However, comparisons between models are difficult because of the subtleties and complexities of definitions of these models. For example, in many countries, first-contact care services do not provide a gate-keeping function and access to paediatricians is unrestricted. Furthermore, although Sweden's model could be defined as GP-delivered, it differs substantially from that in the UK. Most GPs in Sweden receive at least three months' specialist training in paediatrics (GPs are required to train either in paediatrics or in gynaecology and obstetrics) and often work closely with paediatricians and children's nurses, with whom they might be colocated in health centres. By contrast, the UK has a more segregated model with GPs who might not have received any specific training in paediatrics beyond that received as an undergraduate, and who work separately from paediatricians. The potential consequences of inadequate paediatric training and supervision of child health clinicians in Europe are shown by an inquiry into child deaths which drew attention to failures in recognition and management of severe diseases.^{33,35}

The most recent and comprehensive data for first-contact services and professionals for children comes from the European Paediatric Association's survey of 46 European countries (appendix). This study revealed a substantial diversity of service models, showing countries' different approaches to achievement of a balance between expertise and accessibility. 11 countries of the EU15 provide 5 or more years of training for paediatricians. A 3 year so-called common trunk of general training, including training for primary and secondary care, is followed by a further 2 years of training for specialty work or primary care, or both. This system is intended to ensure that primary care paediatricians are prepared for the diversity of clinical and social problems that they will encounter and that specialist paediatricians receive sufficient training in rare and complex disorders. GPs usually train for at least three years with a minimum 6 month requirement in both a hospital specialty and primary care for the general population.^{36,37} Although 13 European countries have extended family-doctor training to 4 years or longer, training in child health remains highly variable between countries.^{38,39} Many constraints to training are not related to education—eg, European Union (EU) working-time limits and the availability of training posts. Analyses of data for training have been insufficient to establish whether these variations correlate with competencies and ultimately with child health outcomes attributable to services provided by these professionals.

Increasingly, much routine and some specialist care for children is delivered by nurses. Nurses lead many services in Sweden's child health-care centres; GPs, paediatricians, psychologists, therapists, and dentists are called upon when needed. In the UK and the Netherlands, nurses provide community-based care for children with asthma, which seems at least as effective as that delivered by a GP or paediatrician,^{40–42} and might be less expensive. The rising prevalence of eczema has stimulated interest in nurse-led care because outcomes seem similar whether delivered by nurses or specialist doctors.^{43,44}

Several European countries have instituted substantial changes to how primary care services are provided outside working hours. Reforms in Denmark, the Netherlands, and the UK led to centralised systems in which large groups of GPs provide care.⁴⁵ In Spain, paediatricians in primary care work closely with GPs in a system of multidisciplinary clinics. Other countries are beginning to develop similar services. For example, the Italian system is evolving towards a more cooperative model. Nurse-led telephone triage for children in the Netherlands seems to be as effective as the same service for adults (as measured by return consultations), although outcome data are unreported.⁴⁵

Evidence from Denmark suggests that a new model based on large cooperatives of GPs, with direct out-of-hours access via telephone to GPs, led to a fall in home visits, increased telephone consultations, and an initial but unsustainable 16% decrease in costs. Patients' satisfaction decreased after the changes, but within 3 years was almost back to initial rates. However, how different models of out-of-hours care affect clinical outcomes in children is unclear.⁴⁶ The challenges associated with provision of out-of-hours first-contact care for children in the UK were brought into sharp focus after the national employment contract for GPs changed in 2004. Rises in emergency department attendances and short admissions in children around this time might have been related to changes in provision of out-of-hours care, and emphasise the crucial role of first-contact care and consequent effects on the rest of the health service.⁴⁷ Yet the 30% rise in child admissions between 1999 and 2010 for acute infections usually managed in primary care suggests that several factors probably contributed.⁴⁸ Other health-care changes during this period include the implementation of a 4 h wait target in emergency departments and the commissioning of walk-in centres.⁴⁸ Concerns about quality of care for children and training standards also emerged, because doctors working in other EU countries were recruited to provide out-of-hours primary care in the UK—a situation which drew attention to general concerns about EU regulations that allow free movement of professionals between countries despite differences in training.⁴⁹

Whole-systems plan

Although some successes in the improvement of the health of children in Europe have been noted, much

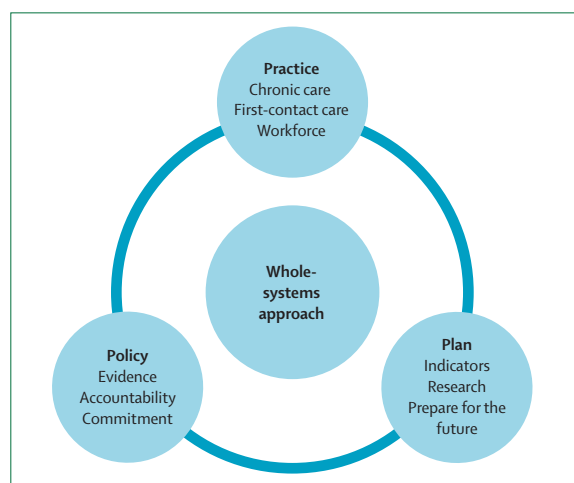


Figure 6: A 3x3 whole-systems plan for European child health

more remains to be done to improve services and ultimately health. Changes in practice are contingent on supportive planning and policy. A whole-systems approach is needed. Problems that need action can be thought of as a 3x3 plan with three general themes—practice, plans, and policy—each with three specific actions (figure 6).

Practice

Chronic care model

The preceding sections have shown the substantial scope to change the ways in which care is delivered to children and their families. In view of the growing numbers of children with chronic disorders in Europe, development of models of care for children is a major priority. This development will be a substantial change from a hospital-centric model to a model in which primary care and secondary care providers and public health services work closely together. Focusing on efforts on prevention of non-communicable diseases and improvement of outcomes of care will necessitate a sustained commitment from bodies representing paediatricians, GPs, child and adolescent psychiatrists, and other health-care professionals (eg, policy makers) at national and European levels. These changes can build upon lessons learned, for example, in the Netherlands, Sweden, and the UK.

First-contact care

The noted variation in outcomes of childhood disorders and appropriateness of emergency contacts and admissions suggests a clear need to learn from experience. Sweden's flexible model of first-contact care might offer important lessons in view of Sweden's achievement of some of the best outcomes for children in Europe. Italy, where primary care paediatricians provide most primary care for children, also has high-quality outcomes and offers an opportunity for comparison to and contrast with

Sweden. Although paediatric specialists working in primary care are more expensive to train than are GPs and barriers still exist between primary and secondary care, these problems might be balanced by better outcomes. In the UK, some GPs do not have much postgraduate training in paediatrics and deliver first-contact care separately from paediatricians. Although the strengths of this model have been celebrated,⁵⁰ some evidence of suboptimum outcomes for children has been reported. Exploration of flexible approaches that preserve the best qualities of the family medicine approach are thus worthwhile.

Workforce

The EU provides for free movement of health professionals on the basis of the principle of mutual recognition of qualifications. However, training standards are mainly based on the duration rather than the content of learning. Standards for competencies of child health professionals, particularly those working in first-contact care, need to be defined. In many countries, progress in development of shared curricula and approaches to learning have been limited by deep divisions between professional groups, which in some cases are backed up by legal constraints or inappropriate financial incentives. These issues will come to the fore because the trend for task-shifting from doctors to nurses will probably continue. Children's health professionals should find ways to overcome structural and cultural barriers to work towards a transformative model of health-professional education needed for sustained progress in child health improvement.⁵¹

Plans

Indicators

Meaningful understanding and international comparisons of the health needs of children and the ways in which health systems respond necessitate appropriate data. Development of indicators for children is particularly challenging because of the so-called four Ds—ie, developmental change, dependency, differential epidemiology, and demographic patterns—which are unique issues in children's health and lives.^{52,53} To ensure that indicators are transferable between countries is important. Examples of progress include the Organisation for Economic Co-operation and Development's Health Care Quality Indicator Project, which has some indicators relevant to children (eg, immunisation cover); WHO's Health for All Database; and the European Collaboration for Healthcare Optimisation project, which will allow comparisons between health systems based on hospital databases but has little information about children.^{54,55} Additionally, several time-limited research projects have provided information that can inform indicator development—eg, Child Health Indicators of Life and Development (CHILD), which consist of key indicators⁵⁶ covering the life course and aspects of primary, secondary, and tertiary prevention and policy. Finally, the EU has agreed a selection of structural

indicators for measures including access to care for vulnerable children such as asylum seekers, and indicators for the protection and promotion of child rights.⁵⁷ However, few Europe-wide indicators are specifically designed for assessment of children's primary and secondary care services.

Some countries have made attempts to develop measures for examination of the quality of primary care—eg, management of ambulatory-sensitive disorders and avoidable hospital admissions. In Spain, a list of primary-care-preventable hospital admissions is available that includes several illnesses relevant to children (eg, immunisation-preventable diseases, pneumonia).⁵⁸ In Italy, frequency and choice of antibiotic use has been used as an indicator of quality of paediatric care and professional continuing education.⁵⁹ The UK has quality indicators (linked to a general practice pay-for-performance system) for some primary care services, but less than 3% of these indicators are relevant to children. New indicators for health outcomes in children and young people, including some specifically for aspects of primary and secondary care, will now supplement existing ones.²⁸ The Dutch College of General Practitioners developed 139 indicators from 61 clinical guidelines, including several for children relating to asthma, non-traumatic knee disorders, otitis media with effusion, and fever.⁶⁰ The UK Outcomes Framework⁶¹ includes a reduction in unplanned hospital admissions for children's chronic diseases and lower-respiratory-tract infections as health improvement targets, showing growing recognition internationally among policy makers of the importance of reductions in avoidable admissions.

Future challenges include devising of indicators of positive aspects of child health instead of those exclusively focusing on health deficits. Development of indicators for complex disorders is important because such illnesses often necessitate interventions from several agencies acting in partnership, and thus measures that are sufficiently sophisticated to encompass all these contributions are needed. Development of indicators that measure the quality of services provided to especially vulnerable children and young people—eg, those who are victims of maltreatment, have mental illness or disabilities, or live in the care of state social systems—will also be important. Some of these indicators are being developed in EU-wide projects.⁵⁷

Children are often an afterthought when health information systems are created (eg, the UK Quality and Outcomes Framework) and in clinical guidelines and service planning. Data deficits are one explanation; political will is another. A compendium of child health indicators enables some comparison, but indicator sets need to be supplemented and based on reliable and uniform systems for data collection and analysis to allow meaningful comparison of the quality of health services for children across Europe. Such a compendium would greatly help with efforts to improve services.

Research

Research about health services for children is in its early stages.⁶² For example, only 5% of all research about cancer relates to children.⁶³ 11–80% of all paediatric prescribing is estimated to be off label, partly because of the paucity of clinical trials in children.⁶⁴ What research is done focuses disproportionately on the most complex disorders. Between 2000 and 2009, the number of Cochrane systematic reviews relevant to children increased by 18%, but the number of reviews applicable to childhood illnesses in primary care increased by only 2%. Although non-drug interventions have an important role in primary care, they were the focus of less than half the reviews assessed.⁶⁵ Only a tenth of the reviews assessed focused on interventions to prevent and cure mental health problems, despite the growing burden of mental illness in children and adolescents.⁶⁶ Systematic attempts to measure the quality of child health services have been made in the USA,⁶⁷ but few similar examples are available in European countries.

Some hopeful signs have been noted, however. A project funded by the EU that includes 29 countries is compiling an inventory of child health research in Europe and identifying emerging priorities for future funding. Europe has the infrastructure in place (eg, networks of longitudinal pregnancy and birth cohort studies) to research important issues in child health. Some countries, such as Denmark, Finland, and Sweden, have benefited from linking of several data sources from primary and secondary care and social services, but this setup is unusual. Practice-based research networks have yielded promising results in the UK, Italy, and some other countries.⁶⁸ The Standards for Research in Child Health initiative is intended to improve the quality, ethics, and reliability of paediatric clinical research and has published its first six standards.⁶⁹ Similarly, the EU-funded Global Research in Paediatrics (GRiP) Network of Excellence was launched in 2011 to enable the safe use of children's medicines and create international standards for paediatric research.

Although these initiatives signal a growing awareness of the importance of child health research, individual countries and EU-wide bodies are needed to strengthen investments in child health and health services research, focusing particularly on underexplored subjects, such as improvement of the understanding of how childhood illness is dealt with by different health systems, for example quality measurement in primary care, meaningful comparisons of first-contact models, development of chronic care systems, and strengthening of child health policy research.

Future scenarios

Similar to how climate change experts study future scenarios for global warming, child health experts should develop modelling techniques to examine the future of child health, thus enabling far-sighted policy making. Undoubtedly such exercises would be complex, but analysis of three broad aspects would be a start—

For more on the **inventory of child health research** see <http://www.childhealthresearch.eu>

For more on the **Global Research in Paediatrics (GRiP) Network of Excellence** see <http://www.grip-network.org>

For more on the **compendium of child health indicators** see <http://www.childhealthresearch.eu>

Panel 3: A rights-based approach to child health services

The 1989 UN Convention on the Rights of the Child is directly relevant for child health and development.⁷⁵ It allows disease and ill health to be understood in the context of environmental and societal threats to children. Crucially, the Convention enables children to be considered in their own right. Clinicians and policy makers should strive to realise children's rights to:

- a high standard of health care
- have special needs attended to if disabled
- have their best interests considered and not face discrimination in the health-care system
- have their privacy and confidentiality respected
- receive direct and appropriate information about their disorders
- be able to participate in discussions and decisions.

Practical measures include incorporation of children's rights into strategies and health development plans, establishment of advocacy committees for children, appointment of children's ombudsmen, and assurance that government ministers with special responsibility for children are appointed. The Council of Europe has adopted a resolution to promote child-friendly health care; countries need to follow through on these commitments.

specifically, trends in health status, social determinants of health, and technological developments. Increases in risk factors—eg, low birthweight, obesity, unhealthy lifestyles—and increases in chronic disorders, such as mental health disorders, cancer, and non-communicable diseases, are likely to impede improvement in child health. Prevention of non-communicable diseases is a major goal of all health systems, and should become a prominent feature of country strategies and policies, especially in times of financial strain. Technological advances, such as genomic medicine, are unlikely to be sufficient on their own to address many of the lifestyle-related chronic illnesses in children—eg, obesity, hypertension, and dyslipidaemia—but advances such as new instruments for point-of-care diagnosis and monitoring of chronic disorders might be useful. Plans need to be sufficiently flexible to incorporate such developments.

Policy Evidence

The UN Convention on the Rights of the Child offers a framework for policies to support child health and wellbeing,⁷⁰ and the European Council has issued guidelines on child-friendly health care.⁷¹ However, much more could be done to translate these high level goals and supporting evidence into policies at the national and European levels. Investment in child-centred public health interventions and social policies will improve health and reduce inequities and accumulate advantages for individuals and populations throughout the life course.⁷² Social protection for the earliest years of life and the most vulnerable and disadvantaged children is particularly important during the most severe financial crisis for decades, to reduce the likelihood that children's health and wellbeing will be adversely affected.⁷³

Provision of universal access to high-quality, affordable early years education is a key strategy for reduction of social inequalities. Such universal access is only an aspiration for disadvantaged children in many countries, especially those in marginalised groups such as the Roma and undocumented migrants.

Accountability

Accountability is crucial if the voices of children are to be heard effectively, and it can be strengthened through a framework of monitoring, reviewing, and remedying of processes.⁷⁴ National oversight mechanisms, with responsibility for child health services, should be put into place and tasked with devising of action plans to address problems that arise. We propose that countries should identify a few context-relevant indicators for child health services and appoint a monitoring organisation with open and transparent responsibility for collection and analysis of data. A national child health oversight committee should report to a minister of state responsible for child health, who should regularly review progress based on data and be able to implement remedying action.

Commitment

Policy makers often seem reluctant to translate into policies the increasing evidence showing that the foundations of life-long health are built through greater investments in the early years of life and by adopting an approach to policy making consistent with the goals of the UN Convention on the Rights of the Child (panel 3). Until national and European governing bodies are willing to accept this challenge, the outlook for child health in Europe will remain uncertain.

Implementation of 3x3 plan for European child health

The arrangements for delivery of health care in the EU are the responsibility of member states, even though many of the inputs into delivery systems, such as health professionals, drugs, and technology, are subject to European law. Furthermore, some risk factors in children and young people are also subject to EU laws and policies—eg, tobacco, food, and alcohol consumption. The EU has substantial influence through its convening power and the Framework Programmes that fund health research. It can also do much to make the health needs of children visible, by working through the Eurostat database,⁷⁶ and the European Health Interview and Examination Surveys under development and by building on the findings of the first Child Health in the European Union report,⁷⁷ to create a permanent on-line database of child health. Finally, the EU, together with the European Central Bank and the International Monetary Fund, is implementing wide-ranging economic policies that are having severe consequences for the health of everyone, including children, in the countries worst affected by the financial crisis, yet is failing to assess the health effects of its policies.

Real and sustained improvements in child health in Europe can happen if political will across the EU can be brought to bear on the problems facing children now and in the future.

Contributors

IW conceived the paper at the request of MM, and wrote the first draft. MT, PG, GT, MB, AvdB, JE, MP-M, SJ, and MM revised the paper. MK did the data analysis, with contributions from MM, IW, and PG.

Conflicts of interest

We declare that we have no conflicts of interest. IW is married to Richard Horton, Editor of *The Lancet*. Richard Horton had no role in the peer-review and acceptance processes for this paper.

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