Report on Review of PAEDIATRIC SERVICES in Hospital Authority

醫院管理局
HOSPITAL AUTHORITY

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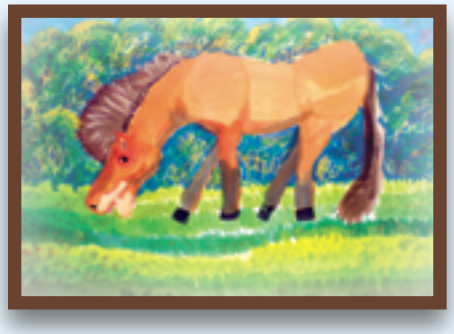

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PURPOSE OF THE REVIEW

1.1 This report presents the findings and recommendations of a comprehensive review of paediatric services provided by the Hospital Authority (HA). The objective is to adequately prepare the HA hospitals for the development of the Centre of Excellence in Paediatrics (CEP). The CEP is a Government initiative to raise professional standards and enhance patient care through efficient concentration of expertise, research and training with multi-partite involvement including the private sector. The review, while cognisant of these non-HA services, does not specifically analyse these services nor does it make any recommendations regarding services delivered outside the ambit of the HA.

CONDUCT OF THE REVIEW

1.2 The review was conducted under the guidance of a steering committee chaired by the Chief Executive of HA, and a panel of consultants from the United Kingdom, Australia and Hong Kong. The hallmark of the review was a high level of participation of clinicians across all disciplines.

BACKGROUND

1.3 In his Policy Address for 2007, the Chief Executive of the Hong Kong Special Administrative Region announced the Government's intention to set up a multipartite medical centre of excellence in Paediatrics, aimed at enhancing the quality of clinical services. The proposed CEP will foster research and training in the discipline and provide comprehensive tertiary paediatric services.

1.4 The Government has decided that the CEP will be centrally located in the Kowloon region and co-located with the proposed Centre of Excellence in Neuroscience (CEN) and, significantly, a new acute general hospital, which will be developed on the same campus as the two centres of excellence.

1.5 The proposed acute general hospital will:

- provide on-site clinical and non-clinical services to support the operation of the co-located centres of excellence;
- serve as the centre for the management of major trauma patients, taking advantage of the high end expertise of neurosurgery in CEN; and

- meet the general medical and surgical needs of the local community by providing a range of clinical services including Accident & Emergency.

1.6 The development of the CEP is widely supported by clinicians from all disciplines involved in child care. The CEP will provide highly specialised tertiary services, particularly the management of low-volume, high complexity clinical conditions. Current paediatric service provision needs to be reviewed to determine how the services can be reconfigured and redistributed after the CEP is established.

THE REVIEW PROCESS

1.7 A highly consultative approach, using the principles of role delineation, was adopted for the review with wide participation of doctors, nurses and allied health professionals from paediatric and related departments in HA hospitals. The review process included:

- A literature review of international experience in the organisation and delivery of paediatric services (November 2009).
- An assessment of the current services provision by a comprehensive questionnaire-based survey of each paediatric department (December 2009).
- Extensive face-to-face small group interviews with clinicians of individual hospitals and hospital departments to clarify the survey responses and solicit inputs at different levels and disciplines on issues such as models of care, current service gaps, key service relationships and aspirations for future development of each individual hospital. Some 110 group consultation meetings were conducted in January and February 2010.
- A second series of consultation meetings was conducted for paediatric and paediatric-related subspecialties across hospital boundaries. These horizontal groups explored proposed service models and the type and range of tertiary services to be transferred to the CEP. Fifty such meetings were conducted by 18 widely represented specialty and sub-specialty groups in April and May 2010.
- Workshops to consolidate results of the small group consultation meetings were conducted in January and June 2010.
- A critical review of proposed service models and estimated caseloads was undertaken by the project consultants and senior clinicians in July and August 2010.
- Projection of future demand for paediatric services taking into account the proposed service model, population growth and demographic changes as well as age- and specialty-specific service utilisation trends up to 2021 was carried out. Based on the projection, estimates of future bed requirements were calculated for the coming decade.

GUIDING PRINCIPLES

1.8 The following principles have been used to guide the discussions and decisions on the reorganisation of paediatric services provided by HA:

- Placing children at the centre of the paediatric service and endeavouring to meet their health needs with more accessible and safer services;
- Adopting the principle of centralising where necessary (to improve outcomes) and localising where possible (to improve access) in service redistribution; and
- Development of an integrated paediatric service model for children, linking primary, secondary and tertiary services in a coordinated continuum of networked services.

INTERNATIONAL EXPERIENCE

1.9 A review of the experience in organising paediatric services in overseas countries clearly demonstrates the importance of concentrating the caseload of uncommon diseases and expertise in specialist children's hospitals. In these hospitals, the delivery of quality services supports research and clinical education. International experiences also highlight the need for coordination between the specialist children's hospital and regional hospitals providing secondary care. Triage and referral protocols ensure access to the appropriate and timely level of service.

1.10 The overseas examples reviewed are characterised by extensive support from government, academia and the broader community. Regional hospitals and community services provide for the basic medical needs of children in a holistic and family centred manner. Tertiary, secondary and primary care are integrated and coordinated in a managed clinical network.

1.11 The trend, on the international scene, is for the academic health science systems (AHSS) to catalyse the transformation of medicine. This widely accepted concept advocates the development of partnerships between academic institutions and healthcare providers (tertiary, secondary and primary) to form integrated health science systems focusing on research, clinical services, and education. It facilitates the translation of research breakthroughs into clinical applications for the benefit of patients (from bench to bedside).

PROPOSED SERVICE MODEL

1.12 Paediatric services in Hong Kong (HK) will be organised under a **hub-and-spoke model** with particular emphasis on **partnerships** between the CEP and HA's hospitals. The CEP will serve as the tertiary referral centre for complex cases; while the HA's hospitals with paediatric departments will provide emergency care, secondary services (including step-down), and community paediatric care. The HA hospitals will be, in most cases, the first point of contact for specialised paediatric care.

1.13 Well-coordinated territory-wide service networks for all major paediatric subspecialties should be developed. These will be characterised by integrated tertiary, secondary, primary and community care services with clear referral guidelines and common clinical protocols designed to facilitate shared care.

1.14 To support this service model, it is necessary to develop a dedicated system for transporting patients that is both safe and efficient. The CEP clinical retrieval teams should be staffed with appropriately trained healthcare professionals.

1.15 An overview for each of the major subspecialties is presented in the following paragraphs. Details of the proposed service models of individual paediatric subspecialties and paediatric-related specialties can be found in *Chapter VII* of this report.

1.16 While the model of care for each subspecialty service varies, there is general agreement about the concept of shared care. The CEP, regional hospitals and community based services will work together to provide patients with the appropriate level of care at different stages of their disease. Opportunities in specialist training and research will also be enhanced by this model. HA paediatric departments in regional hospitals will continue to provide consultation services to other specialties, step-down care for patients returned from the CEP, and high volume secondary services. The major acute hospitals in individual clusters should continue to coordinate the provision of those services with high volume of secondary cases (e.g., respiratory cases) across their respective clusters.

1.17 The proposed service model for each paediatric or paediatric-related subspecialty is summarised below:

Haematology and Oncology

- The caseload of paediatric oncology in HK is about 170 new cases per year. The CEP will treat all newly diagnosed paediatric oncology cases, and paediatric oncology inpatient services currently provided by HA hospitals will be trans-located to the CEP.
- Rare haematological conditions, e.g., paroxysmal nocturnal haemoglobinuria, and disorders requiring multidisciplinary care, e.g., haemophilia, should all be managed in the CEP.
- Regional hospitals will focus on less intensive/supportive oncological treatment and management of common haematological conditions, e.g., Idiopathic Thrombocytopenic Purpura.

Cardiology & Cardiac Surgery

- International experiences demonstrate that paediatric cardiology and cardiac surgery should be centralised, as adequate caseloads are required to maintain clinical expertise and ensure quality of care.
- The number of paediatric cardiac surgery patients in HK is only about 300 per year. With this caseload, all such surgeries should be concentrated in the CEP.
- Invasive cardiac procedures, e.g., diagnostic and interventional cardiac catheterization, electrophysiological studies, abnormal pathway ablation, pacemaker implantation, and mechanical circulatory support will all be concentrated in the CEP.
- Regional hospitals will continue to provide secondary care, emergency cardiac assessment and support to general paediatric and intensive care services.

Nephrology

- There are currently about 50 paediatric patients with end stage renal failure in HK.
- All paediatric nephrology beds as well as renal replacement services will be transferred to the CEP.
- Both acute and chronic renal replacement therapy will normally be performed in the CEP. This will include various modes of acute renal replacement therapy and plasmapheresis, as well as chronic haemodialysis, automated peritoneal dialysis and renal transplantation.
- Regional hospitals will focus on secondary nephrology services, e.g., nephritic syndrome and acute glomerulonephritis.

Neurology & Neuro-development

- With both the CEN and CEP in the precinct, it is expected that all advanced neurological services will be based on the campus.
- Complex conditions, e.g., intractable epilepsy, neuroimmunological disorders (like multiple sclerosis) and neurometabolic disorders will be treated in the CEP.
- Conditions requiring surgical treatment or invasive procedures will be concentrated in the CEP, e.g., intractable movement disorder requiring deep brain stimulation, cerebral palsy requiring dorsal rhizotomy, and intractable epilepsy requiring surgery.
- Common neurological disorders (e.g., epilepsy) will continue to be managed in regional hospitals.

Respirology

- Complex respirology cases, e.g., interstitial lung disease, congenital central hypoventilation, and invasive procedures will be concentrated in the CEP.
- Tracheostomy in young children, diaphragmatic pacing and procedures such as infant lung function testing would be best carried out in the CEP.
- In view of the high volume of common conditions like asthma and sleep disorder, most of the patients will continue to be managed in regional hospitals.

Endocrinology & Metabolism

- The CEP will handle most complex endocrine problems, e.g., disorders of sexual development and inborn errors of metabolism.
- Regional hospitals will provide services for common disorders, preferably under a shared care model.

Clinical Genetics

- Clinical genetics services will be based in the CEP. The service will provide clinical assessment and genetic counselling for complex genetic diseases as well as molecular and functional diagnostics. There will be a reference laboratory with a full range of genetic tests, e.g., basic molecular and cytogenetic tests, tissue banking, and genomics.

Rheumatology, Immunology & Allergy

- Services for tertiary rheumatology cases, e.g., juvenile dermatomyositis and systemic sclerosis will be coordinated by the CEP.
- Most immunodeficiency disorders and severe allergy syndromes as well as treatment requiring specialised expertise will be managed in the CEP. Examples of such therapy include allergen immunotherapy and stem cell transplantation for immunodeficiency.
- In view of the large number of patients involved, common conditions like allergic rhinitis and simple food allergy will continue to be managed in regional hospitals.

Gastroenterology, Hepatology & Nutrition

- Complicated gastrointestinal and liver diseases will be managed in the CEP.
- In view of the small number of patients requiring invasive gastrointestinal procedures and the high level of expertise required, such procedures should be concentrated in the CEP with appropriate clinical support from paediatric anaesthesia.
- Nutrition disorders requiring parenteral therapy should be referred to the CEP.

Neonatology

- As the CEP will be treating the most complicated medical and surgical paediatric cases, it will need to provide neonatal intensive care support to such patients.
- Neonatal services in regional hospitals will need to support the deliveries in their respective hospitals and post-op patients transferred back from the CEP.
- Prematurity and/or low birth weight cases, on their own, will not routinely be referred to the CEP.

Intensive Care

- The paediatric intensive care unit (PICU) in the CEP will need to support a diverse range of surgical and medical patients, often with multiple organ failure.
- With most surgical and complex tertiary cases transferred to the CEP over time, the demand for PICU service in regional hospitals is expected to decrease. A significant proportion of PICU beds are currently occupied by patients requiring chronic ventilator support. In the new service model, such patients will be better supported in specialised rehabilitation centres.
- As some of the HA's PICUs are currently operating at a relatively low capacity, there is room to consider consolidation of PICU services. Published data show that safer and more efficient services can be achieved through aggregation of services with greater economies of scale.

Infectious Disease

- The CEP and Princess Margaret Hospital (PMH) will work collaboratively as the tertiary centres for management of infectious diseases, with CEP treating severe non-communicable infectious diseases and PMH handling communicable infectious diseases within its purpose-built isolation facilities.
- The CEP will provide care to patients with severe infections requiring surgery and/or management of single or multiple organ system failures.
- Regional hospitals will take care of common infections and provide support during major community infectious disease outbreaks.

Dermatology

- Paediatric dermatology is a specialised service which should be provided in the CEP, probably under a shared care arrangement.
- Regional hospitals will provide management of common dermatological conditions.

Rehabilitation

- Complex rehabilitation patients and those involving input from multiple specialties will be concentrated in the CEP.
- Regional hospitals will support longer term and community based rehabilitation.
- It is proposed to develop two to three specialised rehabilitation centres, e.g., Duchess of Kent Children's Hospital and Caritas Medical Centre, to deliver specialised services for children with special needs, such as gait and seating assessment, and chronic ventilator dependence. These children often need prolonged period of specialised rehabilitation that is best provided in a specialised rehabilitation setting.

Surgery

- All neonatal surgery and low-volume/high-risk/complicated paediatric surgical cases will be performed in the CEP.
- Elective surgical cases will be managed in two to three regional hospitals with support from the CEP. This surgical network will also provide emergency surgical services at both the CEP and regional hospitals.

Neurosurgery

- Except for life-threatening situations where transfer is too risky, e.g., critical intracranial hypertension, or limited by time, all paediatric neurosurgery will be performed in the CEP, often in collaboration with the CEN.

Orthopaedic Surgery

- The CEP will provide services for tertiary cases including scoliosis requiring operation, malignancy, limb deformities, neuromuscular disorder and metabolic bone disease.
- Regional hospitals will support work-up and step-down management of tertiary cases and manage simple trauma cases.

Ear, Nose &Throat (ENT)

- Paediatric ENT service is a specialised service and complicated paediatric ENT surgeries should be performed in the CEP. This will include management of intra- and post-partum emergency airway conditions, congenital rhinological and congenital otological conditions, as well as conditions requiring multidisciplinary surgical intervention, e.g., cleft palate.
- Regional hospitals will provide emergency surgical support and secondary services.

Ophthalmology

- Complex cases and those requiring multidisciplinary intervention, e.g., Graves Disease and procedures like visual electrophysiology, will be managed within the CEP.

Oral-maxillofacial & Dental Surgery

- Complex cases such as cleft palate and cranio-maxillofacial deformities will all be treated in the CEP, while regional hospitals will continue to provide emergency and secondary services.

Anaesthesiology

- Specialised paediatric anaesthesiology services will be developed in the CEP to support all its major surgery.
- The CEP will provide specialised pain service for children.
- Sedation/anaesthesia will be provided in the CEP for diagnostic and interventional procedures where appropriate.

Pathology

- The CEP will provide full range of pathology services, including chemical pathology, molecular genetics, cytogenetics, clinical microbiology, anatomical pathology, haematology & transfusion medicine, immunology, transplantation & immuno-genetics.

Radiology

- Paediatric patients requiring interventional radiological procedures will be managed in the CEP.
- With its proximity to the CEN, neurological and neurosurgical cases will be managed in close collaboration with CEN.

Psychiatry

- Child psychiatry will continue to be provided in existing HA's facilities. The CEP will provide care to children requiring multiple specialist support, e.g., anorexia nervosa with profound metabolic disturbance.
- Liaison Psychiatry will be available to CEP inpatients and outpatients.

General Paediatrics, Community Paediatrics and Adolescent Medicine

- These services will be mostly provided in regional hospitals as such services need to be heavily involved with the community.
- It is proposed to pilot the model of short-stay paediatric beds, "Paediatric Assessment Unit (PAU)", in selected Accident & Emergency Departments. Patients admitted to such a unit are given fast-track assessment and treatment and usually will only stay for 24 to 48 hours. Overseas experience has shown that by setting up a PAU, unnecessary admissions will be avoided with improved quality of care and better outcomes. For patients who nonetheless require admission, they can be admitted to either that hospital or the CEP as clinically appropriate.

CAPACITY PLANNING

1.18 A demand projection exercise has been conducted to determine the future hospital beds requirement up to 2021, using a set of internationally recognised demand modelling techniques. Taking into account the proposed service model, population growth, demographic changes, as well as age- and specialty-specific service utilisation trends, the projection indicates a steady demand for general paediatric beds across HA hospitals. However, the demand for neonatal intensive care and special care baby unit beds in some hospitals will likely increase.

RESEARCH AND TRAINING

1.19 To ensure that research innovations and breakthroughs will lead to direct clinical benefits for patients, it is recommended that HA will participate in the development of an academic health science system in partnership with the CEP, local universities and industry to facilitate the translation of health science discoveries into clinical applications. Clinical research should be imbedded throughout our care delivery system to allow patient access to innovatory treatments and retain the most capable clinical researchers in HK.

1.20 It is also recommended that HA hospitals should collaborate closely with the CEP and local universities to develop a transformative educational model for paediatric clinicians in HK. This model should focus on the training of clinician scientists with exposure not only to research and medicine, but to a wide range of health disciplines, social sciences, health economics, business studies, and policy matters.

WAY FORWARD

1.21 There are a number of key enablers (including manpower, expertise, clinical and non-clinical facilities, and information technology) that need to be considered when implementing the proposed models to ensure that HK finishes with a world-class Children's Hospital. The foremost of these enablers is the development of a manpower and training plan to take the CEP project forward. This involves identification of the workforce requirements for the proposed models of clinical care. The projected requirements, for both numbers and skills, need to be matched with existing workforce capacity to map out the gaps. Concrete development plans, including local and overseas training programmes, must be formulated and implemented well in advance of the commissioning of the CEP.

1.22 The paediatric clinical services plan and the models of care developed as part of this review will present challenges for planners and designers as much as it will for the clinicians who will work in the CEP. This report touches on the design implications of the recommended models. It is easy to underestimate the importance of intelligent design. This term refers to design that forces change in clinical practice to the point where the old ways of doing things are just not possible. Perioperative configuration is a prime example. The Day Of Surgery Admission (DOSA) rate for Hong Kong is low by international standards. This review recommends design principles which will force changes in line with the world's best practice.

CONCLUSION

1.23 Reorganisation of paediatric services in HA hospitals is critical to the development of the CEP. As a result of this in-depth review, a number of recommendations have been formulated to reorganise HA's paediatric services in context of the Government's planning for the CEP. These are detailed in Chapters VII and VIII of the report. The following is a summary of the key recommendations:

(a) Organise paediatric services under a hub-and-spoke model with emphasis on partnerships between the CEP and HA's hospitals. The CEP will serve as the tertiary referral centre for the diagnosis and management of highly complex cases. The HA's hospitals with paediatric departments will provide step-down, secondary, acute and community paediatric care.

(b) HA's existing tertiary specialised beds on paediatric oncology, cardiology and nephrology will be trans-located to the CEP.

(c) Most paediatric surgery including neurosurgery and cardiac surgery will be transferred to the CEP. Some high-volume elective and emergency paediatric surgical cases will remain at 2–3 regional hospitals but be fully integrated as part of the Paediatric Surgical Network.

(d) A central patient retrieval system will be developed and operated by the CEP.

(e) Pilot the establishment of short-stay (24–48 hours) child friendly Paediatric Assessment Units in the emergency wards of selected HA hospitals.

(f) Develop two to three rehabilitation centres, e.g., Duchess of Kent Children's Hospital and Caritas Medical Centre, for delivering specialised rehabilitation services, including long-term care for chronic ventilator dependent patients. Complex acute rehabilitation services will be provided at the CEP.

(g) The major acute hospitals in individual clusters should coordinate the provision of those services with high volumes of secondary cases in their respective clusters.

1.24 The paediatric departments of HA will become part of the academic health science system centred on the CEP and local universities. The proposed reorganisation of HA's paediatric services put forward in this review will lead to a significant enhancement of service standards and the formation of an integrated service delivery system to transform paediatric medicine in Hong Kong.

醫院管理局
兒科服務檢討報告
摘要

檢討目的

1.1 本報告載列醫院管理局（醫管局）兒科服務檢討的結果及有關建議。檢討的目的，是讓醫管局轄下醫院作好準備，配合兒童專科卓越醫療中心（兒科中心）的成立。興建兒科中心是特區政府提出的一項計劃，期望透過包括私營醫療的多方合作，有效結集專長、科研和培訓，以提升醫療服務的專業水平及改善病人護理。檢討的範疇集中於醫管局提供的服務，並無就非醫管局的服務作具體分析或提出建議。

檢討的進行

1.2 是次檢討，由醫管局委任的督導委員會及專家小組指導進行。前者由醫管局行政總裁擔任主席，後者包括來自英國、澳洲及香港的顧問專家。檢討的特點，是有來自不同專科界別的臨床人員積極參與。

背景

1.3 香港特區行政長官在 2007 年的施政報告中，提出特區政府有意建立多方合作的兒童專科卓越醫療中心，以提升醫療服務質素。擬興建的兒科中心除提供完備的第三層兒童專科服務外，亦會致力促進有關專科的科研和培訓工作。

1.4 其後，政府決定兒科中心會設於九龍的中心區域，與規劃中的神經科學卓越醫療中心及一所新的急症全科醫院座落於同一地點。

1.5 擬興建的急症全科醫院將：

- 提供臨床及非臨床服務，以支援兩所卓越醫療中心的運作；
- 善用神經科學卓越醫療中心的神經外科尖端技術，處理嚴重創傷個案；以及
- 提供一系列臨床服務，包括急症室服務，滿足區內居民對內外科醫療服務的需求。

1.6 成立兒童專科卓越醫療中心獲兒科服務各有關專科臨床人員廣泛支持。中心將提供專精的第三層服務，特別是治療複雜及特殊的臨床過案。為此，現有的兒科服務需作檢討，以決定兒科中心成立後，應如何重新組織全港的兒科服務。

檢討過程

1.7 是次檢討，採用角色定位的原則和廣泛諮詢的方式進行，醫管局轄下醫院兒科及相關部門的醫生、護士及專職醫療人員均有廣泛參與。檢討過程包括：

- 考核文獻，參考外國籌組及提供兒科服務的經驗（2009 年 11 月）；
- 以問卷方式向每個兒科部門進行調查，評估現時提供的服務（2009 年 12 月）；
- 與個別醫院及醫院部門的臨床人員進行廣泛的小組會面，清楚瞭解他們在調查中作出的回應，並向不同職級和專業的醫護人員徵詢意見，內容包括服務模式、現有服務不足之處，以及各醫院對其未來服務定位和發展的期望。在 2010 年 1 月及 2 月，共進行了約 110 次小組諮詢會議；
- 第二輪諮詢以兒科和相關專科的分科組別進行，這些橫向的科組深入探索個別分科的服務模式，以及哪類和哪範疇的第三層服務日後應遷移到兒童專科卓越醫療中心。在 2010 年 4 月及 5 月，18 個有廣泛代表性的分科小組共進行了約 50 次諮詢會議；
- 舉行工作坊，總結小組諮詢會的成果（2010 年 1 月及 6 月）；
- 由專家小組及高級臨床人員就建議的服務模式及預計個案數目進行客觀評審（2010 年 7 月及 8 月）；
- 根據建議服務模式、直至 2021 年的人口增長及人口結構轉變，以及按年齡及專科劃分的服務使用趨勢，預測未來的兒科服務需求，並按照有關預測，推算未來十年的病床需求。

指導原則

1.8 有關醫管局兒科服務重組所作的討論及建議，採納了以下的指導原則進行：

- 兒科服務應以兒童為中心，並盡可能為他們提供便捷安全的服務，切合其醫療需要；
- 在需要時集中處理（以提升成效），在可行情況下於本區提供（以提升便捷程度）；以及
- 為兒童發展整合的兒科服務模式，把基層、中層及第三層醫療服務連接起來，建立一個協調和連貫的服務網絡。

國際經驗

1.9 參考海外地區組織兒科服務的經驗，清楚顯示將罕見病症及治療專長集中在專科醫院的重要性。在這些醫院，高質素的醫療服務與科研教學是相輔相成的。從國際經驗所見，兒童專科醫院與提供中層醫療的地區醫院建立密切聯繫也是十分重要的。透過制訂分流及轉介常規，可確保病人獲得適切和及時的服務。

1.10 是次檢討所研究的海外醫院，皆同時獲得政府，學術界及社區廣泛支持。地區醫院及社區服務以全人及家庭為本的方式，照顧兒童的基本醫療需要，而第三層、中層及基層醫療則整合和協調於一個妥善管理的服務網絡之下。

1.11 現時，國際間的趨勢是建立「學術醫療科學系統」，以推動醫學的轉化和進步。這個被廣泛接納的概念，主催醫教研合一，提倡學術機構與醫療機構（第三層、中層及基層）發展夥伴關係，糅合科研、治病及教學功能，使科研突破能應用於臨床治療上，令病人受惠。

建議服務模式

1.12 兒童專科卓越醫療中心成立以後，建議香港的兒科服務採用「軸輻模式」加以重組，特別強調與醫管局醫院的夥伴關係。兒科中心將是接收複雜轉介個案的第三層診治中心（輪軸），而設有兒科部門的醫管局醫院（輻條）將提供兒科急症醫療、中層服務（包括跟進治理）及社區護理。一般情況下，醫管局醫院將是病人獲取專門化兒科服務的首個接觸點。

1.13 應為各主要兒科分科，發展整合的全港服務網絡，提供連貫的第三層、中層、基層及社區護理服務，並設立清晰的轉介指引及臨床共用常規，促進共同護理。

1.14 為支援這服務模式，必須設立安全快捷的病人運送系統，並物色接受過適當訓練的人員成立醫療運送小組，以兒童專科卓越醫療中心為基地，提供這些服務。

1.15 下文各段概述各主要分科服務的情況。有關各兒科分科及兒科相關專科的建議服務模式，詳載於本報告第 VII 章。

1.16 雖然每個分科的護理模式不同，但各方普遍認為應採用共同護理的概念。兒童專科卓越醫療中心、地區醫院和社區服務應緊密協作，而藉此模式，亦可推動專科培訓及科研。醫管局地區醫院的兒科部門將繼續為其他專科提供諮詢服務、為從兒科中心轉返的病人提供跟進治理，以及提供高用量的中層服務。各聯網的大型急症醫院應繼續協調其聯網內的中層服務，如一般呼吸系統疾病的診治。

1.17 各兒科或兒科相關分科的建議服務模式概述如下：

血液科及腫瘤科

- 醫管局的兒童腫瘤科部門，每年約須處理 170 宗新症。兒童專科卓越醫療中心將會接收所有新診斷的兒童腫瘤科個案，現時由醫管局醫院提供的兒童腫瘤科住院服務亦會遷往該中心。
- 兒童罕見血液科病症如陣發性睡眠性血紅蛋白尿，以及需要跨專科治療的病症如血友病，均應由兒童專科卓越醫療中心治理。
- 地區醫院將專注治理密集程度或所需支援較低的腫瘤科及一般血液科病症，如自發性血小板缺乏紫斑症。

心臟科及心臟外科

- 從國際經驗所見，兒童心臟科及心臟外科個案應集中處理。
- 要有足夠的病例數目，才能保持臨床專業水平及確保醫療質素。香港每年的兒童心臟外科病人約有三百名，以這數目而言，所有個案應集中在兒童專科卓越醫療中心處理。
- 所有創傷性心臟科程序，如診斷性及介入性心臟導管檢查、電生理檢查、心傳導異常徑路消融、心臟起搏器植入及機械循環輔助裝置將集中在該中心處理。
- 地區醫院將繼續為普通兒科及深切護理服務提供中層醫療及緊急心臟評估和支援。

腎科

- 現時香港約有 50 名末期腎衰竭兒科病人。
- 所有兒童腎科病床及腎臟替代服務將遷往兒童專科卓越醫療中心。
- 緊急及長期的腎臟替代治療在一般情況下將在該中心進行，這包括不同形式的急性腎臟替代治療及血漿析離術，以及長期血液透析、自動腹膜透析及腎臟移植。
- 地區醫院將專注提供腎科及泌尿科中層服務，如腎病綜合症及急性腎小球腎炎治療。

腦神經及腦神經發展科

- 由於神經科學與兒科兩所卓越醫療中心座落同一地點，預料所有腦神經科尖端服務都會在這裏提供。
- 複雜病症如難治的癲癇症、神經性免疫障礙（如多發性硬化症）及神經代謝失調將會在兒童專科卓越醫療中心治理。
- 需進行外科治療或創傷性程序的病症將集中在該中心處理，例如需要深層腦部刺激的難治動作行為障礙、需要背神經根切除的大腦麻痺，以及需進行外科手術的難治癲癇症。
- 一般腦神經失調（如癲癇症）將繼續在地區醫院治療。

呼吸系統科

- 複雜的呼吸系統病症，如間質性肺病、先天中樞性通氣不足症候群及創傷性程序將集中在兒童專科卓越醫療中心處理。
- 幼童氣管切開術、橫隔膜調速及幼兒肺功能測試等程序宜於兒科中心處理。
- 一般病症如哮喘及睡眠失調等由於數量多，大部分病人將繼續在地區醫院治理。

內分泌及代謝科

- 兒科中心將處理最複雜的內分泌病症，如糖尿病酮症酸中毒、性發展失調及先天性代謝異常。
- 地區醫院將採用共同護理模式，治療一般病症。

臨床遺傳科

- 兒童專科卓越醫療中心將設立臨床遺傳科服務，為複雜遺傳病患者提供臨床評估及遺傳學輔導，以及分子與功能診斷。中心亦將設立參考化驗室，提供一系列遺傳學化驗，如基本分子及細胞遺傳學化驗、設立組織庫及基因檢測等。

風濕科、免疫科及過敏科

- 兒科中心將會協調第三層風濕科病症的治療，如幼年型皮肌炎及全身性硬化症。
- 大部分免疫力失調及嚴重過敏綜合症，以及需要專精技術的治療將由該中心處理，包括致敏原免疫療法及治療免疫力缺乏的幹細胞移植。
- 一般病症如過敏性鼻炎及簡單食物過敏，由於病人數量多，將繼續由地區醫院治理。

腸胃科、肝臟科及營養科

- 複雜的腸胃科及肝臟疾病將由兒童專科卓越醫療中心治理。
- 由於需進行創傷性腸胃科程序的個案不多，而且需要專精技術，這些程序應集中在中心處理，並由兒童麻醉科提供適當臨床支援。
- 需要靜脈營養治療的營養失調病人應轉介至兒科中心治理。

初生嬰兒科

- 由於兒童專科卓越醫療中心將會治療最複雜的兒科內科及外科個案，故需為這些病人提供初生嬰兒深切護理支援。
- 地區醫院的初生嬰兒服務將需支援在其醫院進行的分娩個案，以及由兒科中心轉返的術後病人。
- 早產及/或體重過輕的初生嬰兒個案，不會一概轉介至兒科中心。

深切護理服務

- 兒童專科卓越醫療中心的兒科深切護理部，會為各類外科及內科病人提供支援，尤其是患有多重器官衰竭情況的病童。
- 隨著大部分外科及複雜第三層個案逐漸轉往兒科中心，預料地區醫院兒科深切護理部的服務需求會下降。現時兒科深切護理部有部分病床的使用者是長期使用呼吸機的病人。在新的服務模式下，這些病人應轉往專門的復康中心接受護理。
- 由於現時醫管局一些兒科深切護理部使用量較低，故可考慮整固有關服務。研究顯示，有關服務的整合，可提供更安全有效的服務，並能增加經濟效益。

傳染病

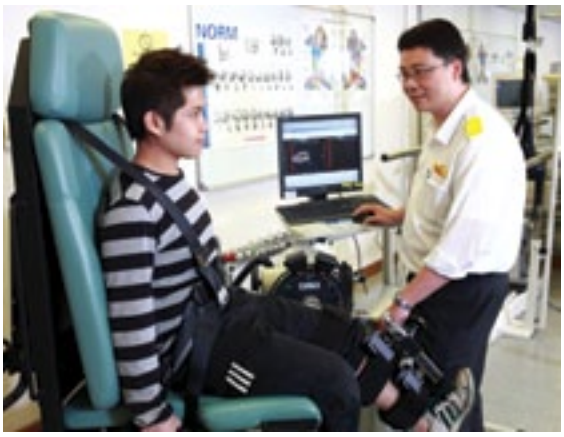
- 兒童專科卓越醫療中心將與瑪嘉烈醫院協作，提供第三層傳染病治療服務。兒科中心將治療嚴重的非傳染性疾病，瑪嘉烈醫院則使用院內特設的隔離設施治療有傳染性的病症。
- 兒科中心將負責治療受嚴重感染而需接受手術及/或有單一或多個器官衰竭的病人。
- 地區醫院會治理受一般感染的病人，並在社區出現大型傳染病爆發時提供支援。

皮膚科

- 兒童皮膚科是專門的服務，故應由兒童專科卓越醫療中心提供，最好是採用共同護理的模式進行。
- 一般皮膚科疾病將由地區醫院治理。

復康服務

- 複雜的復康個案及需要跨專科照顧的病人將集中在兒童專科卓越醫療中心處理。



- 地區醫院將支援較長期及以社區為本的復康工作。
- 建議發展兩至三個專門復康中心，如大口環根德公爵夫人兒童醫院及明愛醫院，為有特別需要（如步姿及坐姿評估、長期呼吸機依賴）的兒童提供專科復康服務。這些病人通常需要長期的專門化復康護理，而有關服務最好由專門的復康中心提供。

外科

- 所有初生嬰兒及低用量/高風險/複雜的兒童外科個案將在兒童專科卓越醫療中心進行。
- 非緊急手術個案將會在兩至三間地區醫院進行，由兒童專科卓越醫療中心（實質是一個外科網絡）支援。這個外科網絡亦會為兒科中心及地區醫院提供緊急手術服務。

腦外科

- 除非病人處於危重情況（如嚴重顱內高壓，或時間緊急）而轉送會有高風險，所有兒童腦外科手術將在兒童專科卓越醫療中心進行，一般會和神經科學卓越醫療中心合作。

骨科手術

- 兒童專科卓越醫療中心將為第三層個案提供服務，包括需進行手術的脊柱側彎、惡性腫瘤、肢體變形、神經肌肉性疾病及骨骼代謝疾病。
- 地區醫院將會支援第三層個案的術前及跟進治理，以及治療簡單的創傷個案。

耳鼻喉科

- 兒童耳鼻喉科是專門的服務，複雜的過案應集中在兒童專科卓越醫療中心處理。這包括出生時及出生後嬰兒緊急呼吸道症狀、先天性耳鼻疾病，以及需要跨專科外科治療的症狀，如裂顎。
- 地區醫院將提供緊急外科支援及中層服務。

眼科

- 複雜及需要跨專科介入的個案，包括格雷夫斯病及視覺電生理檢測，將會在兒童專科卓越醫療中心處理。

口腔頜面及牙齒外科

- 複雜個案如裂顎及頜面骨骼缺損和變形均會在兒童專科卓越醫療中心治理，地區醫院則繼續提供急症及中層服務。

麻醉科

- 兒童專科卓越醫療中心將會發展兒童麻醉專科，以支援在中心內進行的所有主要手術。
- 中心將提供兒童痛症專科服務。
- 中心在適當時會為診斷性及介入性程序進行鎮靜/麻醉。

病理學

- 兒童專科卓越醫療中心將提供一系列病理學服務，包括化學病理學、分子遺傳學、細胞遺傳學、臨床微生物學、剖析病理學、血液學及輸血醫學、免疫學、移植及免疫遺傳學。

放射學

- 需接受介入性放射程序的兒科病人將由兒童專科卓越醫療中心治理。
- 兒科中心由於與神經科學卓越醫療中心位置相近，故會與後者緊密合作，處理腦神經內外科的個案。

精神科

- 兒童精神科將繼續由現時的醫管局機構提供。兒童專科卓越醫療中心會向需要多專科支援的兒童提供服務，例如有嚴重代謝失調的神經性厭食症。
- 兒科中心的住院及門診病人，將可獲提供精神科諮詢會診服務。

普通兒科、社區兒科及青少年醫學

- 基於這些服務與社區有密切關連，故此大部分將由地區醫院提供。
- 建議在選定的地區醫院急症室，試行「兒科評估病房」，設立兒科短暫留院病床。入住此病房的病人會獲兒科醫生提供快速評估及治療，通常只需逗留 24–48 小時。從外國經驗所見，設立兒科評估病房可減少不必要的入院，並能提升醫療質素及成效。如病人確需入院，因應病人的臨床情況可入住該急症室所屬的醫院或兒童專科卓越醫療中心。

服務量規劃

1.18 我們採用了一套國際認可的需求推算模式，就未來需求進行預測，以釐定到 2021 年的醫院病床需求。有關預測已顧及建議的服務模式、人口增長和人口結構的轉變，以及按年齡及專科劃分的服務使用趨勢。預測結果顯示醫管局各醫院的普通兒科病床需求平穩，但一些醫院的初生嬰兒深切護理及特別護理病床的需求可能會增加。

科研及培訓

1.19 為使科研創新成果及突破可帶來直接臨床效益，令病人受惠，建議醫管局與兒童專科卓越醫療中心、本地大學及業界合作，推動醫教研合一，建立兒科的「學術醫療科學系統」，使科研成果可應用到臨床治療上。在整個系統中，科研與治病應結合一體，相輔相成，讓病人可享用創新的醫療技術，而香港優秀的臨床科研專才亦得以發揮所長。

1.20 此外，亦建議醫管局醫院應與兒童專科卓越醫療中心及本地大學緊密合作，為香港的兒科醫療人員發展嶄新的教育模式。此模式既著重醫療科學人員在科研及醫學方面的培訓，亦強調須涉獵其他不同醫療專業、社會科學、醫療經濟學、商業運作及政策事宜。

前瞻

1.21 香港如要擁有一所世界級的兒童醫院，在推行建議服務模式時需考慮多個主要因素（包括人手、專才、臨床及非臨床設施，以及資訊科技）。其中最重要的是制訂人手培訓方案，以推行兒科中心的計劃。這包括就建議的臨床護理模式鑑辨所需人手和專才，而預計的需求須與現有人手作比較，從而找出培訓的需要，並在中心啟用前，盡早制訂及落實具體的本地及海外培訓計劃。

1.22 檢討過程中制訂的兒科臨床服務計劃及護理模式，對建築規劃及設計人員，以至日後在兒童專科卓越醫療中心工作的醫療人員來說，都是一項挑戰。報告嘗試評估建議服務模式對建築設計的影響。我們往往對智能設計予以低估，這種設計可有效改變醫療服務模式，令過時的模式無法延續。手術前後的配置安排就是一個明顯例子。與國際標準比較，香港的日間手術比率偏低。是次檢討，建議採用一些 建築設計原則，以帶來與國際範式看齊的服務模式轉變。

結論

1.23 醫管局醫院兒科服務重組對兒童專科卓越醫療中心的成立十分重要。藉著這次檢討，我們就醫管局兒科服務重組制訂了多項建議，以配合政府就兒科中心所作的規劃，詳情載於報告第 VII 及第 VIII 章。各項主要的建議概括如下：

(a) 採用「軸輻模式」重組香港的兒科服務網絡，特別強調兒童專科卓越醫療中心與醫管局醫院的夥伴關係。兒科中心將是接收複雜轉介個案的第三層診治中心，而設有兒科部門的醫管局醫院將提供跟進治療、中層和急症服務，以及社區護理。

(b) 醫管局現時的兒童腫瘤科、心臟科及腎科第三層服務，連同專科病床，將遷往兒童專科卓越醫療中心。

(c) 大部分兒童外科包括腦外科及心臟外科將轉往兒童專科卓越醫療中心。一些非緊急及緊急兒童外科個案將保留在兩至三間地區醫院處理，但必需與整個兒童外科服務網絡結合。

(d) 兒童專科卓越醫療中心將發展及成立中央病人運送系統。

(e) 在選定地區醫院的急症部門試行「兒科評估病房」，營造兒童喜愛的環境，讓兒童短暫留院（24–48 小時）接受評估。

(f) 於地區醫院發展兩至三間復康中心，如大口環根德公爵夫人兒童醫院及明愛醫院，提供專門復康服務，包括對依賴呼吸機病人的長期護理。複雜的急性復康服務則在兒科中心提供。

(g) 各聯網的大型急症醫院應繼續協調聯網內提供的中層兒科服務。

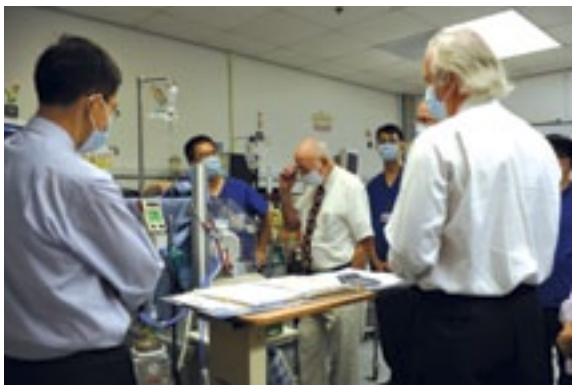
1.24 此外，在以兒童專科卓越醫療中心及本地大學為核心的「兒科學術醫療科學系統」成立後，醫管局的兒科部門應成為其中的一份子，參與兒童健康的科研和培訓工作。期盼是次檢討提出的醫管局兒科服務重組建議，將有助提升香港的兒科服務水平，建立整合的服務系統，推動兒童醫學的轉型和進步。

Chapter II

Purpose of Report

Chapter II
Purpose of Report

2.1 This report presents the key findings and recommendations of a review on the paediatric services provided by HA in preparation for the development of the Centre of Excellence in Paediatrics (CEP). Mapping out the future paediatric services delivery model for HA upon inception of the CEP, it is the result of an intensive and extensive consultative process with the different categories and levels of healthcare professionals working in all HA's paediatric departments and paediatric-related disciplines.



2.2 The report mainly addresses the issue of reorganising HA's paediatric services around the CEP and touches on the design and workforce implications upon adoption of the proposed clinical service model. It is, however, not a document about design/master or workforce planning.

Chapter III

Background

Chapter III
Background

POLICY OBJECTIVE ON CENTRES OF EXCELLENCE

3.1 In his Policy Address of 2007, the Chief Executive of Hong Kong Special Administrative Region announced the Government's policy intent to develop the Centres of Excellence in Paediatrics and Neuroscience (CEP and CEN). These are specialty centres that consolidate specific expertise, concentrate patients with complex disorders, facilitate the development of relevant technologies, and improve quality of care for the benefit of patients. They have a tripartite mission of providing high quality clinical services, world class research and advanced education/training programmes.

3.2 To take forward this policy initiative, a Steering Committee chaired by the Permanent Secretary for Food & Health (Health) has been set up by the Government to provide policy directions for the development of the CEP. The Steering Committee is widely represented with representatives from professional bodies, the HA, the Department of Health, non-government organisations, the private sector and patient groups.

3.3 The Government has subsequently decided that the CEP will be a multipartite medical centre involving the HA, Department of Health, local universities, the private healthcare sector, and major sponsoring organisations. It will be centrally located in the Kowloon region and co-located with the CEN and a new acute general hospital, which is intended to:

- Provide on-site clinical and non-clinical services to support the operation of the co-located CEN;
- Serve as the trauma centre for the management of major trauma patients, taking advantage of the high end expertise of neurosurgery in the CEN; and
- Meet the general medical needs of the local community by providing a range of clinical services including accident and emergency.

3.4 Together as a whole, the CEP, CEN and the new acute hospital will be developed into a hub for cutting-edge paediatrics, neuroscience, and traumatology with commitment to clinical services, research and training.

PROPOSED CENTRE OF EXCELLENCE IN PAEDIATRICS

3.5 The proposed CEP will concentrate low-volume-cum high complexity conditions for care by experienced teams, with purpose-built age-appropriate environment and facilities that cater for the needs of paediatric patients and their families. Concentration of patients and expertise will also facilitate training and research which are important to the development of the paediatric discipline and thereby improving the health of the next generation. To ensure clinical excellence and continued advancement, it is also proposed to establish a research institute at the CEP to promote and advance paediatric basic medical, epidemiological and clinical research.

3.6 The proposed CEP will provide comprehensive paediatric and paediatric related specialties and subspecialties service. The focus will be on tertiary services. It will also take emergency transfer cases according to set guidelines and conditions. There will be no maternity service and neonates are referred from other hospitals for treatment of complicated surgical conditions.

3.7 More than 400 beds will be provided in the CEP, including some isolation and private beds, to mainly cater for children and adolescents up to 18 years old.

DELIBERATIONS IN HOSPITAL AUTHORITY

3.8 Within HA, there has been consensus among its healthcare professionals about the merit of establishing a children hospital in Hong Kong. After commissioning a working group in 2005 to study this subject for two years, the HA Paediatric Clinical Coordinating Committee (COC) set up a Children Hospital Project Team in April 2007 to develop a proposal for consideration of the HA Management and Government. Senior academics in paediatrics of the two university medical schools, President of the Hong Kong College of Paediatricians, and representatives from over 20 child-related medical specialties and disciplines were invited to contribute to the proposal.

3.9 The COC Project Team reviewed a multitude of data and information, including international experiences in establishing children hospital, HA's existing paediatric service provision, and local population projection. The results were reported to the Chief Executive of HA in July 2007. In its report entitled "A Children Hospital for Hong Kong – For the Future Generation and Paediatrics", the Project Team proposed that the Children Hospital should have over 400 beds to provide comprehensive tertiary paediatric subspecialty services, fully supported by related specialties and disciplines for children and adolescent up to 18 years of age. While the Children Hospital would handle the complex conditions, it should be part of the network with other secondary regional hospitals and community centres in the provision of a coordinated and integrated care.

3.10 The Government's announcement of its policy objective to develop the CEP in October 2007 received wide support from HA's clinicians. In anticipation of the development of the CEP, HA launched a service planning exercise in December 2009 to review its current paediatric service provision and to consider how the services in public hospitals can be reconfigured and redistributed when the CEP is established. The purpose is to develop a well-coordinated network of paediatric services centred around the CEP for the benefit of patients.

3.11 It is against the above background that this report has been compiled to spell out the findings of this review and its key recommendations on the future organisation of paediatric services upon commissioning of the CEP.

Chapter IV

Review Process

Chapter IV
Review Process

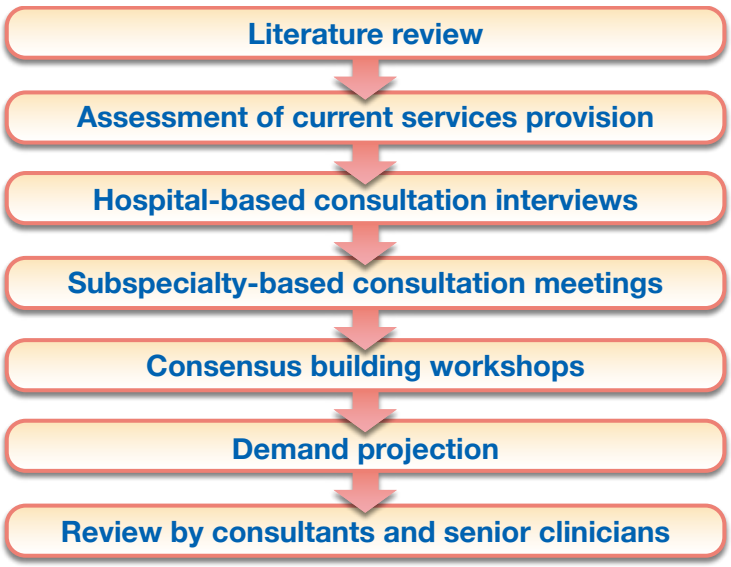
GOVERNANCE

4.1 An HA Steering Committee was formed to provide policy guidance to the service planning exercise. Chaired by the Chief Executive of HA, it comprised the three HA Head Office Directors with clinical administration responsibilities, the Cluster Chief Executive of Kowloon Central, and three clinical leaders from the local paediatric community including President of the Hong Kong College of Paediatricians. A panel of eminent overseas and local health experts was also appointed to provide independent professional advice during the service planning process. Membership and terms of reference of the Steering Committee and Consultant Panel are shown in Appendices 1 and 2 respectively.

4.2 An international consultant with expertise in formulating clinical service plans was engaged to conduct the review together with the project team comprising staff from the Strategy & Planning Division of HA Head Office.

METHODOLOGY

4.3 A role delineation approach was adopted for the review with wide participation of doctors, nurses and allied health professionals from paediatric and related departments in HA hospitals, and all paediatric and paediatric-related subspecialties across hospital boundaries. The review process included:



- Literature review on international experience of organising paediatric services and the world trend of developing academic health science systems
- Assessment of the current services provision through in-depth questionnaire survey of each paediatric department
- Extensive face-to-face small group interviews to clarify the survey responses and solicit inputs from professional staff at different levels and disciplines on areas like model of care, current service gaps, key service relationships and aspiration of future development
- In-depth consultation meetings by paediatric and paediatric-related subspecialty services to discuss in detail the proposed service model and the types of tertiary services to be transferred to the CEP
- HA-wide workshops to consolidate results of the small group consultation meetings
- Demand projection of paediatric services taking into account the proposed service model, population growth, demographic changes as well as age- and specialty-specific service utilisation trends up to 2021
- Critical review of the proposed service model and estimated caseload by the local and overseas project consultants as well as senior clinicians and executives of HA

LITERATURE REVIEW

4.4 A literature review on the historical development of children hospital services and different models of organising paediatric services in different parts of the world was conducted to identify relevant learning points for reference during this service planning exercise. Results of the literature review are presented in Chapter V of this report.

QUESTIONNAIRE SURVEY

4.5 A survey was administered to the 13 paediatric departments of HA in December 2009. Questions covered their paediatric bed numbers, staff profile, subspecialty services provided, service gaps, anticipated changes with inception of CEP, and aspiration on future development. The responses were analysed to highlight the profile of individual departments to form the basis for the small group consultation sessions conducted in January and February 2010.

HOSPITAL-BASED CONSULTATION INTERVIEWS

4.6 Over 110 face-to-face small group consultation sessions were held from 19 January to 10 February 2010 with several hundred frontline staff of individual HA hospitals, covering different ranks and paediatric-related specialties / subspecialties including doctors, nurses and allied health professionals. Views collected from clinicians during the hospital-based consultation interviews were summarised for further discussion and confirmation in the second round consultation meetings by subspecialty.

SUBSPECIALTY-BASED CONSULTATION MEETINGS

4.7 After the hospital-based consultation interviews, 18 working groups covering all major paediatric and paediatric-related subspecialty services were formed. These widely represented groups reviewed the services for each specialty horizontally across hospital boundaries including the types of tertiary services to be provided by the CEP. In April and May 2010, some 50 consultation meetings were conducted by the 18 horizontal subspecialty groups. Results of their deliberations were posted to the HA Intranet to facilitate inter-group communication. A list of the chairs and co-chairs of the 18 subspecialty groups is in *Appendix 3*.

CONSENSUS BUILDING WORKSHOPS

4.8 Two HA-wide seminar / workshops for members of the HA paediatric community were held during the consultation process. Sir Cyril Chantler, a world-renowned paediatrician and former Board Chairman of the London Great Ormond Street Hospital for Sick Children, was invited to conduct a seminar to share his vision and the United Kingdom's experience in establishing children hospitals with clinicians of HA before commencement of the consultation meetings in January 2010. Upon completion of the second round consultation, a whole-day workshop was held on 8 June 2010 for all the subspecialty groups to present their proposals concerning the reorganisation of paediatric services for discussion with members of other groups. The consensus reached in the workshop is reflected in the recommendations set out in Chapter VII of this report.

DEMAND PROJECTION

4.9 Demand projection of paediatric services up to 2021 was computed by the project team with consideration of the proposed service model, population growth, demographic changes as well as age- and specialty-specific service utilisation trends. Details of the process and result are described in Chapter IX of this report.

REVIEW BY CONSULTANTS AND SENIOR CLINICIANS

4.10 Information collected from the questionnaire survey and consultation meetings was evaluated and synthesised for the drafting of the plan for reorganisation of paediatric services after commissioning of the CEP, supplemented by statistics on the estimated caseload. The reports were reviewed by the subspecialty group chairs as well as members of the Consultant Panel in July and August 2010. These covered key recommendations on the proposed service model for each subspecialty service, development of specific subspecialty services, and service enhancements in regional hospitals.

POLICY OVERLAY

4.11 Policy overlay for the recommended reorganisation of paediatric services in HA was provided through the HA Steering Committee. This involved policy decisions at high level with broad considerations having regard to the views of various stakeholders including the Government, HA Management and HA Board.

GUIDING PRINCIPLES

4.12 During the entire review process, the following principles have been adopted to guide the discussions and decisions:

- Placing children at the centre of the paediatric service and endeavouring to meet their health needs with more accessible and safer services;
- Adopting the principle of centralising where necessary (to improve outcomes) and localising where possible (to improve access) in service redistribution; and
- Development of an integrated paediatric service model for children, linking primary, secondary and tertiary services in a coordinated continuum of networked services.

Chapter V

Organisation of Paediatric Services in Overseas Countries

Chapter V

Organisation of Paediatric Services in Overseas Countries

5.1 This chapter presents the learning points identified from a literature review on the different models of organising paediatric services in different parts of the world.

HISTORICAL DEVELOPMENT OF PAEDIATRIC SERVICES

5.2 Modern or Western medicine was mainly adult oriented when it first started. It was not until 1491 when Metlinger first pointed out the special needs of the sick children and special hospital facilities were established to look after sick children in Germany. Subsequently, children hospitals were started in the United Kingdom in 1805 and in the United States in 1830. Hospitals for sick children were then built in most major cities in the industrialised world, while many clinical units for accommodating sick children were also established within medical departments of major hospitals. In recent decades, emphasis had been placed on the promotion of general health of children with progressive application of new technologies to look after the special needs of sick children.

5.2 Recognising that children are not just “little adults”, many big cities around the world have now established one or more children’s hospitals to provide specialised care for infants, children and adolescents. Most children’s hospitals have emergency admissions in addition to being a referral centre for specialised tertiary and sometimes quaternary care of complex conditions. They are of different sizes, mostly with 200−500 beds, either attached to a general adult hospital or stand alone. Most children’s hospitals have affiliation with university medical schools and research institutes to serve as centres for training specialists and conducting research in paediatrics. Their mission is invariably to provide the best in family-centred compassionate care, to lead in scientific and clinical advancement, and to train the next generation of leaders in child health, i.e., excellence in patient care, research and education.

MODELS OF ORGANISING PAEDIATRIC SERVICES

5.3 The development of children’s hospitals is a major milestone in the organisation of paediatric services around the world. There are basically two main models, one is to organise services around the tertiary referral centre type of children’s hospitals with limited secondary care services, and the other is to develop the open-door type that provides accident & emergency services and accepts self referral or parent referral (Diagrams 5.1 and 5.2).

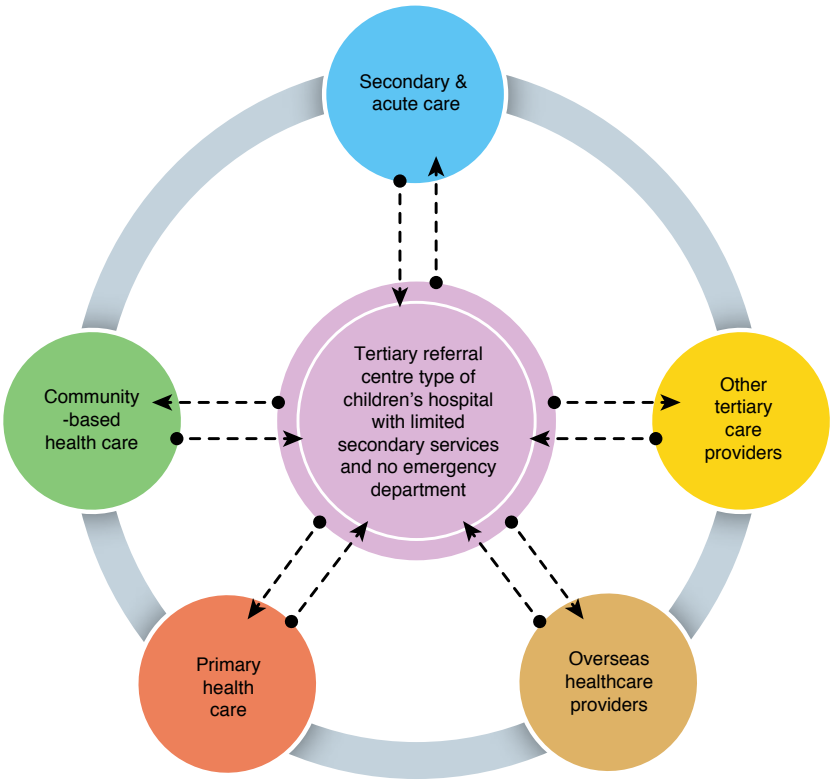


Diagram 5.1 – Organisation of Paediatric Care Around Tertiary Referral Centre

Diagram 5.2 – Organisation of Paediatric Care Around Open-door Type of Children's Hospital

5.4 The Great Ormond Street Hospital for Children (GOSH) in London is representative of the first type of services organisation. It is a specialist hospital without emergency department and secondary care services. It accepts specialist referrals from other hospitals and community providers. The hospital has 35 wards, 10 operating theatres, approximately 150 outreach clinic sites, and 387 available beds, 49 of which are used for intensive care.

5.5 GOSH is a standalone specialist hospital that has partnerships with other paediatric institutions, such as the North Middlesex University Hospital, the Haringey Teaching Primary Care Trust and the Whittington Hospital. The hospital maintains a close link with other general paediatric hospitals to ensure the provision of high quality services for complex conditions. All sub-specialties, including paramedic care, are covered at GOSH and they support each other when presented with complicated conditions. Investigations and operations of the hospital are self-sufficient.

5.6 GOSH aspires to provide a child-friendly environment and to engage parental participation in the process of diagnosis and treatment. The hospital complex is delightfully decorated and is specifically designed for children. Holistic care for patients and their families is best demonstrated by the provision of parent accommodation, hospital schools, play activities, and music and arts projects.

5.7 For research, GOSH is currently affiliated with the Institute of Child Health (ICH) of University College London (UCL). The institute is the largest paediatric research centre in the United Kingdom and is a globally renowned establishment. The hospital is also a training centre for paediatricians and has a partnership with London South Bank University for the training of nurses.

5.8 The second model of organising paediatric services is more common. Examples include Royal Children's Hospital in Melbourne, Hospital for Sick Children in Toronto, and Children's Hospital of Fudan University in Shanghai. While all these hospitals place emphasis on family-centred patient care, advanced research and world-class education with affiliation to a university medical school, they differ from the first type in the provision of emergency and secondary care services. They accept emergency admissions through their accident & emergency department while handling tertiary referrals from other hospitals. They also take care of paediatric trauma cases and serve as major trauma centres for paediatrics in their respective cities.

5.9 These hospitals also maintain close links with other secondary care hospitals in paediatric and child health networks, striving to integrate tertiary services with secondary and primary care. They offer comprehensive services in a wide range of subspecialties and adopt a multidisciplinary approach for enhancing collaborations between different subspecialties and research groups to provide better outcomes for paediatric patients.

LEARNING POINTS

5.10 Studying the models of organising paediatric services around the world has clearly demonstrated the importance of concentrating the caseload of uncommon paediatric diseases and expertise. As indicated by the experiences in other world cities, the merits of concentration are manifold, including the following:

- Concentrating children with highly specialised medical problems produces better clinical outcomes.
- It will assist in retaining and developing high quality clinical staff and expertise.
- Capital investment in child health facilities will be more efficiently utilised.
- Creation of a centre of excellence will provide a stimulus to achieve greater innovation and efficiency of child health services.
- A paediatric medical centre's child-friendly and family-centred environment can reduce the children's emotional and psychological problems resulting from severe illnesses.
- Research to improve patient care will be facilitated.
- The centre of excellence can become a focal point of the tripartite mission of achieving excellence in service, research and education, leading to improved treatments and care.
- Of particular importance will be research into environmental health, epidemiology and genetic susceptibility, not only to rare inherited disorders, but also to common chronic diseases manifest in adults.

5.11 International experience has also shown that while centralising specialised medical care is necessary for safe practice and better outcomes, equally important is localising to improve access to the treatment of less serious common illnesses and for the management of chronic diseases and conditions. There should be coordination between the tertiary referral centre and other hospitals providing secondary care in the locality with established triage and referral protocols to ensure access to the appropriate and timely level of service.

5.12 Secondary care hospitals and community service providers are to provide for the basic medical needs of children in a holistic and family-centred manner. They, together with the tertiary referral centre, should form a managed clinical network to provide a high-quality integrated service to improve the health and healthcare of children from the centre to regional hospitals, the community and general practitioners.

5.13 The fact that nearly all tertiary medical paediatric centres around the world have affiliation with a university medical school has highlighted the need for close partnership with academic institutions in the organisation of paediatric services. The trend in the development of academic health science systems to catalyse the needed transformation of medicine on the international scene is certainly relevant to this review. This concept advocates the development of partnership between academic institutions and healthcare providers (tertiary, secondary and primary) to form integrated health science systems focusing on research, clinical services, education and training to ensure the translation of research breakthroughs into clinical applications for the benefit of patients (from bench to bedside).

Chapter VI

Organisation of Paediatric Services in Hong Kong

Chapter VI

Organisation of Paediatric Services in Hong Kong

6.1 This chapter outlines the development of paediatric services in Hong Kong and describes the profile of paediatric services organisation in its public hospital system as of early 2010.

DEVELOPMENT OF HONG KONG'S PAEDIATRIC SERVICES

6.2 Until the last quarter of the 20th century, sick children in Hong Kong had been mostly looked after by adult physicians or "self-trained" paediatricians. Since late 1960s, more certified and qualified paediatricians have become available and the special needs of sick children are more professionally taken care of.

6.3 Back in the 1960s, there was only one single inpatient referral paediatric unit at Queen Mary Hospital which functioned within the Department of Medicine of the University of Hong Kong. Another paediatric ward was established in a medical unit in Kowloon Hospital, where sick children were managed under the direction of an adult physician. It was not until 1962 when the first professor of paediatrics was appointed that a concerted effort was made to develop paediatrics as a distinct clinical discipline. It was against this background that the Hong Kong Paediatric Society was formed on 1 February 1962 "to advance the knowledge of Paediatrics, to help maintain the standard of paediatric practice in Hong Kong, and to promote child health".

6.4 On the development of special services, the earliest facilities provided for children were the isolation and rehabilitation wards for children with tuberculosis in Ruttonjee Hospital, where most children with tuberculous meningitis and complications of pulmonary tuberculosis in the 1950s were accommodated. By 1956, the first special hospital for children was set up at Sandy Bay to provide convalescent care to children suffering from the sequalae of poliomyelitis and spinal tuberculosis. The latter condition made Hong Kong world famous for its "anterior spinal fusion" for tuberculosis spine. This hospital was later named after the Duchess of Kent.

6.5 The development of paediatrics as a distinct clinical discipline had led to increasing subspecialisation in the provision of paediatric services. The first successful attempt to ventilate a newborn with severe respiratory distress syndrome was made in 1968 at Queen Mary Hospital. The first human intermittent ventilation was introduced in 1970 at Queen Elizabeth Hospital. The concept of paediatric intensive care was first coined-in in 1969. However, it was not until 1982 when the proper setup for neonatal intensive care was instituted. The first genetic counselling service was set up in 1981. This was coupled with the setting up of a prenatal diagnosis laboratory, introducing DNA technology for accurate diagnosis of thalassaemia syndromes at Tsan Yuk Hospital[1].

6.6 Continuous Ambulatory Peritoneal Dialysis (CAPD) and renal transplantation were introduced in 1982. A well-planned paediatric cardiology programme was established at Grantham Hospital also in 1982. A new neuro-developmental paediatric service was initiated at Duchess of Kent Children Hospital in 1985. In November 1991, the Hong Kong College of Paediatricians was founded under the Hong Kong Academy of Medicine to advance knowledge in the science and art of paediatrics through the promotion of postgraduate training, research and other academic activities.

6.7 Since the establishment of the Hospital Authority (HA) in 1990, significant improvements in paediatric hospital facilities and services have occurred in Hong Kong over the past 20 years, with the development of subspecialties becoming a popular phenomenon in various public hospitals. However, tertiary level services have largely been developed opportunistically, which is not conducive to concentration of cases and pooling of scarce expertise/resources for management of low-volume high-complexity paediatric conditions. For a number of paediatric-related specialties such as pathology and radiology, facilities and expertise are still adult oriented.

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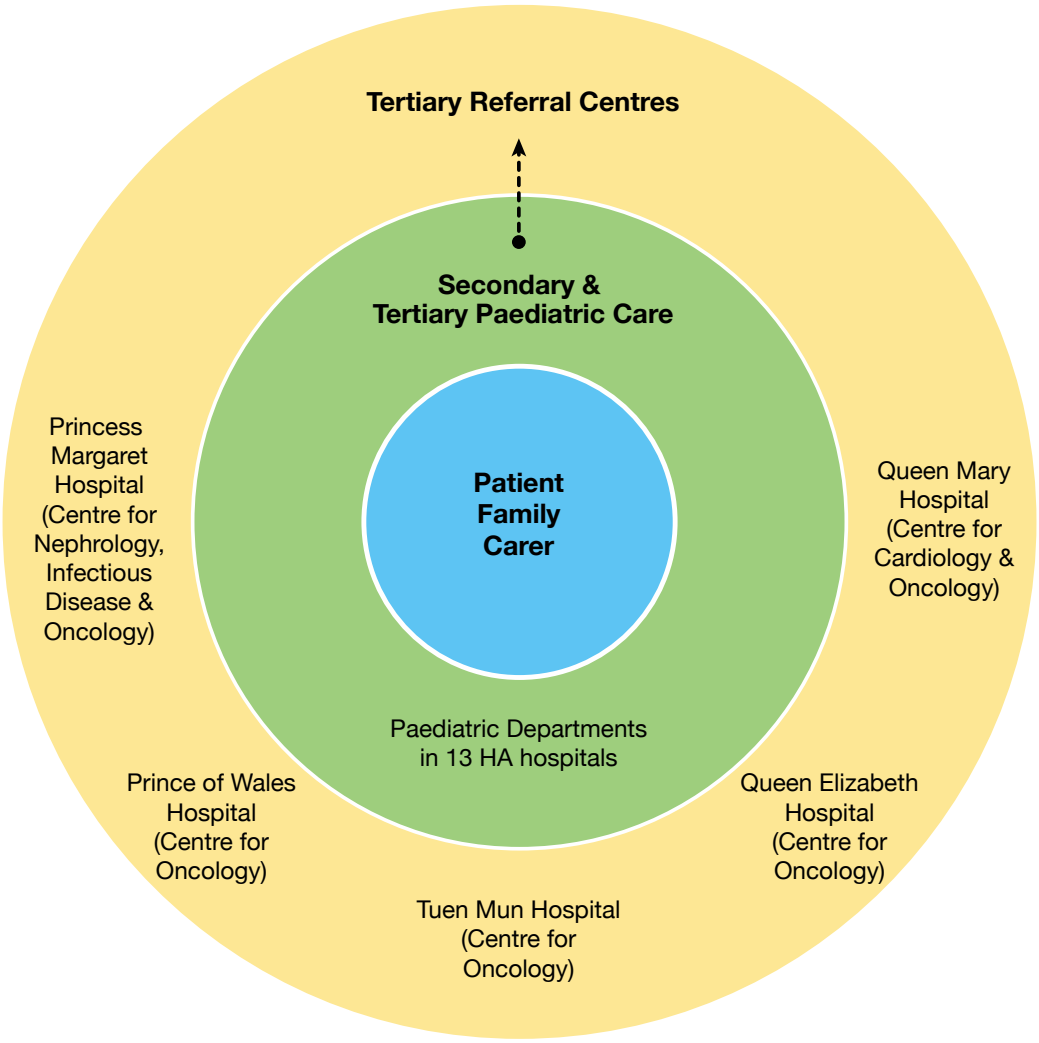
[1] *Yeung C Y, "Evolution of Child Health Care in Hong Kong", Hong Kong Journal of Paediatrics (New Series) 2001; 6:66-71.*


Public Hospitals with Paediatric Services
Shenzhen
Tuen Mun Hospital
Yan Chai Hospital
New Territories
Alice Ho Miu Ling Nethersole Hospital
Prince of Wales Hospital
Princess Margaret Hospital
Kowloon
Queen Elizabeth Hospital
Caritas Medical Centre
Lantau Island
Hong Kong Island
Kwong Wah Hospital
Tseung Kwan O Hospital
Cheung Chau Island
United Christian Hospital
Queen Mary Hospital
The Duchess of Kent Children's Hospital
Pamela Youde Nethersole Eastern Hospital

ORGANISATION OF PAEDIATRIC SERVICES IN PUBLIC HOSPITALS

6.8 The current model of paediatric care in public hospitals is shown in Diagram 6.1.

Diagram 6.1 – Current Model of Paediatric Care



6.9 As shown in the diagram, paediatric services are currently provided in 13 HA Hospitals. They deliver both secondary and tertiary services. The range of tertiary services offered by each hospital varies, depending on the availability of expertise and resources. At present, there are several tertiary referral centres for oncology, cardiology, nephrology and infectious disease. These centres receive referral of complex cases from other hospitals.

BEDS

6.10 As at 31 December 2009, there are 1,372 paediatric acute inpatient and day patient beds in 13 HA hospitals, of which 936 are for paediatrics (including 45 paediatric intensive care and 13 high dependency beds) and 436 for neonates (including 100 neonatal intensive care beds) (*Table 6.1*). Included in these are 102 paediatric and special care baby day beds.

Table 6.1 – Paediatric Acute Inpatient and Day-patient Beds in use at HA Hospitals (as at 31 December 2009)

Hospital		Paediatric beds						Neonatal beds			Total
		General Paediatrics			PICU	PID	Total	NICU	SCBU	Total	
		Acute	HD	Total							
HKEC	PYNEH	51	–	51	3	–	54	7	22	29	83
HKWC	DKCH	13	–	13	–	–	13*	–	–	–	13*
	QMH	97	8	105	7	–	112	17	37	54	166
KCC	QEH	105	–	105	9	–	114	15	66	81	195
KEC	TKOH	36	–	36	–	–	36	–	–	–	36
	UCH	70	–	70	3	–	73	10	35	45	118
KWC	CMC	68	–	68	–	–	68	–	–	–	68
	KWH	80	–	80	5	–	85	5	44	49	134
	PMH	74	1	75	8	24	107	14	32	46	153
	YCH	29	–	29	–	–	29	–	–	–	29
NTEC	AHNH	67	–	67	–	–	67	–	8	8	75
	PWH	85	4	89	5	–	94	21	60	81	175
NTWC	TMH	79	–	79	5	–	84	11	32	43	127
Total		**854**	**13**	**867**	**45**	**24**	**936**	**100**	**336**	**436**	**1,372**

* Excluding 20 convalescent/rehabilitation beds

Source: HA Quarterly Bed Statistics Report 2009

Key: HD – high dependency
PICU – paediatric intensive care unit
PID – paediatric infectious disease
NICU – neonatal intensive care unit
SCBU – special care baby unit
PYNEH – Pamela Youde Nethersole Eastern Hospital
DKCH – Duchess of Kent Children's Hospital
QMH – Queen Mary Hospital
QEH – Queen Elizabeth Hospital
TKOH – Tsueng Kwan O Hospital
UCH – United Christian Hospital
CMC – Caritas Medical Centre
KWH – Kwong Wah Hospital
PMH – Princess Margaret Hospital
YCH – Yan Chai Hospital
AHNH – Alice Ho Miu Ling Nethersole Hospital
PWH – Prince of Wales Hospital
TMH – Tuen Mun Hospital

6.11 Among the above paediatric beds in HA, there are 142 specialised service beds, the distribution of which is shown in *Table 6.2* below.

Table 6.2 – Specialised Beds in Referral Centres (as at 31 Dec 2009)

Centre	Hospital	Number of Beds
Cardiology	Queen Mary Hospital	40
Oncology	Prince of Wales Hospital	28
	Queen Mary Hospital	21
	Princess Margaret Hospital	5
	Queen Elizabeth Hospital	18
	Tuen Mun Hospital	10
Nephrology	Princess Margaret Hospital	20
Total		**142**

Source: Survey of HA paediatric departments conducted in December 2009

6.12 There are currently two HA hospitals specialising in providing rehabilitation services for paediatric patients, namely Duchess of Dent Children's Hospital (DKCH) and Caritas Medical Centre (CMC). As at 31 December 2009, there were 33 specialised rehabilitation beds in DKCH and 160 in CMC (for mentally handicapped). There were also ten paediatric rehabilitation beds in Kowloon Hospital (KH).

ACTIVITIES

6.13 The activity statistics of the year 2009 are used as references for this review. Statistics on inpatient (IP) and day-patient (DP) discharges & deaths, inpatient and day-patient bed days and specialist outpatient (SOP) attendances with breakdown by General Paediatrics and Neonates as well as by hospital are compiled to give an overview of the existing paediatric services in HA.

6.14 In 2009, inpatient services provided to paediatric patients occupied a total of 355,492 bed days, of which 139,358 were for neonates. The number of bed days for paediatric intensive care services amounted to 15,953 bed days (7.4% of general paediatrics), whereas the total for neonatal intensive care services was 30,024 (21.5% of neonates). The overall inpatient bed utilisation rate was 77.2%. The number of baby deliveries was 40,575, while the number of paediatric Accident & Emergency attendances was 252,495. There were 251,197 specialist outpatient attendances, of which 20,010 were first attendances.

MANPOWER

6.15 There are about 350 full-time equivalent doctors working in the paediatric departments of HA hospitals (*Table 6.3*). Majority of them have been trained in several paediatric subspecialties and have been practising subspecialties for several years.

Table 6.3 – Number of Doctors working in Paediatric Departments of HA Hospitals (as at 31 Dec 2009)

	Hospital												
Type of Staff	**AHNH**	**CMC**	**KWH**	**PMH**	**PWH**	**PYNEH**	**QEH**	**QMH***	**TKOH**	**TMH**	**UCH**	**YCH**	**TOTAL**
Consultant	3	1	2	6	7.75	3	5	8	1	5	2	1	44.75
Associate Consultant/ Senior Medical Officer	4	6	6	10	6.1	6	9	9	3	9	11	1	80.1
Resident Specialist/ Medical Officer	3	4	6	8	9	3	14	10	3	2	3	0.5	65.5
Resident Trainee/ Medical Officer	8	3	9	13	17	14	12	15	5	21	12	1.5	130.5
House Officer	2	2	2	4	0	2	6	7	0	3	2	0	30
Total	**20**	**16**	**25**	**41**	**39.85**	**28**	**46**	**49**	**12**	**40**	**30**	**4**	**350.85**

* Figures include doctors working in the Department of Paediatric Cardiology and DKCH

Source: Survey of HA paediatric departments conducted in December 2009

6.16 There are about 1,247 full-time equivalent nurses working in the paediatric departments of HA (*Table 6.4*). Over 55% of them are working in various specialised centres including the tertiary referral centres, neonatal intensive care units, and paediatric intensive care units.

Table 6.4 – Number of Nurses working in Paediatric Departments of HA Hospitals (as at 31 Dec 2009)

	Hospital												
Type of Staff	**AHNH**	**CMC**	**KWH**	**PMH**	**PWH**	**PYNEH**	**QEH**	**QMH***	**TKOH**	**TMH**	**UCH**	**YCH**	**TOTAL**
Department Operations Manager/Senior Nursing Officer	1	1	1	1	1	1	1	2.4	0	1	1	0.33	11.73
Ward Manager/ Nursing Officer/ Advanced Practice Nurse/ Nurse Specialist	7	10	18	21	25	15	33	32	4	24	22	4	215
Registered Nurse	26	34	79	107	151	68.3	99	153	12	113	85	15	942.3
Enrolled Nurse	1	21	1	1	0	0	4	20	2	6	2	0	58
Nurse Trainee	0	0	0	0	3	6.5	0	1	1	9	0	0	20.5
Total	**35**	**66**	**99**	**130**	**180**	**90.8**	**137**	**208.4**	**19**	**153**	**110**	**19.33**	**1,247.53**

* Figures include nurses working in the Department of Paediatric Cardiology and DKCH

Source: Survey of HA paediatric departments conducted in December 2009

Chapter VII

Proposed Service Model

Chapter VII

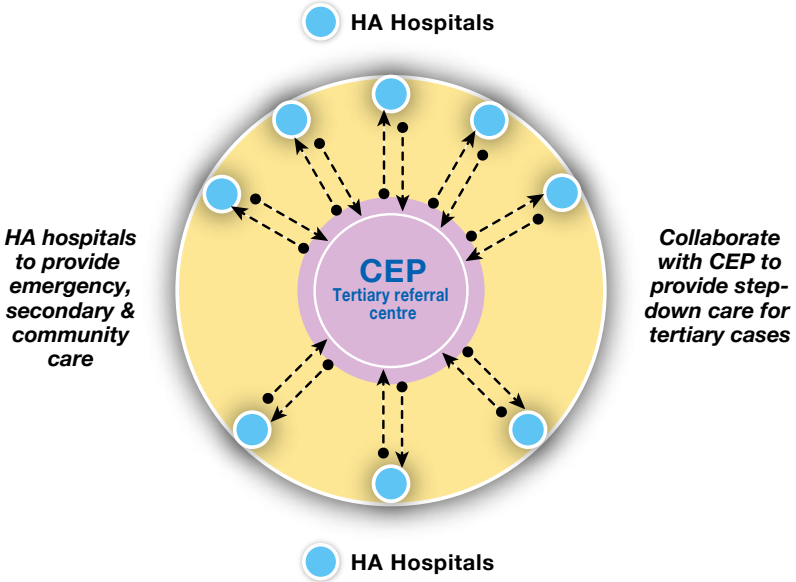
Proposed Service Model

7.1 This chapter presents the results and recommendations of the review on clinical service models for specific paediatric and paediatric-related specialties and subspecialties. They are developed through a comprehensive consultation process described in the Review Process chapter. References have been made to the different models of organising paediatric services in overseas countries and the current services provision set out in the previous two chapters.

OVERALL SERVICE MODEL

7.2 Based on findings of the hospital-based consultations and the consensus reached through the sub-specialty working groups, it is proposed that upon commissioning of the CEP, paediatric services in Hong Kong should be reorganised under a **hub-and-spoke model** with particular emphasis on **partnership** between the CEP and HA hospitals. Essentially, this service model will concentrate complicated cases, advanced technology and expertise at the CEP to raise the quality of tertiary services, while enhancing and integrating secondary services in the HA regional hospitals to form a well-coordinated network of paediatric services for achieving better clinical outcomes.

7.3 As the hub in the service network, the CEP will serve as a tertiary referral centre for diagnosing and treating complex cases requiring multidisciplinary management or surgical intervention. As spokes, the HA hospitals with paediatric departments will provide mainly emergency, secondary and community paediatric care. The proposed service model is diagrammatically represented as follows:



7.4 Under this service model, close partnership between the CEP and HA hospitals will have to be developed to set up integrated territory-wide service networks for all major paediatric subspecialties. Referral guidelines, common clinical protocols and shared care models should be formulated to link tertiary, secondary, primary and community care services in a holistic way.

7.5 To support the centralisation of tertiary paediatric services while maximising patient care, there is a need to provide a dedicated specialist paediatric transport service for efficient and safe inter-hospital transfers, including emergency retrieval of patients by the CEP.

7.6 The proposed service model for individual paediatric and paediatric-related subspecialties are presented in the remaining part of this chapter. While the model of each subspecialty service varies, there is general consensus that in the area of shared care, the CEP and HA hospitals should collaborate closely to provide more opportunities in specialist training and research. Meanwhile, HA's paediatric departments in regional hospitals will continue to provide consultation service to other specialties, step-down care for patients returned from the CEP, emergency and high-volume secondary level services, as well as community care.

PAEDIATRIC ONCOLOGY

Current service provision

7.7 Paediatric oncology services are currently provided by five designated centres in Prince of Wales Hospital, Princess Margaret Hospital, Queen Elizabeth Hospital, Queen Mary Hospital, and Tuen Mun Hospital with the development of common treatment protocols for nearly all childhood cancers and involvement in international collaborative and national multi-centre studies.

7.8 There are a total of 82 paediatric oncology beds (including 7 bone marrow transplant beds) and 20 ambulatory beds in the five centres, which are handling some 170 new cancer cases per year. Bone marrow transplants are performed at Prince of Wales Hospital and Queen Mary Hospital only. All these services are tertiary in nature and require multidisciplinary management.

Proposed service model

7.9 Paediatric oncology services will be centralised at the CEP upon its commissioning to concentrate cases and expertise for enhancement of service quality, research and training. It is recommended that all these cases should be managed under one territory-wide programme administered and coordinated by the CEP oncology team. Regional hospitals especially those in geographically distant areas may take part in providing step-down and long-term follow-up care under shared clinical protocols and with support of oncologists from the CEP.

7.10 For radiotherapy service, it is suggested that there should be on-site services in the hospital complex comprising the CEP, the Centre of Excellence in Neuroscience (CEN), and the new acute general hospital.

Services provided by CEP

7.11 It has been agreed that all the existing oncology beds and newly diagnosed paediatric oncology cases should be transferred to the CEP for initial work up and management. Intrathecal, high-dose chemotherapy and febrile neutropenia should also be managed in the CEP. In addition, the CEP team should provide oncology consultation service to all regional hospitals and take the lead in developing a territory-wide palliative care programme for paediatric patients, which would also cover those dying from other illnesses.

Services provided by regional hospitals

7.12 As an interim arrangement, old cases on less intensive treatment or follow-up for relapse after completion of treatment may continue to be handled at regional hospitals under regular review by the CEP oncology team. Regional hospitals may also provide long-term follow-up and multidisciplinary support to cancer survivors in their catchment areas to improve service accessibility.

PAEDIATRIC HAEMATOLOGY

Current service provision

7.13 Tertiary paediatric non-oncological haematology services are currently provided together with oncology services in the five cancer centres, e.g., aplastic anaemia. Secondary services and haematology consultation support are provided in all HA paediatric departments with different levels of sub-specialisation.

Proposed service model

7.14 It is recommended that the CEP should serve as a referral centre for severe or rare haematological diseases with complicated conditions. It should be the only paediatric haematopoietic stem cell transplant centre in Hong Kong, and provide support to regional hospitals for managing step-down cases and less complicated haematological illnesses.

Services provided by CEP

7.15 The CEP will manage the following haematological diseases:

- all severe haematological conditions with life-threatening complication, e.g., severe aplastic anaemia, hereditary thrombotic and bleeding conditions
- all newly diagnosed cases requiring multidisciplinary care, e.g., haemophilia
- rare conditions, e.g., sickle cell disease and Paroxysmal nocturnal haemoglobinuria
- special treatment or procedures, e.g., radioactive synovectomy and haemophilia treatment with inhibitor

7.16 It is also proposed that comprehensive centres be set up at the CEP for some haematological diseases such as thalassaemia and haemophilia to provide integrated care and smooth transition of care to adult haematology services.

Services provided by regional hospitals

7.17 Regional hospitals will continue to take care of the common haematological conditions, such as Idiopathic Thrombocytopenic Purpura, iron deficiency anaemia and thalassaemia intermedia. They may also provide step-down care for those CEP patients requiring regular blood transfusion of thalassaemia major and factor concentrate treatment.

PAEDIATRIC CARDIOLOGY AND CARDIAC-THORACIC SURGERY

Current service provision

7.18 At present, Queen Mary Hospital is the tertiary referral centre for paediatric cardiology and cardiac-thoracic surgery in Hong Kong. It receives referrals from all over the territory and is performing some 300 cardiothoracic surgeries and 500 cardiac catheterisation procedures per year. It has 40 beds including six paediatric cardiac intensive care beds and four high dependency unit beds. Secondary paediatric cardiology services are currently provided in all HA paediatric departments with different levels of sub-specialisation.

Proposed service model

7.19 With inception of the CEP, it is recommended that the tertiary services currently provided at Queen Mary Hospital including its 40 beds should be trans-located to the CEP to further the development of this highly specialised paediatric subspecialty. The CEP will in future be the tertiary referral centre for managing complicated cases and invasive high risk procedures to provide adequate caseload to maintain clinical expertise and ensure quality of care.

7.20 A strong network between the CEP and regional hospitals should be established to provide high quality, sustainable and safe services to paediatric patients with cardiac problems. The roles of regional hospitals in the network are to provide step-down care for patients transferred back from the CEP, to handle secondary paediatric cardiology cases, and to provide emergency and consultative cardiology service coverage to the acute hospitals in their respective clusters.

Services provided by CEP

7.21 The types of paediatric cardiology and cardiothoracic surgery cases to be concentrated in the CEP include:

- paediatric cardiothoracic surgery including both open and closed heart surgery
- invasive procedures such as diagnostic and interventional cardiac catheterisation
- Inpatient and outpatient services for managing conditions like:
  - end-stage heart failure, mechanical circulatory support and cardiac transplantation
  - cardiac electrophysiology, complex cardiac arrhythmia, ablation of abnormal pathways, and pacemaker implantation
  - cardiac intensive care for paediatric patients and neonates
  - severe pulmonary hypertension

7.22 New tertiary services to be considered for development at the CEP may include:

- Mechanical circulatory support programme such as extracorporeal membrane oxygenation (ECMO) and Ventricular assist device (VAD)
- Paediatric heart transplantation programme

Services provided by regional hospitals

7.23 Regional hospitals will continue to provide secondary care for patients with cardiac problems in their respective catchment areas except for those cases requiring surgery or invasive investigations. Examples of these services include simple non-interventional cardiac procedures, emergency assessment of cyanotic newborns, pre- and post-operative care, emergency consultation support to paediatric and neonatal intensive care units, as well as outpatient cardiology consultations.

7.24 Inter-hospital collaborations will be encouraged to maximise utilisation of resources and organisation of cardiovascular health programmes such as prevention of hypertension and lipid disorders.

PAEDIATRIC NEPHROLOGY AND UROLOGY

Current service provision

7.25 Princess Margaret Hospital (PMH) is currently serving as the tertiary referral centre for management of paediatric chronic kidney disease and end stage renal disease (ESRD) patients in Hong Kong with 14 specialised renal, one high dependency unit, four haemodialysis and two paediatric urology beds. The Paediatric Nephrology Centre in the hospital provides paediatric nephrology, urology and ESRD services, renal support for paediatric and neonatal intensive care units, and treatment for complicated paediatric renal diseases including acute renal replacement and plasma exchange.

7.26 At present, there are about 50 paediatric patients with chronic renal failure requiring renal replacement therapy in Hong Kong. All of them are treated in PMH. Secondary paediatric nephrology and urology services are now provided in all HA paediatric departments with different levels of sub-specialisation.

Proposed service model

7.27 Upon establishment of the CEP, paediatric tertiary nephrology and urology services currently provided at PMH will be trans-located to the CEP, together with its paediatric nephrology beds. Both acute and chronic renal replacement therapy will be concentrated in the CEP, while regional hospitals will focus on providing secondary nephrology and urology services.

Services provided by CEP

7.28 Complicated paediatric renal and urological cases will be managed in the CEP. These include cases requiring various acute renal replacement therapy and plasmapheresis in paediatric and neonatal intensive care settings. The end stage renal disease programme for managing late-stage chronic kidney disease, automated peritoneal dialysis, chronic haemodialysis and paediatric renal transplantation should also be administered and coordinated by the CEP.

7.29 Moreover, development of new services will be concentrated in the CEP, for example:

- Haemoperfusion and dialysis therapy for drug poisoning and detoxification
- Combined liver and renal transplantation
- Renal function and physiology assessment (in collaboration with pathology and nuclear medicine experts)
- Multidisciplinary clinics for management of complex diseases
- Molecular diagnosis of genetic renal diseases

Services provided by regional hospitals

7.30 Regional hospitals will focus on providing secondary inpatient, outpatient and community-based nephrology and urology services for populations of their catchment areas. Examples of these services include management of nephrotic syndrome and various kinds of glomerulonephritis. They will also participate in providing step-down care for patients returned from the CEP, and transitional care for grown-up patients.

PAEDIATRIC NEUROLOGY AND NEURO-DEVELOPMENT

Current service provision

7.31 Paediatric neurology and neuro-development services are currently provided in all paediatric departments of HA hospitals both in inpatient and outpatient settings. Among complicated neurological cases, intractable epilepsy, neuromuscular diseases, neurometabolic/neurodegenerative diseases or intractable movement disorders and encephalopathy top the diagnosis list.

Proposed service model

7.32 With the Centre of Excellence in Neuroscience (CEN) located in its proximity, the CEP is well positioned to develop advanced paediatric neurology and neuro-development programmes in collaboration with the CEN. It is recommended that all complicated paediatric neuroscience procedures should in principle be carried out at the CEP which is equipped with paediatric and neonatal intensive care units. If needed, staff from the CEN could be sent over to the CEP to perform the procedures. Upon development of the CEP and CEN, regional hospitals should focus on managing high-volume common neurological disorders.

Services provided by CEP

7.33 The following complex neurological conditions will be referred to the CEP for diagnosis and treatment:

- Intractable epilepsy, including epilepsy surgery and use of ketogenic diet
- Cerebral palsy with difficult management issues including use of a gait laboratory, selective dorsal rhizotomy, and intrathecal baclofen pump
- Intractable movement disorders including deep brain stimulation
- Various neuro-immunological diseases such as multiple sclerosis
- Developmental assessment for children with complex disabilities

Services provided by regional hospitals

7.34 Upon development of the CEP, existing secondary paediatric neurology and neuro-development services in HA hospitals will be reorganised to provide secondary and high volume services, for example:

- Step-down care for patients returned from CEP, including ventilator care
- Autism Programme
- Attention Deficit Hyperactivity Disorder Drug Titration Programme

7.35 Regional hospitals should also develop sub-acute neuro-rehabilitation and developmental behavioural paediatrics to enhance development of multidisciplinary ambulatory care services and to augment staff training and parent education.

PAEDIATRIC RESPIROLOGY

Current service provision

7.36 Paediatric respirology services are provided to a variable extent in all HA hospitals with paediatric departments. Asthma and sleep disordered breathing top the list of diagnoses. Pulmonary function studies and sleep studies are provided in some hospitals.

Proposed service model

7.37 It is proposed that complex respirology cases, surgeries and procedures should be managed by the CEP with the development of common protocols and guidelines for shared care, training and research. In view of the high volume of some common conditions such as asthma, they will be managed in regional hospitals.

Services provided by CEP

7.38 Complex respirology cases to be managed by the CEP may include:

- Complex or rare respiratory diseases, e.g., pulmonary hemosiderosis, interstitial lung disease, cystic fibrosis, obstructive sleep apnea with multiple morbidities, dysfunctional swallowing with upper airway obstruction requiring aero-digestive assessment, and congenital central hypoventilation
- Complex surgeries, e.g., tracheoplasty, Treacher-Collins syndrome, lung transplant, tracheostomy in young children, and diaphgramatic pacing
- Complex procedures, e.g., infant lung function test, infant overnight Polysomnography, flight simulation test/hypoxic challenge, cilia function study, Sweat test, and respiratory muscle assessment

Services provided by regional hospitals

7.39 Regional hospitals will continue to provide comprehensive secondary paediatric respirology services through their paediatric departments. Examples of these services include:

- High volume cases such as asthma
- Community-based rehabilitation for patients recovering from complex respiratory diseases and cardio-pulmonary de-conditioning
- Medium term support for pre- and post-operation care
- Nurse or allied health professional led respiratory clinics
- Community education programmes on respiratory medicine

PAEDIATRIC ENDOCRINOLOGY AND METABOLISM

Current service provision

7.40 Paediatric endocrinology and metabolism services are provided in all HA hospitals with paediatric departments. The care of patients is predominantly ambulatory. Other than diabetes mellitus and surgical cases, most endocrine conditions do not usually need long hospitalisation. However, patients with inborn error of metabolism (IEM) often need intensive inpatient care.

Proposed service model

7.41 The CEP will be a tertiary referral centre for managing complex endocrinology and metabolism cases requiring surgical intervention, molecular lab support or multidisciplinary management. It has an important role to play in coordinating the development of referral guidelines, clinical management protocols, quality standards and assurance schemes for building up a territory-wide paediatric endocrinology and metabolism service programme. Under the leadership of the CEP, regional hospitals should continue to provide secondary and step-down care for paediatric patients in their respective catchment areas.

Services provided by CEP

7.42 The following are some examples of the complex endocrinology and metabolism cases to be treated in the CEP:

- Post bone marrow transplant, chemotherapy and neurosurgery cases requiring endocrine function assessment
- Complex cases of disorder of sex development
- Growth Hormone and Luteinizing Hormone-Releasing Hormone Analogue treatment
- Complex metabolic diseases such as inborn error of metabolism
- Enzyme replacement therapy for rare metabolic disorders
- Joint management of neuro-metabolic diseases with neurologists

Services provided by regional hospitals

7.43 Regional hospitals will focus on providing step-down care for patients transferred back from the CEP, develop patient support groups and community network for management of endocrine and metabolic diseases, and handle less complicated secondary cases such as adrenal puberty, obesity, diabetes and thyroid disorders. Paediatric departments in regional hospitals should also provide endocrinology support to other clinical departments, conduct community studies on endocrine and metabolic diseases, and help set up registries for IEM, diabetes and other paediatric endocrine disorders.

CLINICAL GENETICS

Current service provision

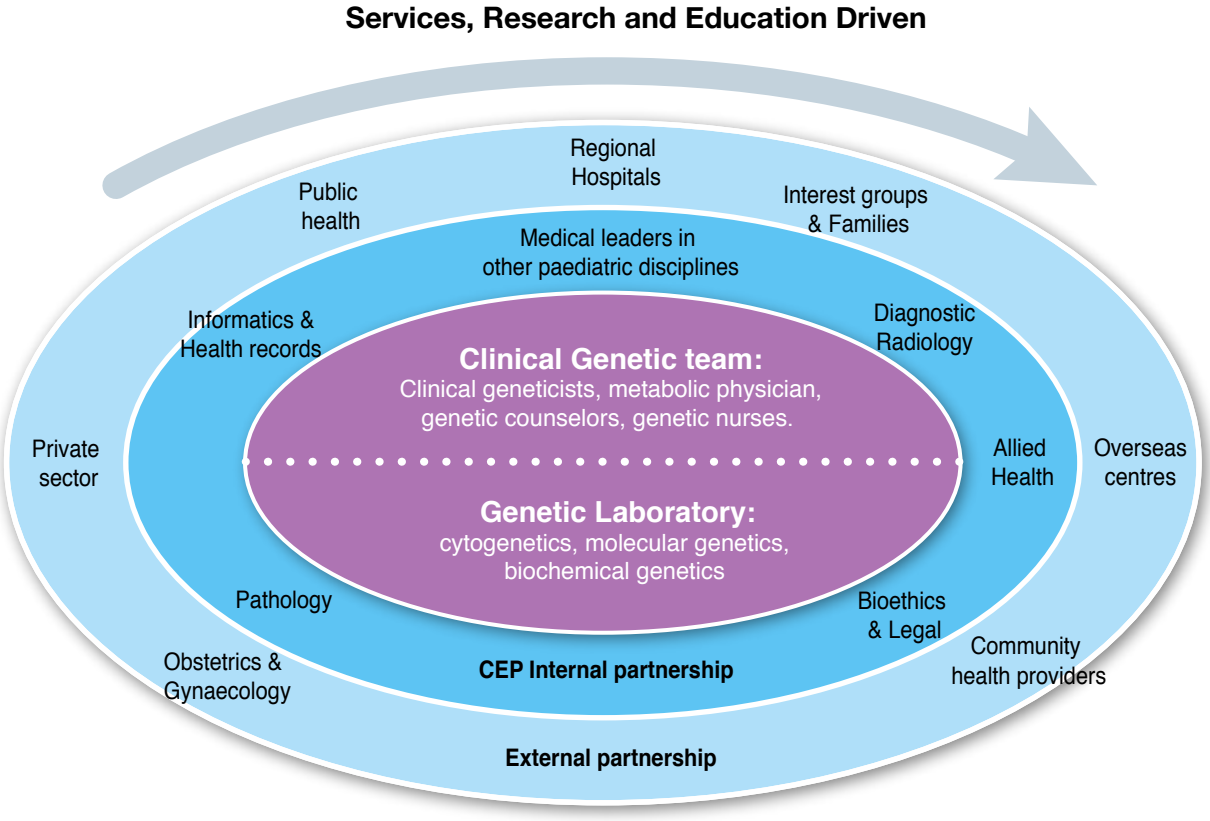
7.44 Paediatric clinical genetic services are not well developed at present, though some foundation works are being done in the two teaching hospitals. However, the discipline has expanded rapidly in recent years. It now includes a spectrum from inborn error of metabolism and malformation to complex disorders.

Proposed service model

7.45 Clinical genetic service will be concentrated in the CEP. It will provide clinical assessment of complex genetic cases leading to a definitive diagnosis, acting as source of information for providing consultation to other clinicians and delivery of genetic counselling as well as molecular and functional diagnostics.

7.46 These services should be provided by a multidisciplinary core team consisting of clinical geneticists, genetic nurses, and genetic counsellors, with support from other professionals including pathologist, diagnostic radiologist, allied health professionals, etc.

7.47 This team would need to be backed up by a robust reference laboratory, which can perform a full range of genetic tests from basic molecular and cytogenetic tests, DNA & tissue banking to state-of-the-art technologies in genetics and genomics. An integrated service network should be developed between the CEP team and relevant parties in regional hospitals, universities, Department of Health, the private sector, other community health providers and overseas genetic/genome centres (See the diagram below).



7.48 While receiving referrals from regional hospitals, the CEP clinical genetic service team will formulate shared care guidelines and protocols to involve regional hospitals in providing step-down and transitional care for its patients. It will also collaborate closely with regional hospitals to conduct clinical genetics research and training including the development of newborn screening programme and birth defect registries.

7.49 It would be necessary to enhance communication between the CEP and regional hospitals through academic meetings, teleconferences, and genetic counselling and management reports. These channels for knowledge transfer and platform to facilitate territory-wide basic and clinical genetic/genomic research are vital in the maintenance of the cutting-edges of the clinical genetic service.

PAEDIATRIC IMMUNOLOGY, RHEUMATOLOGY & ALLERGY

Current service provision

7.50 Paediatric rheumatology service is mainly provided on outpatient basis. Inpatient admissions are indicated for multidisciplinary assessment, inter-current major illness, procedures like intra-articular steroid injection, renal biopsy or biologics or chemotherapy administration.

7.51 For allergy cases, most HA hospitals have comprehensive repirology service to take care of asthma patients. Some hospitals operate paediatric dermatology clinics to look after patients with severe atopic dermatitis, complemented by the Department of Health's dermatology service. Food allergy is usually managed at general clinics or gastroenterology clinics. Allergic rhinitis is often jointly managed by general paediatricians, respirologists and ENT surgeons.

7.52 The tertiary paediatric immunology clinics at the two teaching hospitals are handling many allergic diseases, as well as cases with suspected immuno-deficiencies and undefined autoimmunity and inflammation.

Proposed service model

7.53 Severe primary immune-deficiencies, autoimmune diseases, rheumatic and allergic diseases, and haematopoietic stem cell transplantation will be managed in the CEP.

7.54 The immunology, rheumatology and allergy (IRA) team in the CEP will assume the role of coordinating the management of complex/rare diseases and organisation of interdisciplinary research/training programmes, while regional hospitals will provide acute and secondary IRA services based on common clinical protocols.

7.55 To enhance the development of multidisciplinary care for the IRA patients, it is proposed that consideration be given to setting up one-stop ambulatory centres for paediatric rheumatology, immunology and allergy in the CEP.

Services provided by CEP

7.56 The following types of IRA conditions will be managed in the CEP with multi-specialty and multi-disciplinary participation:

Immunology and allergy

- Diagnostic evaluation and clinical care of conditions like:
  - primary immunodeficiency or immune dysregulation
  - anaphylaxis or anaphylactoid reactions
  - multiple drug allergy, latex and insect allergy with systemic reactions
  - rare disorders
- Stem cell transplantation of immunodeficiency
- Immune-replacement and immunomodulatory therapy
- Allergen immunotherapy
- Drug desensitization
- Food allergy – oral tolerance induction
- Use of various biologics

Rheumatology

- All uncommon and/or complex diseases such as juvenile dermatomyositis, systemic sclerosis, chronic vasculitis syndrome, and periodic fever syndrome
- Cases with multisystem problems requiring joint management with other subspecialties
- Patients receiving specific treatment modalities such as:
  - Biologics or cellular therapies
  - multidisciplinary assessment or intervention
  - intra-articular steroid injection
  - autologous haematopoietic stem cell transplantation
- Juvenile Idiopathic Arthritis and systemic lupus erythematosus

7.57 Diagnostic and therapeutic services for patients with 'orphan diseases' will also be centralised in the CEP, including the use of 'orphan drugs', cytokine-based treatments for rheumatological, autoimmune and allergy disorders, as well as cellular therapies for primary immuno-deficiencies.

Services provided by regional hospitals

7.58 Regional hospitals will mainly provide step-down care as well as acute and secondary IRA services. Examples of these services include management of asthma, rhinitis, dermatitis, simple food/drug allergy, inflammation disorders, and rheumatology cases not requiring special treatment. Emphasis will be placed on enhancing their acute ambulatory and community-based IRA programmes through close interface with private practitioners and voluntary organisations.

PAEDIATRIC GASTROENTEROLOGY, HEPATOLOGY & NUTRITION

Current service provision

7.59 Gastroenterology, hepatology and nutrition services are currently provided by most HA paediatric departments. Short gut syndrome and intestinal malabsorption are the top diagnoses. The incidences of chronic inflammatory bowel diseases and cases requiring total parenteral nutrition have been increasing in recent years, while other chronic gastrointestinal (GI) and hepatic conditions are rather uncommon.

Proposed service model

7.60 The CEP should provide advanced medical treatment and disease prevention for children with gastrointestinal, liver and nutrition disorders through high-quality patient care programmes, education, training and research.

Services provided by CEP

7.61 The CEP will manage severe or complicated gastrointestinal, liver and nutritional conditions, for example:

Gastrointestinal diseases

- Congenital gut anomalies
- Complicated gastro-esophageal reflux disease
- Intestinal mal-absorption, chronic diarrhoea and steatorrhea
- Short gut or other forms of intestinal failure
- Inflammatory bowel diseases

Liver diseases

- Chronic hepatitis, including hepatitis B and hepatitis C
- Acute/fulminant/chronic liver failure
- Biliary atresia
- Cholestatic liver disease
- Wilson's disease
- Cirrhosis/portal hypertension
- Work-up and follow-up for liver transplant patients

Nutritional disorders

- Enteral and parenteral nutritional support for children with chronic debilitating disease, critically ill infants/children, and those requiring long-term/home parenteral nutrition

Services provided by regional hospitals

7.62 Under the new service model, regional hospitals will conduct simple GI and liver investigations, manage patients with mild and non-specific GI symptoms, and take care of patients transferred back from the CEP. Efforts will be made to enhance primary and secondary GI services through the organisation of public education campaigns and nutrition promotion programmes, provision of stoma care and multidisciplinary management of community-based GI nutritional cases, as well as development of case management, play therapy, patient support groups, and transitional care programme for grown-up patients.

NEONATOLOGY

Current service provision

7.63 There are currently eight hospitals in HA with newborn delivery, namely Kwong Wah Hospital, Princess Margaret Hospital, Prince of Wales Hospital, Pamela Youde Nethersole Eastern Hospital, Queen Elizabeth Hospital (QEH), Queen Mary Hospital (QMH), Tuen Mun Hospital and United Christian Hospital. All eight hospitals have Neonatal Intensive Care Unit (NICU) provision. Neonatal surgeries are performed in the two teaching hospitals and QEH, while neonatal cardiac surgeries are centralised in QMH. Neonatal neurosurgeries are performed in hospitals with neurosurgery departments. The majority of cases in the NICUs come from the management of prematurity, followed by septicaemia and respiratory distress syndrome.

Proposed service model

7.64 It is recommended that all neonatal surgeries including Ear, Nose & Throat, Orthopaedics, Ophthalmology, neurosurgeries and cardiothoracic surgeries be centralised to be performed at the CEP to concentrate cases and expertise for better results. To support these services, there should be an NICU in the CEP.

7.65 An integrated neonatology service network should be formed across Hong Kong with the NICUs in regional hospitals providing step-down care for patients transferred back from the CEP, in addition to the neonatal care required to support the needs in their respective hospitals.

Services provided by CEP

7.66 Complex neonatology cases requiring surgical intervention and multidisciplinary management will be managed by the CEP. These may include:

- Complicated neonatal surgical or neurosurgical cases (in-utero or post delivery)
- Severe necrotizing enterocolitis cases
- Complex neonatal congenital heart diseases
- Neonates with difficult and unstable airways
- Neonatal oncology cases
- Neonatal cases requiring acute renal replacement or ECMO therapy
- Complicated neonatal congenital diseases requiring multidisciplinary and specialised management, e.g., ambiguous external genitalia, inborn error of metabolism and multiple congenital anomalies
- Babies requiring special treatment modalities not available in regional hospitals, e.g., hypothermia for Hypoxic-Ischemic Encephalopathy (However, prematurity or low birth weight is not per se an indication for transfer to the CEP)

Services provided by regional hospitals

7.67 After commissioning of the CEP, regional hospitals will continue to provide neonatology services to support the newborn deliveries in their respective hospitals, including antenatal counselling, standby service at delivery, and management of high-risk deliveries not transferred to the CEP or its co-located hospital. They will also deliver follow-up care for those stable post-op surgical neonates and other neonates with stable conditions transferred back from the CEP. Regional hospitals will, working in close partnership with the CEP, further enhance their neonatology services through development of clinical pharmacy support and respiratory therapy.

PAEDIATRIC INTENSIVE CARE

Current service provision

7.68 Among the 13 HA hospitals with paediatric services, eight are operating a paediatric intensive care unit (PICU), with a total of 45 beds excluding six PICU and four high dependency unit (HDU) beds for paediatric cardiology and cardiothoracic surgical intensive care which are run by the paediatric cardiology department of QMH. The main bulk of caseload for PICUs is from respiratory, neurological, sepsis, post-surgical, post-neurosurgical, post-cardiac surgical and multi-organ failure conditions. Ventilator therapy and parenteral nutrition therapy are the two major procedures performed in the PICUs. Other activities such as long line insertion also constitute substantial workload in the PICUs.

Proposed service model

7.69 As paediatric surgery, neurosurgery, cardiothoracic surgery, oncology, complex nephrology and orthopaedics cases will be managed at the CEP under the new service model, it is recommended that there should be a PICU in the CEP to support the surgical and medical patients with organ failure. The PICU in CEP will accept referral of complicated cases from regional PICUs, which should provide step-down care for patients returned from CEP and support trauma and infectious cases in their respective hospitals.

Services provided by CEP

7.70 The following types of cases will be managed in the PICU of the CEP:

- All cardiology cases requiring operation
- Complex paediatric surgical and neurosurgical cases
- Complex paediatric orthopaedics cases
- Critical cases with multi-organ failure or requiring renal replacement therapy/ multidisciplinary support
- Complicated trauma/burn cases

Services provided by regional hospitals

7.71 PICUs in regional hospitals will continue to manage less complex conditions requiring admission to their respective hospitals.

7.72 There is a need to review the number of PICUs in HA hospitals, as international experiences show that safer and more efficient service can be achieved through concentration with economy of scale. The following factors should be considered in consolidating the PICU service in regional hospitals:

- Changes in service demand due to the transfer of surgical and tertiary cases to the CEP
- Increase in the total number of PICU beds after inception of the CEP
- Appropriate size of a PICU in order to achieve clinical effectiveness and operational efficiency
- Utilisation pattern of existing PICU beds
- Availability of PICU service in neighbouring districts
- Transfer of patients requiring chronic ventilator support to specialised rehabilitation centres under the new service model

PAEDIATRIC INFECTIOUS DISEASE

Current service provision

7.73 Paediatric infectious disease inpatient services at secondary level are currently provided by most HA paediatric departments while tertiary services are provided in Princess Margaret Hospital (PMH) and the two university hospitals. Tuberculosis and chickenpox (in immuno-compromised patients or in patients with complications) are the most common communicable infectious diseases that may require tertiary care, followed by pertussis and typhoid fever. Tuberculosis, chronic hepatitis B, chronic hepatitis C, Human Immunodeficiency Virus (HIV) infection and Cytomegalovirus infection are the major chronic infectious diseases requiring outpatient management by paediatric infectious disease specialists.

7.74 The HA Infectious Disease Centre (IDC) at PMH was commissioned in 2007. It is a tertiary referral centre for managing infectious diseases in Hong Kong. It is also the clinical arm of the HA Central Committee on Infectious Diseases and the Centre for Health Protection under Department of Health. At present, 24 paediatric infectious disease beds are in operation in the IDC, including two paediatric intensive care beds.

Proposed service model

7.75 Upon its commissioning, the CEP will be responsible for managing severe, serious, life-threatening, unusual, rare, difficult or complicated non-communicable infections requiring multidisciplinary management, organ or surgical support. The IDC will play the role of a tertiary referral centre for communicable diseases, notifiable infectious diseases and exanthematous infections. With built-in surge capacity, the IDC will continue to be the designated centre for emergency preparedness and first line defence for containing initial community outbreaks of novel, emerging or re-emerging infectious diseases and agents of biological attack. Regional hospitals will be responsible for providing secondary and step-down infectious disease services for local populations in their respective catchment areas.

Services provided by CEP

7.76 The types of severe or complicated cases of non-communicable infectious disease to be handled by the CEP may include:

- Opportunistic infections in immuno-compromised hosts suffering from primary immuno-deficiencies, human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), or those receiving intensive immuno-suppressive therapy, chemotherapy and haematopoietic stem cell/bone marrow/solid organ transplantation
- Severe or complex infections requiring organ/surgical support and multidisciplinary care
- Infections caused by multi-drug resistant organisms
- Disseminated infection with herpes group of viruses
- Invasive/systemic fungal, atypical mycobacterial and parasitic infections

Services provided by regional hospitals

7.77 The types of secondary and step-down infectious disease services to be provided by regional hospitals may include:

- Management of community acquired respiratory and gastrointestinal infections
- Mitigation of second wave of major community outbreak of infectious diseases
- Step-down care for patients referred back from the CEP
- Provision of consultation service on infection control and hospital outbreak management to paediatric-related specialties

PAEDIATRIC DERMATOLOGY

Current service provision

7.78 At present, specialised paediatric dermatology services are mainly provided at United Christian Hospital and Queen Mary Hospital, which operate paediatric dermatology clinics to look after patients with rare and severe skin problems, complemented by the Department of Health's dermatology service.

Proposed service model

7.79 It is proposed that a multidisciplinary and integrated care model be adopted to take care of the rare and severe paediatric dermatology cases in the future CEP with close collaborations between the subspecialties concerned. The CEP will provide specialised treatments such as light therapy for eczema and psoriasis. Regional hospitals will manage common dermatological conditions like mild eczema. A coordinated network of paediatric dermatology services will be established across Hong Kong, with the development of shared care models between the CEP and HA hospitals.

PAEDIATRIC REHABILITATION

Current service provision

7.80 Paediatric rehabilitation services are currently provided, to a variable extent, in all HA hospitals with paediatric departments. Tertiary services such as selective dorsal rhizotomy rehabilitation are most developed in Tuen Mun Hospital. Specialised rehabilitation service for mentally handicapped patients is provided in Caritas Medical Centre with 160 beds. There are also some 30 paediatric rehabilitation beds in Duchess of Kent Children's Hospital and Kowloon Hospital, providing specialised neuro-rehabilitation and ortho-rehabilitation services.

7.81 All paediatric departments in HA hospitals provide outreach services to local communities, e.g., to pre-school centres and special schools. Training by therapists (physiotherapists, occupational therapists and speech therapists, etc.) after acute phase of illnesses is provided by allied health departments of various hospitals. The child assessment service operated by Department of Health and Duchess of Kent Children's Hospital provides assessment, counselling and rehab planning services to children with special needs.

Proposed service model

7.82 To coincide with development of the CEP, a coordinated service network should be developed to enhance rehabilitation services for paediatric patients. Complex, low-volume tertiary services and acute rehabilitation should be provided in the CEP with the development of two to three rehabilitation centres in regional hospitals to deliver non-acute and specialised services for children with special needs.

7.83 The roles of other regional hospitals are to provide long-term maintenance services for discharges from the CEP as well as to develop more ambulatory and community-based programmes for children with neuro-developmental disorders, behaviour or emotional disorders, acute adjustment disorders, and etc. To ensure seamless care for patients at different stages of rehabilitation, shared care models and protocols should be formulated for all hospitals in the service network to follow.

Services provided by CEP

7.84 The following paediatric tertiary rehabilitation services, which are technologically demanding, highly specialised and multidisciplinary, will be concentrated in the CEP:

- Complex and low-volume tertiary services such as rehabilitation for selective dorsal rhizotomy (SDR), Botox injection, and various operative interventions (neurosurgical, orthopaedic, cranio-facial, gastrostomy & tracheostomy)
- Services involving multi-specialties, e.g., neurological/functional assessment, hearing impairment, and diagnostic evaluation such as respiratory dysfunction

Services provided by rehabilitation centres

7.85 Building on their current strengths in paediatric rehabilitation, HA hospitals such as Duchess of Kent Children's Hospital and Caritas Medical Centre may be developed into paediatric rehabilitation centres to provide the following multidisciplinary assessment and rehabilitation services:

- Non-acute & specialised services for children with special needs, e.g., assistive device prescription, alternative augmentative communication, management of spasticity, post-acute brain or spinal injuries, chronic ventilator dependent, etc.
- Rehabilitation/maintenance care for bridging to other regional hospitals/community or institutionalisation, e.g., residential/respite care and advanced directive/ethical evaluation.

PAEDIATRIC SURGERY

Current service provision

7.86 Paediatric surgical services in HA are currently provided in three paediatric surgical centres, namely Queen Mary Hospital (QMH), Queen Elizabeth Hospital/United Christian Hospital, and Prince of Wales Hospital (PWH). The three centres provide secondary and tertiary services and higher training in paediatric surgery in Hong Kong. The services include neonatal surgery, surgery of infants and children with complex disorders, oncology, major trauma, and those requiring reconstructive surgery, and paediatric urology. At present, QMH is the only centre providing liver transplantation.

7.87 Gastro-oesophageal reflux, malignant neoplasm, and necrotising enterocolitis are the commonest conditions requiring paediatric surgery. Procedures like central line access and laparotomy are commonly carried out in HA hospitals.

Proposed service model

7.88 After establishment of the CEP, all low-volume, high-risk index/complicated elective and emergency cases should be managed at the CEP by pooling expertise from the existing paediatric surgical centres. As an interim measure, elementary elective and emergency paediatric surgical cases will be handled by three regional paediatric surgical teams, with the Hong Kong Island team based at QMH, the New Territories team at PWH and the Kowloon team at CEP.

7.89 The three regional surgical teams will provide paediatric surgical service coverage for all acute hospitals of HA to ensure proper management of emergency cases. They will also provide step-down care for patients transferred back from the CEP. Common clinical protocols should be developed to facilitate the development of shared care services and to ensure service standard.

Services provided by CEP

7.90 The CEP will provide the following types of paediatric surgical services after an appropriate transition period:

- All neonatal surgery
- Upper and lower gastroenterological & hepatological surgery
- Hepatobiliary & pancreatic surgery
- Paediatric urology
- Oncological surgery
- Thoracic surgery

- Cleft lip/palate & craniofacial surgery
- Burns
- Severe vascular and lymphatic malformations
- Endocrine and metabolic surgery
- Fetal medicine/Antenatal diagnosed anomaly/ex-utero intrapartum treatment procedure

Services provided by regional hospitals

7.91 Examples of non-index/elementary cases continued to be managed by the three regional surgical teams after commissioning of the CEP include:

- Elective cases such as circumcision, inguinal hernia, orchidopexy for undescended testes, superficial lumps excision, simple vascular access, branchial anomalies & thyroglossal cyst, varicocele, stoma fashioning & closure, and oesophago-gastro-duodenoscopy & colonoscopy
- Emergency cases such as acute abdomen, appendicitis, intussusceptions, acute scrotum, and incarcerated hernia

PAEDIATRIC NEUROSURGERY

Current service provision

7.92 Paediatric neurosurgery is currently performed in all the seven neurosurgery departments of HA without a formal network of case referral and designated paediatric neurosurgery beds. The surgeons usually have a mixed adult and paediatric practice. There is some cooperation among surgeons especially for complicated cases.

7.93 Hydrocephalus, malignant neoplasm, congenital brain anomalies, intracranial haemorrhage, and spinal cord tumour are the common diagnoses requiring tertiary neurosurgery services. Procedures such as craniotomy, Ventriculoperitoneal shunting, external ventricular drainage, laminectomy, endoscopic 3rd ventriculostomy, burr hole for traumatic brain injury are commonly performed by the neurosurgery departments, which have a total caseload of about 300 per year.

Proposed service model

7.94 Paediatric neurosurgery services will be centralised at the future CEP, as nearly all neurosurgical cases are tertiary and complex in nature, small in number, and skill demanding. It is proposed that the CEP should collaborate with the Centre of Excellence in Neuroscience (CEN) to provide multidisciplinary neurosurgery programmes for paediatric patients. Regional hospitals will provide step-down care for patients transferred back from the CEP according to agreed shared care model and protocols.

Services provided by CEP

7.95 The following types of complex paediatric neurosurgery will be done in the CEP:

- Neuro-oncology cases
- Neuro-vascular cases
- Epilepsy surgery
- Spasticity in cerebral palsy and other form of movement disorders
- Congenital conditions such as bony condition of the skull and spine
- Traumatic brain injury cases
- Neuro-rehabilitation

Services provided by regional hospitals

7.96 After the reorganisation of paediatric neurosurgery services around the CEP, regional hospitals will continue to handle those life-threatening situations where transfer is too risky or limited by time, subject to the availability of experienced surgeons for stabilising the patient's condition. Examples of these situations may include critical intracranial hypertension of all causes, traumatic brain injury cases, and newborns not ready for transfer. However, such patients will be transferred to the CEP for further treatment once their conditions become stable.

PAEDIATRIC ORTHOPAEDIC SURGERY

Current service provision

7.97 Paediatric orthopaedic services are currently provided in the two teaching hospitals (including Duchess of Kent Children's Hospital). Cerebral palsy, muscular dystrophies & myopathies, and scoliosis are the common conditions requiring hospitalisation.

Proposed service model

7.98 All tertiary paediatric orthopaedic cases requiring highly specialised care and multidisciplinary inputs should be concentrated in the CEP to improve clinical outcome through pooling of expertise, state-of-the-art facilities, and research. An integrated service network should be developed between the CEP and regional hospitals to provide seamless care for patients according to a set of common clinical protocols. Regional hospitals will provide step-down care as well as inpatient and outpatient rehabilitation services for patients transferred back from the CEP.

Services provided by CEP

7.99 The types of tertiary orthopaedic cases to be managed by the CEP include the following:

- Operative scoliosis, in particular, severe and complex spinal deformities such as congenital, syndromic and early onset scoliosis below age 16
- All malignant musculo-skeletal tumours requiring multidisciplinary support
- Complex upper and limb deformities reconstruction
- Neuromuscular disorders such as cerebral palsy, spina bifida and muscular dystrophy
- Metabolic diseases leading to bone deformities
- Osteogenesis imperfecta, renal rickets, mucopolysaccharidosis, polyostotic fibrous dysplasia, and marble bone diseases

7.100 New services and facilities, such as computer-assisted orthopaedic surgery lab, special day rehab centre, gait lab and seating clinic, should also be developed in the CEP to support its tertiary services.

Services provided by regional hospitals

7.101 Regional hospitals will continue to conduct screening, assessment and initial work-up for tertiary cases, manage acute trauma and infection cases, perform less complex elective orthopaedic procedures such as fracture, and provide paediatric orthopaedic consultation services to other clinical departments in their respective clusters. Their current service provision & facilities should be enhanced to ensure high standard shared care with the CEP.

PAEDIATRIC EAR, NOSE & THROAT

Current service provision

7.102 At present, tertiary paediatric ear, nose & throat (ENT) conditions are mainly managed at the two teaching hospitals and Queen Elizabeth Hospital. United Christian Hospital also has a strong ENT team, which is operating on complicated cases such as cleft palate in collaboration with other related surgical subspecialties. The commonest ENT diagnosis requiring inpatient care is laryngomalacia, followed by deafness, adenoid hypertrophy and sinusitis.

Proposed service model

7.103 Complicated paediatric ENT surgeries should in future be performed in the CEP. An integrated service network for paediatric ENT should be established to ensure continuity of care and to promote further development of the subspecialty through formulation of common clinical protocols and joint research/training programmes.

Services provided by CEP

7.104 The kind of complex ENT conditions to be managed at the CEP may include:

- Congenital intra- and post-partum emergency airway conditions
- Congenital rhinological conditions such as paediatric functional endoscopic sinus surgery as well as nasal, head and neck tumours
- Congenital otological conditions such as deafness & otological malformations
- Conditions requiring multidisciplinary surgical intervention, e.g., cleft palate, Syndromic child, Drooling child (neurological cases), obstructive sleep apnoea due to airway problems, oral-maxilo-facial conditions, and facial plastic procedures (rhino/otological)
- Immunoallergology / Rhinoallergology cases
- Paediatric otological conditions such as middle ear effusions, chronic suppurative otitis media, and cholesteatoma (congenital or early acquired)
- Adenotonsillar conditions such as obstructive sleep apnoea syndrome

Services provided by regional hospitals

7.105 Regional hospitals will operate on those less complex cases and provide step-down care for patients returned from the CEP.

PAEDIATRIC OPHTHALMOLOGY

Current service provision

7.106 Paediatric ophthalmology services are currently provided in all seven hospital clusters with no distinction of services to children and adults. The commonest diagnosis requiring inpatient treatment is retinopathy of prematurity, followed by blindness/low vision, strabismus, and congenital ptosis of eyelid.

Proposed service model

7.107 An integrated paediatric ophthalmology service network should be developed across Hong Kong, with complex cases treated at the CEP by pooling expertise from various hospital clusters.

Services provided by CEP

7.108 The types of tertiary cases to be treated at the CEP include management of:

- Complex cases such as visual electrophysiology, ocular genetics, and low vision rehabilitation
- Complex cases requiring multidisciplinary intervention such as retinoblastoma, Graves Disease, and uveitis of juvenile rheumatoid arthritis

Services provided by regional hospitals

7.109 Regional hospitals will continue to provide paediatric ophthalmology services, including strabismus, amblyopia, retinopathy of prematurity, congenital cataract and ocular rehabilitation.

PAEDIATRIC ORAL-MAXILLOFACIAL & DENTAL SURGERY

Current service provision

7.110 Oral-maxillofacial and dental surgical services are currently offered by the major acute hospitals of the seven HA clusters in collaboration with Department of Health and the University of Hong Kong Faculty of Dentistry. The commonest diagnosis requiring multidisciplinary inpatient care is cleft lip and palate.

Proposed service model

7.111 Complicated paediatric oral-maxillofacial-dental surgical cases will be managed in the CEP with step-down care provided by regional hospitals, forming a coordinated service network for delivering different levels of care.

Services provided by CEP

7.112 The types of oral-maxillofacial and dental surgery to be performed in the CEP may include:

- Cleft lip and palate
- Cranio-maxillofacial deformities
- Obstructive sleep apnoea syndrome
- Dental and maxillofacial trauma
- Oral-maxillofacial vascular malformation

Services provided by regional hospitals

7.113 Upon development of the CEP, regional hospitals will continue to handle emergency acute and less complicated elective cases for local populations of their respective catchment areas.

PAEDIATRIC ANAESTHESIOLOGY

Current service provision

7.114 Paediatric anaesthesia for neonates and children with complex problems are largely undertaken in the three HA paediatric surgical centres. There is minimal provision of sedation/anaesthesia service to areas like radiology and nuclear medicine because of manpower shortage. Highly specialised paediatric anaesthesia services are provided for complex paediatric cardiac surgeries and liver transplantation at Queen Mary Hospital and paediatric renal transplantation at Princess Margaret Hospital.

Proposed service model

7.115 Specialised paediatric anaesthesiology services should be centralised in the CEP to support all its major/ultra-major paediatric operations. Other major paediatric anaesthesia services to be provided in the CEP include a new system for the organisation of peri-operative patient care, acute and chronic pain management, sedation/anaesthesia for diagnostic and interventional radiology, anaesthesia for cardiac catheterisation, and endoscopy and other painful procedures.

PAEDIATRIC PATHOLOGY

Current service provision

7.116 There is currently no dedicated paediatric laboratory service in Hong Kong. The level and accessibility of paediatric pathology services vary among HA's seven hospital clusters. These laboratories do not have adequate definitive diagnostic services, age-specific reference intervals, menu of special tests, and advanced technology-based services for paediatric patients.

Proposed service model

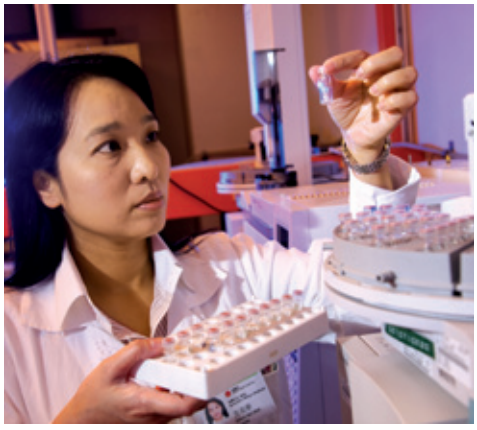
7.117 Comprehensive accredited paediatric laboratory services should be developed in the CEP, with emphasis on research, training and high-quality services. These services should be delivered by a dedicated team of paediatric pathologists who are responsible for coordinating the territory-wide paediatric pathology service network including development of protocols and organisation of collaborative research and training programmes. Laboratories of the seven hospital clusters will contribute specimens and complicated/rare cases to the CEP for special investigation and consultation.

Services provided by CEP

7.118 There should be a full range of laboratory services in the CEP and CEN hospital complex, including chemical pathology, molecular genetics, cytogenetics, clinical microbiology & infection, anatomical pathology, haematology & transfusion medicine, as well as immunology, transplantation & immuno-genetics. The proposed types of service for each discipline are listed below:

Chemical pathology

- Core laboratory – paediatric friendly with specific assay
- Paediatric endocrinology & metabolism
- Metabolic screening and confirmation for metabolic diseases
- Diagnostic enzymology and cell culture
- Paediatric therapeutic drug monitoring and Toxicology
- Paediatric oncology and personalized medicine
- Nutrition and trace elements
- Community paediatric service
- Point of care testing and quality assurance



Molecular genetics

- Molecular genetics pathologist-led services
- Development of clinical genetics network, genetic database and clinical bioinformatics
- New technologies such as diagnostic microarray analysis, nuclear magnetic resonance spectroscopy-based metabolomics, and next generation sequencing, etc.
- New service provisions such as complicated cases of inborn errors of metabolism, inborn errors of development, mitochondrial genetics, paternity testing and community genetics, etc.

Cytogenetics

- Constitutional Cytogenetics for identification of genes fusion, gene deletion, gene amplification, unidentified (marker) chromosome, mosaicism and aneuploidy, cryptic chromosomal translocation, and delineation of chromosomal breakpoints
- Cancer Cytogenetics for haemic malignancies and solid tumours
- Multi-colours banding for characterization of chromosomal inversion
- Comparative genomic hybridization (CGH) to characterize unbalanced translocation and origin of marker chromosomes
- Cellular immuno-fluorescence and fluorescence in situ hybridisation (FISH) to examine the nature of tumour cells
- Fiber FISH analysis to identify the specific chromosomal locations of genes and to determine distances between genes
- Genome-wide microarray (array CGH) to conduct analysis for some patients with dysmorphism and learning disability

Clinical microbiology and infection

- 24-hour microbiology service
- Lab automation to improve case turnaround time
- Molecular biology testing service plus DNA-based rapid virology diagnosis
- Quantitative assay for monitoring of viral load in infected immuno-compromised patients
- Investigation and rapid detection of mycology pathogens for oncology patients
- Anaerobic infections in paediatric patients

Anatomical pathology

- Comprehensive onsite histopathology and cytology services
- Neuropathology/neuromuscular services (in collaboration with the CEN)
- Molecular lab for cancer and others
- Cytogenetic for solid tumours
- Mortuary and autopsy service
- Tissue bank/cell culture service

Haematology and transfusion medicine

- 24-hour paediatric-friendly core lab and blood banking services
- Enhanced service for haematological malignancies
- New service provision in the diagnosis of paediatric haemostatic and thrombotic disorders, congenital and acquired platelet disorders, and hereditary red cell disorders
- Molecular diagnostics and flow cytometry
- Databank on genetics in thalassaemia, haemoglobinopathies and haemostatic disorders
- Facilities for stem cell collection, testing and processing
- Clinical consultation service on blood and blood component therapy
- Manipulation of blood and blood components

Immunology, transplantation and immunogenetics

High-volume routine tests and low-volume special tests including:

- Autoantibody tests
- Immune cell function tests
- Allergy tests
- Immunogenetics (in collaboration with Molecular Genetics Lab)

Services provided by regional hospitals

7.119 Laboratories in regional hospitals will continue to provide core and emergency lab services for paediatric patients admitted to their respective hospitals and collaborate closely with the CEP to organise joint research and training programmes.

PAEDIATRIC RADIOLOGY

Current service provision

7.120 Paediatric radiology services are currently provided in cluster hospitals in HA together with adult services. At present, there is no full-time paediatric radiologist in Hong Kong. There are about ten radiologists with special interest in paediatric imaging, who are also responsible for duties in adult imaging. They are mainly part-time paediatric radiologists who have to perform other duties in adult imaging as well.

7.121 The range of paediatric radiology services in individual hospitals varies widely depending on the availability of expertise and the types of clinical services provided in their respective hospital clusters. In the five HA paediatric oncology centres, more paediatric imaging services are provided which include imaging for the diagnosis of malignancy, image-guided tissue biopsy, disease monitoring including treatment of complications and long-term follow-up.

Proposed service model

7.122 Complicated paediatric interventional radiology procedures will in future be managed in the CEP. An integrated network of paediatric radiology services should be established across Hong Kong with CEP serving as the tertiary referral centre and regional hospitals providing emergency and less complicated radiological services to meet the needs of paediatric patients. Common clinical protocols should be formulated to foster the development of shared care services and organisation of joint research and training activities.

Services provided by CEP

7.123 Cases requiring complicated interventional procedures will be managed by the CEP, including complex neurological and neurosurgical cases which should be handled in collaboration with specialists of the co-located CEN. A dedicated team of radiologists, radiographers, sonographers, physicists, and anaesthetists should be set up to provide 24-hour radiology service coverage in the CEP and CEN hospital complex. This team will provide radiological support in the diagnosis and management of illnesses in both centres, advise other specialists on the choice of imaging, and develop sub-specialisation in paediatric radiology and neuro-radiology such as musculoskeletal radiology, cardiac radiology and interventional radiology (IR).

Proposed types of equipment

7.124 The types of equipment required for providing radiological services in the CEP may include:

- Digital X Ray
- Ultrasound
- C Arm Fluoroscopy (for IR, gastrointestinal and genitourinary radiology and endoscopic retrograde cholangiopancreatography)
- 3 Tesla Magnetic resonance imaging (MRI) system (for neuro-imaging or other high resolution imaging)
- 1.5 Tesla MRI (for routine imaging including fetal imaging/cardiac imaging)
- 7 Tesla MRI (for research) *
- Computed Tomography CT>64 detectors (for radiation dose consideration)
- Hybrid Operating Room (for minimal invasive therapy and open surgery) *
- Biplane digital subtraction angiography (for complex IR) *
- Cardiac Catheterisation lab
- Bi/Trimodality Operating Room *
- Magnetic Resonance-Positron Emission Tomography scanner * (for future development)
- Positron Emission Tomography/Computed Tomography *
- Single Photon Emission Computed Tomography (SPECT)/CT *
- Cyclotron *

(* denotes equipment that can be shared with the CEN)

Services provided by regional hospitals

7.125 After commissioning of the CEP, regional hospitals will continue to provide emergency and core paediatric radiological support to the paediatric departments of their respective hospitals, particularly those with neonatal and paediatric intensive care units.

PAEDIATRIC PSYCHIATRY

Current service provision

7.126 Psychiatric services including those for children and adolescents are currently provided in HA hospitals by five regional psychiatric teams. In line with development trends around the world, HA has reduced its dependence on hospital and bed-based psychiatric services and strengthened the care to young people with mental health problems in specialist outpatient and community care settings.

Proposed service model

7.127 Upon development of the CEP, paediatric psychiatry services will still be mostly provided in regional hospitals, as such services need to be heavily involved with the community. Only complicated paediatric psychiatric cases requiring multiple specialist support, e.g., anorexia nervosa with profound metabolic disturbance, should be referred to the CEP for management by a team of experts.

GENERAL PAEDIATRICS, COMMUNITY PAEDIATRICS & ADOLESCENT MEDICINE

Current service provision

7.128 General paediatric, community paediatric, and adolescent medicine services are currently provided by all paediatric departments in HA. There are about 860 general paediatric inpatient and day patient beds in 13 hospitals. In line with world development trends, general paediatric services are increasingly delivered in ambulatory, outpatient and community settings in recent years.

Proposed service model

7.129 After inception of the CEP, most general paediatric, community paediatric & adolescent medicine services will continue to be provided by regional hospitals. As a tertiary referral centre, the CEP will only handle those complex cases with multiple problems referred by paediatricians of regional hospitals. It would assume the role of expert coordinator, advisor and trainer to integrate and support services provided by regional hospitals including step-down care of complicated cases. The general paediatrics and adolescent medicine team in the CEP will also take the lead in organising collaborative training and research programmes with regional hospitals.

Services provided by CEP

7.130 Complex cases with multiple problems, those having difficulties in diagnosis/work-up, and chronic conditions requiring formulation of multidisciplinary care plan will be managed by the CEP. Examples of such cases include:

- Eating disorders requiring specialist input and child psychiatry support such as anorexia nervosa with profound metabolic disturbance
- Adolescent drug abuse, attempted suicide and obesity with severe co-morbidities requiring multidisciplinary input and child psychiatry support
- Specialised programmes for adolescent patients, e.g., anti-obesity programme

Services provided by regional hospitals

7.131 Paediatric departments in regional hospitals will continue to manage the large volume of acute paediatric illnesses such as gastroenteritis, upper respiratory infections, pneumonia, and other less complex subspecialty cases.

7.132 To improve the quality of emergency paediatric services, it is recommended that short-stay Paediatric Assessment Units (PAUs) be set up in the Accident & Emergency Department of some HA hospitals to facilitate prompt assessment and appropriate management of young patients by clinicians with paediatric expertise in a child friendly environment. Patients admitted to such units will usually stay for 24 to 48 hours. Overseas experience has shown that by setting up PAUs, unnecessary admissions will be avoided with improved quality of care. As the CEP will be developed together with a co-located acute general hospital, it is further proposed that a PAU be established in this new hospital to pilot this model of emergency paediatric care.

7.133 In addition to emergency and ambulatory care, regional hospitals will also enhance their general paediatric services through the further development of the following:

- Community paediatrics – e.g., organisation of more community-based and outreach programmes to promote child health outside the hospital setting
- Psycho-behavioural paediatrics – e.g., collaboration with child psychiatrist to enhance treatment of Attention Deficit Hyperactivity Disorder
- Public education – e.g., providing health/hygiene information and education to primary carers, and promoting lifestyle modification

7.134 More details of the proposed service models of individual paediatric subspecialties and paediatric-related specialties can be found in the table at *Appendix 4*.

Chapter VIII

Service Considerations by Hospital Cluster

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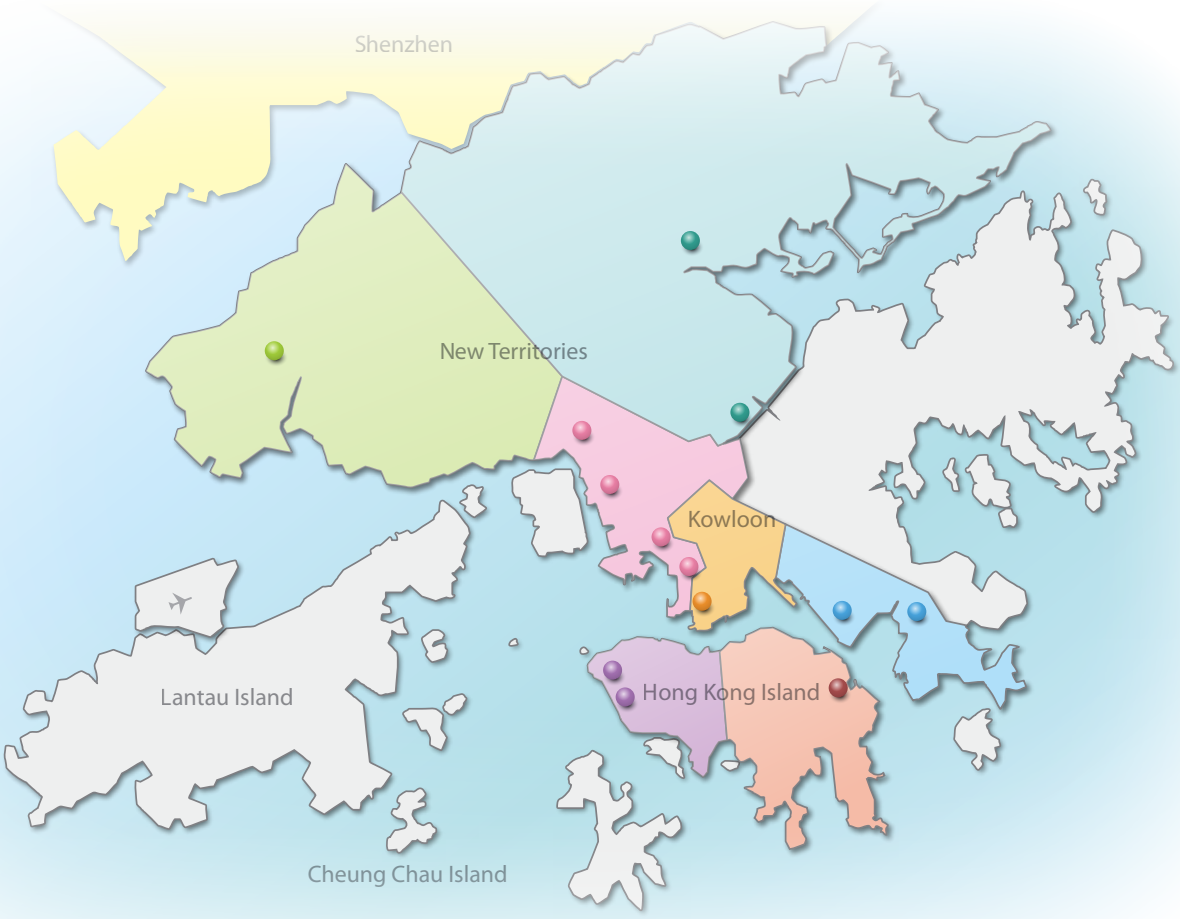
Service Considerations by Hospital Cluster

OVERVIEW

8.1 Upon implementation of the proposed service model for various paediatric subspecialty services as described in the last chapter, HA hospitals with paediatric departments will continue to play an important role in providing secondary, acute and community paediatric care for children and adolescents in their respective catchment areas. Their services will be knitted into an integrated network of tertiary, secondary and primary care services with the CEP and other healthcare providers for the treatment and prevention of illnesses in children.

8.2 In line with the current hospital cluster structure of HA, the major acute hospitals will continue to take up the role of coordinating the provision of these secondary, emergency and community care services in their respective clusters after commissioning of the CEP. The key service considerations for individual hospital clusters when the proposed service model is put into effect are outlined in the ensuing paragraphs of this chapter.



HONG KONG EAST CLUSTER

Current service provision

8.3 Pamela Youde Nethersole Eastern Hospital (PYNEH) is the only hospital with a paediatric department in Hong Kong East Cluster (HKEC). It has 83 paediatric beds including seven neonatal intensive care unit (NICU), 22 special care baby unit (SCBU), and three paediatric intensive care unit (PICU) beds. Paediatric subspecialty services provided include cardiology, endocrinology & metabolism, intensive care, neonatology, neurology and respiratory medicine. At present, PYNEH mainly provides secondary and community paediatric services and refers complicated tertiary cases requiring multidisciplinary management and surgical intervention to tertiary referral centres in other HA hospitals.

Service development after inception of CEP

8.4 Instead of referring complex cases to the existing HA tertiary referral centres, PYNEH will direct referrals to the CEP upon its commissioning. Building on its current strength, the hospital will focus on enhancing secondary care, community paediatrics and public education.

8.5 NICU and SCBU services will continue to be provided to support the obstetric service in PYNEH and post-op patients transferred back from the CEP after surgery. Consideration may be given to rationalising the PICU in the hospital in view of its relatively small size and low capacity operation.

8.6 To improve emergency paediatric services in HKEC, PYNEH may consider piloting a short-stay paediatric assessment unit (PAU) in its Accident & Emergency Department to ensure prompt management of paediatric patients by clinicians with expertise in paediatrics and to prevent unnecessary hospitalisation.

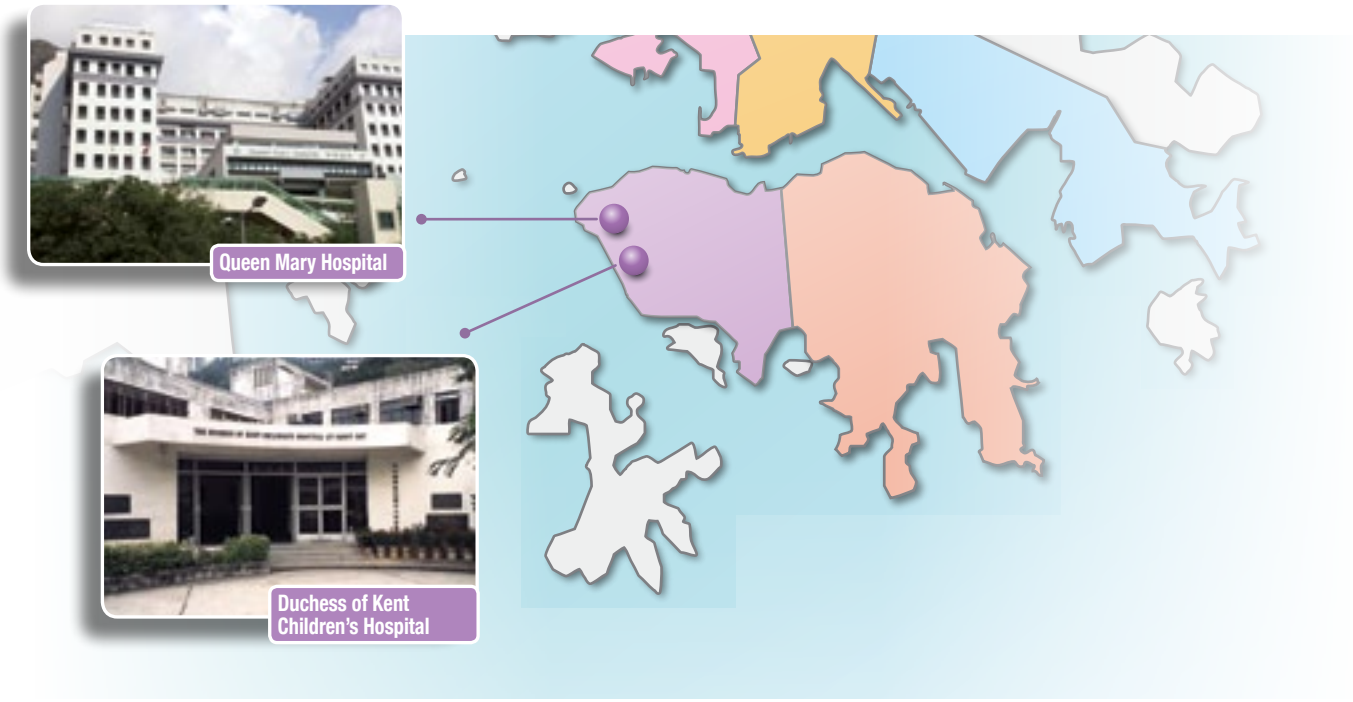
8.7 PYNEH will continue to enhance its expertise in paediatrics by developing more community-oriented services in collaboration with other community providers, augmenting its child psychiatry, child protection and transitional care services, as well as serving as a training centre for general and community paediatrics.

HONG KONG WEST CLUSTER

Current service provision

8.8 Queen Mary Hospital (QMH) and Duchess of Kent Children's Hospital (DKCH) are the two hospitals in the Hong Kong West Cluster (HKWC) providing paediatric services. They are managed under the same Department of Paediatrics & Adolescent Medicine. The Department is operating about 140 paediatric beds, including 17 NICU, 33 SCBU and seven PICU beds, while DKCH has 31 beds including 18 extended care/rehabilitation beds. The Department provides a full range of paediatric subspecialty services.

8.9 Since 2008, the Department of Paediatric Cardiology in Grantham Hospital has been trans-located to QMH to provide tertiary paediatric cardiology and cardiothoracic surgery services to the entire population of Hong Kong. This Department has 40 beds including six PICU and four high dependency unit beds.



Service development after inception of CEP

8.10 According to the subspecialty service model proposed in the last chapter, there will be a number of major changes to the paediatric service provision in HKWC after commissioning of the CEP:

- The 40 paediatric cardiology beds, 18 oncology beds and three bone marrow transplant beds in QMH will be trans-located to the CEP as a result of the centralisation of tertiary paediatric cardiology and oncology services.
- Complex and low-volume paediatric surgeries including cardiothoracic and orthopaedic surgeries as well as neurosurgeries will be referred to the CEP.

- Complicated tertiary cases of other paediatric subspecialties will also be referred to the CEP for diagnosis and management.
- DKCH may be developed into a paediatric rehabilitation centre to deliver high-volume and non-acute specialised rehabilitation services to complement the complex acute rehabilitation services provided by the CEP, including the provision of long-term care to chronic ventilator dependent patients.

8.11 After centralisation of tertiary paediatric services in the CEP, QMH will provide step-down paediatric care for patients returned from the CEP and concentrate on developing acute, secondary and community care services. As a teaching hospital, it will collaborate closely with the CEP to train paediatric specialists and to conduct various research on subjects related to child health.

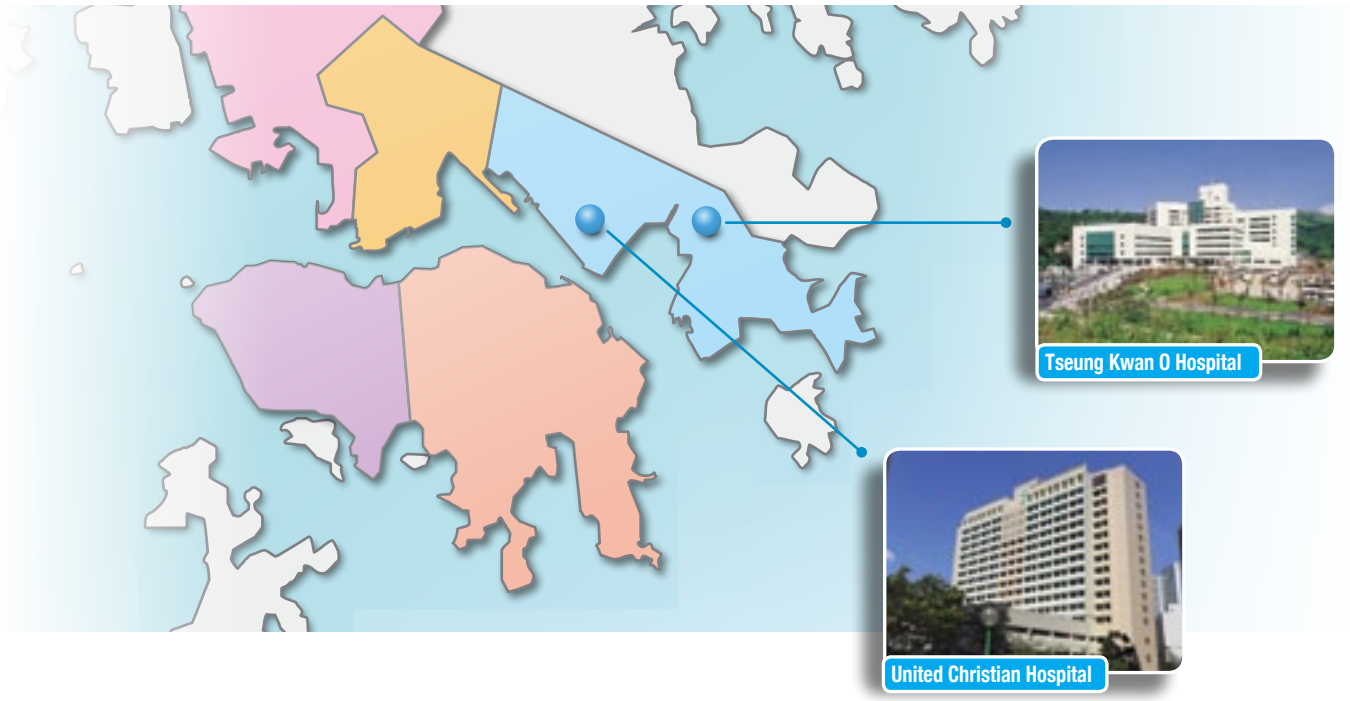
8.12 Selected high-volume elective paediatric surgeries and emergency paediatric surgeries will continue to be performed in QMH as interim measure to provide coverage for the acute hospitals on Hong Kong Island. These should be transferred to the CEP after an appropriate transition period. NICU services will also be provided to support obstetric deliveries in QMH.

KOWLOON EAST CLUSTER

Current service provision

8.13 There are two hospitals in the Kowloon East Cluster (KEC) with provision of paediatric services, namely United Christian Hospital (UCH) and Tseung Kwun O Hospital (TKOH). UCH has 118 paediatric beds including ten NICU, 35 SCBU and three PICU beds. It provides a number of paediatric subspecialty services such as adolescent medicine, cardiology, endocrinology & metabolism, infectious disease, intensive care, neonatology, nephrology, neurology and respiratory medicine. The hospital has a paediatric surgical team, which is operating on some complex cases such as cleft palate in collaboration with ENT and other related surgical subspecialties.

8.14 TKOH is currently operating 36 paediatric beds, providing only a few paediatric subspecialty services, namely, adolescent medicine, endocrinology & metabolism, and gastroenterology & hepatology.



Service development after inception of CEP

8.15 Upon development of the CEP, UCH and TKOH will refer complex tertiary paediatric cases to the new centre for diagnosis and treatment, including all paediatric surgical, ENT, eye and oral-maxillofacial-dental cases. Both hospitals will then place emphasis on the further development of emergency, secondary and community care for paediatric patients in their catchment areas.

8.16 In view of UCH's close proximity to the CEP and the anticipated decrease in demand for its PICU service after transfer of surgical cases to the new centre, consideration may be given to rationalising the hospital's PICU beds in collaboration with the CEP.

8.17 As overseas experience has shown that the setting up of short-stay paediatric assessment units (PAU) can reduce unnecessary admissions and improve quality of care, the KEC may consider setting up a pilot PAU in UCH to augment its emergency paediatric services.

8.18 With its proximity to the CEP, there is opportunity for UCH to rationalise its secondary paediatric services in close collaboration with other paediatric departments in the Kowloon East and Kowloon Central region, harnessing support from the CEP.

KOWLOON CENTRAL CLUSTER

Current service provision

8.19 Paediatric services in the Kowloon Central Cluster (KCC) are provided in Queen Elizabeth Hospital (QEH). Among its 195 acute paediatric beds, there are 15 NICU, 66 SCBU and nine PICU beds. At present, it is providing a full range of paediatric subspecialty services, except clinical genetics and immunology. It is one of the HA's five paediatric oncology centres with 18 inpatient specialised oncology beds.

Service development after inception of CEP

8.20 The centralisation of paediatric tertiary services in the CEP will change the current paediatric service provision of QEH in the following ways:

- The 18 paediatric oncology beds in QEH will be trans-located to the CEP.
- Paediatric surgical and neurosurgical cases will be performed in the CEP.
- Complex tertiary cases of other paediatric subspecialties will be referred to the CEP for diagnosis and treatment.

8.21 As a result of these changes, the care model of QEH will shift to become a secondary care centre with emphasis on emergency, ambulatory and community services. Given their proximity to the CEP, there could be closer collaborations between the paediatric departments in the Kowloon Central and Kowloon East Clusters (including the new acute hospital at Kai Tak) in the provision of secondary paediatric care.

8.22 While continuing to provide neonatology and NICU services to support the obstetric service in KCC, QEH should further develop its paediatric services in the direction of enhancing acute and community care. One of the service enhancements that could be considered is the setting up of a short-stay paediatric assessment unit (PAU) in the Accident & Emergency Department to facilitate prompt assessment and appropriate management of young patients by clinicians with paediatric expertise to improve emergency paediatric care. More ambulatory and community services may also be introduced.

KOWLOON WEST CLUSTER

Current service provision

8.23 There are four hospitals in the Kowloon West Cluster (KWC) providing paediatric services. They are Princess Margaret Hospital (PMH), Kwong Wah Hospital (KWH), Caritas Medical Centre (CMC), and Yan Chai Hospital (YCH).

8.24 Tertiary services are mainly provided in PMH, which is operating some 153 paediatric beds including 14 NICU, 32 SCBU and eight PICU beds. The hospital is currently serving as the tertiary referral centre for management of paediatric chronic kidney disease and end stage renal disease patients in Hong Kong, with 14 specialised renal, one high dependency unit, four haemodialysis and two urology beds. Co-located with PMH is the HA Infectious Disease Centre (IDC) which is operating 24 paediatric infectious disease (ID) beds. Other paediatric subspecialty services provided in PMH include haematology & oncology, intensive care, neonatology, and neurology.

8.25 KWH also provides some paediatric subspecialty services, mainly neonatology, neurology and respiratory medicine. It has 134 paediatric beds, including five NICU, 49 SCBU, and five PICU beds. The paediatric department of CMC mainly provides general paediatric and extended care services. It is operating 228 paediatric beds, 160 of which are for extended care or rehabilitation. The paediatric department in YCH has 29 paediatric beds in use, providing general paediatric and adolescent medicine services.

Service development after inception of CEP

8.26 The reorganisation of paediatric subspecialty services around the CEP would have the following impact on the existing paediatric service provision in KWC:

- The nephrology and urology centre in PMH will be trans-located to the CEP together with its specialised renal, haemodialysis and urology beds.
- The five paediatric oncology beds in PMH will be trans-located to the CEP as a result of the centralisation of paediatric oncology services in the new centre.
- The four paediatric departments in KWC will refer complicated tertiary cases requiring multidisciplinary management or surgical intervention to the CEP, and provide step-down care for those returned from it.
- Building on its current strengths, CMC may be developed into a rehabilitation centre to deliver high-volume and non-acute specialised rehab services to complement the complex acute rehabilitation services provided by the CEP, including the provision of long-term care to chronic ventilator dependent patients.

8.27 After the services reorganisation around CEP, PMH and KWH will continue to provide neonatology and NICU services to support baby deliveries in their respective hospitals. The ID team in PMH will also keep up with its subspecialty services to support the HA IDC as a tertiary referral centre for communicable diseases, notifiable infectious diseases and exanthematous infections. However, future service development of the four paediatric departments in KWC will focus on enhancing their emergency, secondary and community care.

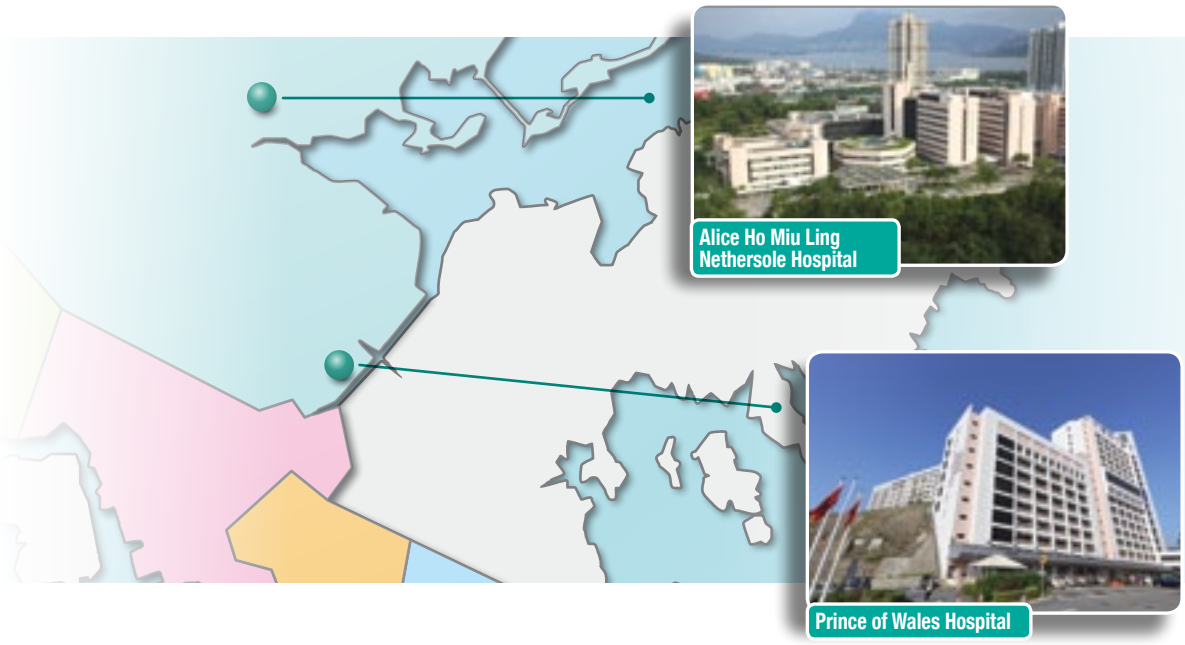
8.28 With the transfer of tertiary and surgical cases to the CEP, it is anticipated that the demand for PICU services in KWC will decrease. There may be room for rationalising the Cluster's PICU service in collaboration with the CEP.

NEW TERRITORIES EAST CLUSTER

Current service provision

8.29 Paediatric services in the New Territories East Cluster (NTEC) are provided by Prince of Wales Hospital (PWH) and Alice Ho Miu Ling Nethersole Hospital (AHNH). PWH is operating some 175 paediatric beds, 21 of which are NICU beds, 60 SCBU beds and five PICU beds. The hospital operates a children's cancer centre with 24 paediatric oncology and four bone marrow transplant beds. It offers a full range of paediatric subspecialty services in collaboration with the medical school of the Chinese University of Hong Kong (CUHK).

8.30 AHNH is now operating 74 paediatric beds to provide general acute and secondary care services to the paediatric populations in the northern part of NTEC. It provides a number of paediatric subspecialty services including cardiology, endocrinology & metabolism, haematology, rheumatology, nephrology, neurology, and respiratory medicine.



Service development after inception of CEP

8.31 With the centralisation of paediatric oncology services in the CEP, the 24 paediatric oncology and four bone marrow transplant beds in PWH will be trans-located to the new centre after its commissioning. Complex tertiary cases of other paediatric subspecialties currently managed in PWH will also be referred to the CEP when the latter is in full operation.

8.32 Whilst complicated paediatric surgical cases including orthopaedic surgeries and neurosurgeries will be concentrated in the CEP, PWH will continue to manage high-volume elementary elective surgical cases and provide emergency paediatric surgical service coverage for all acute hospitals in the New Territories as interim measure. These surgeries should be performed at the CEP after an appropriate transition period.

8.33 Upon inception of the CEP, PWH will collaborate closely with the new paediatric medical centre and CUHK to organise comprehensive training programmes on various paediatric subspecialties for healthcare professionals in Hong Kong. Joint research programmes on strategic child health subjects will also be initiated to help advance the knowledge and skills of practitioners.

8.34 With the transfer of complex tertiary cases to the CEP, there are opportunities for the two paediatric departments in NTEC to reorganise and rationalise their acute, secondary and community care services to meet the health needs of the children and adolescents in the Cluster.

NEW TERRITORIES WEST CLUSTER

Current service provision

8.35 The New Territories West Cluster (NTWC) has only one paediatric department in Tuen Mun Hospital (TMH), providing both tertiary and secondary paediatric services to the children and adolescents in the western part of the New Territories. There are 127 paediatric beds in TMH, including 11 NICU, 32 SCBU, five PICU and ten paediatric oncology beds. The hospital provides a wide range of paediatric subspecialty services, such as adolescent medicine, endocrinology & metabolism, gastroenterology & hepatology, haematology & oncology, rheumatology, intensive care, neonatology, nephrology, neurology and respiratory medicine.

Service development after inception of CEP

8.36 The reorganisation of paediatric oncology services upon commissioning of the CEP would necessitate the translocation of the ten paediatric oncology beds in TMH to the new tertiary referral centre. Complicated tertiary cases of other paediatric subspecialties will also be referred to the CEP for diagnosis and treatment by its multidisciplinary expert teams.

8.37 TMH will develop into a secondary care centre, providing mainly step-down care for patients transferred back from the CEP as well as enhanced acute general paediatric inpatient, outpatient and community services. Various service enhancements will be initiated such as the organisation of more community-based and disease prevention programmes.

8.38 To back up the obstetric service in NTWC, neonatology and NICU services will continue to be provided in TMH after inception of the CEP. PICU services will also be maintained to improve service accessibility for patients residing in this relatively remote area of Hong Kong.

8.39 To enhance NTWC residents' accessibility to emergency paediatric services, consideration may be given to setting up a short-stay paediatric assessment unit (PAU) in the Accident & Emergency Department of Pok Oi Hospital, which does not have on-site paediatricians to provide prompt assessment and immediate management for paediatric patients at present.

Chapter IX

Capacity Planning

Chapter IX
Capacity Planning

9.1 With inception of the CEP, the number of paediatric beds required in HA hospitals will be adjusted according to the new service delivery models for various subspecialty services detailed in the previous chapters. This chapter gives an overview of the capacity planning for the number of paediatric beds required in context of the development of the CEP.

METHODOLOGY

9.2 Using demand modelling techniques, a demand projection exercise was carried out to determine the future capacity required in terms of paediatric beds for the next 10 years up to 2021, with 2007 as the base year. The projection took into account the proposed service model, population growth and demographic changes as well as age- and specialty-specific service utilisation trends. Scenario modelling was also carried out in the bed projection to factor in changes in service delivery.

DATA SOURCES

9.3 Projections were based on data from three main sources:

- Service utilisation data in 2007 from the HA data warehouse, which included the Integrated Patient Administration System, the Operating Theatre Record System, the Obstetrics Clinical Information System (for newborn delivery data), and the Executive Information System (for bed occupancy data);
- Local birth statistics in 2009 and birth projection figures from 2009 to 2021, obtained from the Census & Statistics Department (C&SD) of the government; and
- Territory-wide population projection figures obtained from the C&SD, and district-based population projections from the Planning Department of the government, from 2007 to 2021.

PLANNING PARAMETERS

9.4 All planning parameters for the projections for paediatric beds were age-specific (by age groups of 0-4, 5-14, and 16+). For neonatology, including neonatal intensive care unit (NICU) and special care baby unit (SCBU), planning parameters were devised from birth data.

BED PROJECTION MODEL

9.5 For the projection of bed requirement for the paediatrics specialty, the volume and mix of expected service demand from residents in each of the 21 districts were first computed taking into account age-specific hospital service utilisation rates and average length of stay (ALOS) per episode at base year (2007), as well as population growth and ageing over the period to 2021.

9.6 Using the base-year data on cross-district patient flow for acute paediatrics bed days, the hospital patronage pattern across the 21 districts was computed. The demand for acute bed days in each paediatric department was then derived by applying this hospital patronage pattern, that is, the proportion of residents residing in each of the 21 districts who used the respective hospitals' paediatric services.

9.7 The demand for different types of paediatric beds was based on the overall HA distribution of the different types of bed days at base year (2007).

9.8 The demand for NICU and SCBU beds on the other hand was derived from projected births. Projected births at the respective hospitals formed the basis for estimating the demand for NICU and SCBU, with the use of respective admission and tertiary referral rates among inborns. For the demand for NICU from outborns, it was based on the NICU admission rate from total projected births at private hospitals, as well as the relative distribution of outborn admissions among the respective hospitals in HA. The demand for NICU and SCBU beds was estimated using the respective service utilisation per episode planning parameters.

ASSUMPTIONS FOR BED PROJECTION

9.9 The projection model described above provided a base case scenario to demonstrate the nature and volume of work to be expected up to 2021. The overall HA maternity service is assumed to be capped at around 43,000 births per annum. The projected births of Mainland mothers at HA hospitals were adjusted downwards proportionately, should the total projected births at HA exceed this assumed cap.

9.10 The model covered both IP and DP bed days. The projected bed days were translated into the number of beds required for each specialty by assuming an optimum occupancy rate of 85% and 120% for IP beds and DP beds respectively. A lower optimum occupancy rate of 80% was assumed for NICU1 to allow flexibility throughout the year, since these departments generally admitted patients on an urgent but random basis.

SCENARIO MODELLING IN BED PROJECTION

9.11 Besides the base case scenario, two different scenarios were constructed to model changes in service demand for general paediatric beds, including changes in ALOS and service substitution and diversion which sought to promote effective alternatives to reduce reliance on IP hospital services:

- Scenario A – It depicted an efficiency gain in IP services achieved through reducing ALOS by 1% per year over the whole projection horizon.
- Scenario B – In this scenario, on top of the efficiency gain of 1% for ALOS, it was assumed that the share of DP service (relative to IP service) for hospital admissions would increase by 0.5% point per year, by comparing the past DP share trend with international benchmarks.

BED REQUIREMENT WITH INCEPTION OF CEP

9.12 Under the proposed service model described in the previous chapters, many of the tertiary services currently provided by HA's paediatric departments will be transferred to the CEP when it is in full operation. This would involve translocation of some specialised paediatric beds from HA hospitals to the CEP. *Table 9.1* shows the translocation of the paediatric subspecialty beds in oncology, cardiology and nephrology.

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[1] *UK Neonatal Staffing Study Group. Patient Volume, staffing and workload in relation to risk-adjusted outcomes in a random stratified sample of UK neonatal care units: a prospective evaluation. Lancet (2002); 359:99-107*

Table 9.1 Translocation of Paediatric Specialised Beds to CEP

Cluster	Hospital	Paediatric Specialised Beds to CEP			
		Oncology	Cardiology	Nephrology	Total
HKWC	QMH	21	40	–	61
KCC	QEH	18	–	–	18
KWC	PMH	5	–	20	25
NTEC	PWH	28	–	–	28
NTWC	TMH	10	–	–	10
Total		**82**	**40**	**20**	**142**

9.13 As complex surgical cases will in future be managed at the CEP by pooling expertise from existing HA paediatric surgical centres, there will be some redistribution of PICU beds between HA hospitals and the CEP. Details of the redistribution will be subject to further deliberation between the paediatric departments concerned, taking into consideration factors such as changes in service demand, increase in the total number of PICU beds after inception of the CEP, and the appropriate size of a PICU, etc. Based on current service utilisation statistics of bed days occupied by post-operation paediatric patients, the projected number of PICU beds required in HA hospitals will be in the range of 39 to 41 by 2021, assuming a shared care service delivery model between the CEP and regional hospitals.

9.14 In addition, since the CEP will provide NICU care to those very high risk births, a proportion of which are currently treated at regional hospitals, the number of NICU beds required in HA will also need to be adjusted with the phased commissioning of the CEP. The redistribution of NICU beds in HA hospitals will be subject to further deliberation between the paediatric departments concerned. Based on existing service utilisation patterns, the projected number of NICU beds required in HA hospitals will be in the range of 87 to 93 by 2021, assuming a shared care service delivery model between the CEP and regional hospitals.

9.15 Given that the CEP will be centrally located in the Kowloon region, it will have impact on the delivery of paediatric services in the nearby hospitals, particularly Queen Elizabeth Hospital, United Christian Hospital and Kwong Wah Hospital. The redistribution of paediatric beds among these hospitals will therefore need further deliberation.

9.16 Taking into account the new service delivery model, population and demographic changes, as well as age- and specialty-specific service utilisation trends, the projected bed requirement for different types of paediatric beds in HA hospitals up to 2021 are shown in *Table 9.2.*

Table 9.2 – Projected Acute Bed Requirement for HA Hospitals after inception of CEP up to 2021

Type of beds	Existing bed provision (as at 31 Dec 2009)	Projected acute bed requirement in HA hospitals after inception of CEP up to 2021 ^
PICU	45	39–41
NICU	100	87–93
Other acute paediatric & neonatal	1,227	938–1,092 #
Total	**1,372**	**1,064–1,226**

^ Projection based on an assumed optimum occupancy rate of 80% for intensive care beds and 85% for all other beds.

The range shows the different bed requirement under different scenarios as described in paragraph 9.11.

9.17 The projection indicates a steady demand for general paediatric beds, as the below-18 population will stay more or less the same throughout the next ten years. However, the demand for NICU and SCBU beds in some hospitals will likely increase due to the need to support baby deliveries in their respective catchment areas. With the extra number of paediatric beds available after inception of the CEP, there should be adequate facilities for meeting the health needs of Hong Kong's paediatric population in the coming decade.

Chapter X

Implementation Enablers

Chapter X
Implementation Enablers

10.1 There are a number of key enablers that need to be considered when implementing the proposed paediatric services model upon inception of the CEP. This chapter presents the suggestions collected during the consultation and review process on the three most important enablers, namely, building design, research and development, as well as workforce planning. When appropriately implemented, they will help move the overall development of paediatric services in Hong Kong towards the desirable model of care, as envisaged in this report. Ultimately, the health of our future generations will be safeguarded, maintained and enhanced.

DESIGN IMPLICATIONS

Intelligent design and healing environment

10.2 Best practice design (so-called intelligent design) is a powerful driver of change. New models of care can be mandated by intelligent design. For example, many support the philosophy of day of surgery admission (DOSA). Intelligent design can address these issues and drive the desired outcomes.

10.3 Numerous studies have demonstrated that sensitive, culturally appropriate design can contribute to the healing process for those that are sick as well as create a focus for health in the broader community. In designing the CEP and redeveloping paediatric facilities in regional hospitals, a culturally appropriate healing environment should be pursued. Factors that contribute to a healing environment include:

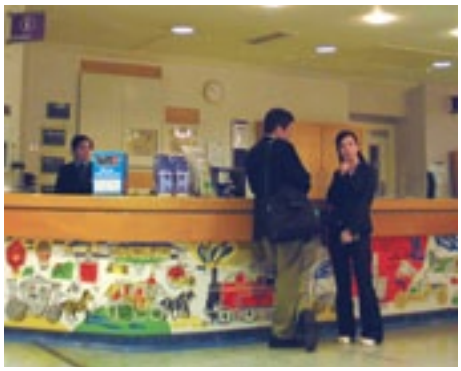
- The buildings and their location
- Spatial orientation
- Art and cultural symbols
- Accessibility
- Way finding
- Visual engagement with the outside world – views and gardens etc.
- Family friendly

- Unobtrusive technology
- Respect for the sick and infirm
- Community involvement
- Philanthropic participation
- Pride of the men and women who are fortunate enough to work in the institution

Acute admissions

10.4 Under the proposed hub-and-spoke model of reorganising paediatric services, the CEP will accept acute referrals from other hospitals (including the private sector), a specific system for the assessment, initial management and processing of these referrals will have to be put in place.

10.5 For many acute referrals, the provisional diagnosis may be wrong and/or the patients may have co-morbidities. For these and other reasons, the CEP will require an acute admission ward, specifically designed, staffed, located and equipped, to manage this category (often called acute arranged) of patients.



10.6 In designing the acute admission ward, the following would need to be considered:

- The unit should be located in the critical care zone of the CEP
- It will need to be a 24-hour/7-day operation
- Work will need to be done on the anticipated numbers of acute arranged admissions but a minimum of 20 beds would be an initial estimate
- Patients requiring mechanical ventilation would be transferred to PICU/NICU
- As soon as the diagnosis is confirmed and the patient stabilised, they can be transferred to a general ward or home ward (or discharged or referred to a regional hospital)
- The initial phase should take less than 12 hours
- The model is similar to the one that has been described as Paediatric Assessment Units in earlier parts of this report
- Protocols will need to be developed, for each specialty, which will send the patients to either the home ward or the acute assessment ward

Ambulatory and inpatient facilities

10.7 Over the past 50 years, hospital practice has changed with the development of ambulatory care. The evolution of technologies such as minimally invasive procedures has made it possible for many complex procedures to be performed without the need for an overnight admission. Given this new development, thinking about hospital design and campus layout has centred around two models.

10.8 The first is the zonal system where the campus is divided into functional zones, i.e., ambulatory zones, inpatient zones, critical care zones which are designed and located to specifically meet the requirements of the users of these services. The zonal system is the one that is thought to deliver the best patient-focussed care. However, for certain subspecialties with adequate critical mass, there are advantages of adopting the institute model to group a full range of services on one floor or one building for more effective and efficient delivery of care.

10.9 Having considered recent trends in hospital design, a mixed model is recommended for the CEP and other new HA paediatric facilities. The inpatient and ambulatory components of appropriate clinical groupings, oncology for example, should be linked and integrated on an institute model. For the rest of the campus, critical care, education, pathology and logistics are retained on a zonal basis.

10.10 It is suggested that the centrepiece of the institution should be an ambulatory centre closely integrated with inpatient units. It should be easily accessible and culturally appropriate, offering one stop service to patients on a multidisciplinary basis, particularly to those with chronic and/or complex problems. Under the ambulatory care model, clinics are organised so that an individual patient can see their health care team in one visit, or at the very least, during the course of one day. This requires large consulting rooms with in-built technology.

10.11 Day surgery facilities can be part of the ambulatory centre or integrated within the main theatre complex. The preferred option is an integrated suite with the ambulatory and inpatient populations utilising the same facilities.

10.12 Day of surgery admission (DOSA) should be promoted by adopting a perioperative model. This requires the setting up of pre-anaesthetic clinics where a patient is assessed and counselled, and consent is obtained prior to the day of admission. The pre-operative visit can also be used to familiarise the patient with the point of presentation on the day of surgery and the area from which patients can be collected post-operatively.

10.13 For DOSA patients, even when an inpatient admission is planned, experience suggests that a dedicated DOSA ward enables the patients to be assembled and assessed rapidly on the morning or afternoon of surgery. This is frequently known as the perioperative ward. All patients, day and multi-day, present there on the day of surgery. All processes are significantly enhanced by this model. The flow is then to the theatre suite and onto recovery and only then to the assigned ward.

Ward configuration

10.14 More than 400 beds are proposed for the CEP, with PICU, NICU, assessment unit, perioperative, recovery and general wards. Of these, about 70% are in general wards, the configuration of which will be pivotal to the future success of the Centre.

10.15 For some disciplines, oncology in particular, an institute model is preferred. Under this model, inpatients, clinics, chemotherapy suites, researchers etc are all clustered in a geographic area. Intelligent designs can juxtapose inpatient spaces with ambulatory floors to create an institute model without confusing the design principles of the respective areas.

10.16 For other disciplines, the requirement of the ward is merely a place for the child/patient to sleep, with minimal requirements for nursing intervention. Under this scenario, grouping the children (and hence the wards) on other criteria may be more appropriate. Infants and toddlers separated from adolescents would be an obvious example. With older children, gender segregation becomes important, particularly in relation to child protection issues.

10.17 Many factors will influence this discussion including:

- Concentration of nursing expertise
- The absolute number of children in any particular discipline
- The mobility of the children
- Proximity to educational facilities
- Parent accommodation
- Convenience to staff

10.18 Allocation of private patients to a particular ward is not necessarily in the patients best interests. Private facilities can be located as part of/or adjacent to general clinical areas.

10.19 In determining the configuration of the beds, future flexibility is perhaps the major determinant. Maximum flexibility is achieved in other countries by opting for an all single room design. However, this may not be appropriate in Hong Kong. A sensible mix of single rooms and four bedded accommodation is likely to produce a reasonable outcome.

10.20 For nursing purposes, large floor plates are the most important consideration for efficiency. Greater flexibility is achieved by creating large floor plates laid out in pods of 10 to 12 beds. Pods of this size can accommodate small disciplines and/or groups of children with needs in common (age groupings for example). Pods of 10 to 12 beds are easy to lock-down in times of low demand. Four collocated pods of this size will house even the largest specialties.

10.21 The floor plates will also need to provide for the educational and social needs of the children as well as providing for staff amenity including tea-rooms, change rooms and carefully designed time-out space.

Academic and research spaces

10.22 The three pillars of the CEP are clinical service, research and education. Intelligent design also extends to the other components – not just service.

10.23 Offices and facilities (probably not wet labs) need to be allocated to teaching and research staff as part of the clinical spaces. Too often, non-clinical staff members are based in remote corners of the campus with little or no interaction with their clinical colleagues, thus undermining the strategic intent of developing an academic medical centre.

RESEARCH AND DEVELOPMENT

10.24 There is general consensus within HA that a research institute on child health is critical to the success of the CEP and related services reorganisation. This is because:

- The concentration of paediatric patients with complex disorders in the CEP means that if it does not research into their needs, no one else will be able to do so.
- The concentration of specialised staff at the CEP will provide the resources necessary to undertake translational research which has the potential to directly or indirectly benefit paediatric patients.
- It is only through research-led practices that the clinical outcome for paediatric patients can be improved.

Vision and mission

10.25 The vision of the HA professionals is for the CEP and its research institute to become a leading Academic Health Science Centre (AHSC) in the Asia-Pacific region to provide the best paediatric care by linking the evidence from research into training and education, and from there into practice in the community. Over time, this AHSC should be transformed into an Academic Health Science System (AHSS) in partnership with primary and secondary care throughout Hong Kong to prevent the high prevalence of chronic illness and to improve the efficiency of care.

10.26 The research institute together with the CEP should be devoted to the tripartite mission of excellence in clinical practice, research and education by synergising collaboration among healthcare professionals in the public, private and academic sectors.

Features

10.27 While the actual research to be undertaken at the research institute will need to be discussed in detail at a later stage with all the stakeholders, it is suggested that it should have the following features:

- Located close to or integrated with the CEP to enable interaction between clinicians and scientists on a daily basis
- Collaboration between clinically aware laboratory scientists and laboratory aware clinicians with laboratory-based research groups housed in the institute
- Research at the CEP should be developed in conjunction with research, both basic and applied, in other universities in Hong Kong
- A range of state-of-the-art platform technologies should be developed in the research institute for achieving its mission
- Certain disciplines such as clinical and molecular genetics, metabolic diseases and inborn errors of metabolism, developmental biology and management of congenital handicaps, public health and preventive medicine in childhood, study of childhood origins of disease in adults are some of the topics that should concern the research institute. In addition, research topics and conditions will also need to be considered in relation to the specialties developed at the CEP.

Governance

10.28 The research institute on child health should be sponsored by a number of stakeholders who will need to participate in its governance. The local universities have to be fully engaged from the start and thereafter. Philanthropic institutions and patient/family support groups might also assist in providing capital and/or revenue, as in other AHSCs around the world.

Participation of Hospital Authority

10.29 It is recommended that HA will participate in the development of the research institute in partnership with the CEP and local universities to facilitate the translation of health science discoveries into clinical applications. Paediatric departments of HA could serve as test centres for new paediatric healthcare delivery models and emerging diagnostic and treatment modalities, and take part in research on new methods to ensure the delivery of high-quality, patient centred and cost-efficient paediatric services for our community. Clinical research could be imbedded throughout our care delivery system to allow patient access to innovatory treatments.

10.30 To contribute to the transformation of medicine in paediatrics, it is also recommended that HA hospitals should collaborate closely with the CEP and local universities to develop a transformative educational model for paediatric clinicians in Hong Kong. This model should focus on the training of clinician scientists with exposure not only to research and medicine, but to a wide range of health disciplines, social sciences, health economics, business studies and policy matters.

WORKFORCE PLANNING

10.31 Among the implementation enablers, the one stood out most obviously during the review process is the formulation of a manpower and training plan to take the CEP project forward for enhancing child healthcare services, research and training in Hong Kong. This involves identification of the manpower and expertise requirements based on the proposed model of clinical care, matching the projected requirements with existing workforce capacity to map out the training needs, formulating concrete training and staff development plans, as well as organising local and overseas training programmes for healthcare professionals.

Manpower and training issues

10.32 It is generally recognised that over time additional medical, nursing and allied health manpower and expertise in the specialty of paediatrics and related disciplines will be required to support the development of the CEP in partnership with other secondary and primary care providers. The increasing subspecialisation and development of high-quality, dedicated medical services for sick children in context of the CEP will necessitate the training of more healthcare professionals with expertise in various paediatric and paediatric-related subspecialties.

10.33 The major issues on manpower and training identified during the review process are summarised below:

- Identification of the manpower and expertise required for operating the CEP and paediatric units in regional hospitals
- Identification of existing manpower and expertise gaps
- Sorting out ways to meet these manpower and expertise requirements/gaps, including how to redistribute staff within the public hospital system, to intensify the training of healthcare professionals, and to recruit from external sources
- Formulation of plans for phasing in different specialty and subspecialty services to the CEP with corresponding manpower arrangements
- Developing a system for identifying potential candidates and expertise for transfer to the CEP

- Working out appropriate staff relief arrangements for releasing healthcare professionals to undertake local and overseas training in preparation for implementation of the new service model
- Designation of "recognised" centres in hospitals for training of various paediatric and paediatric-related subspecialties
- Sourcing of suitable overseas training programmes

10.34 These would need further deliberation among relevant parties and stakeholders in order to enable implementation of the recommendations of this report.

Proposed way forward

10.35 The importance of starting the training and development of expertise as soon as possible has been highlighted throughout the review process. It is therefore proposed that upon finalisation of the paediatric services model, a high-level working group with wide representation from clinicians of different paediatric and paediatric-related subspecialties across HA and universities be set up to further discuss the above-mentioned manpower and training issues with a view to developing a comprehensive manpower and training plan for implementation starting from 2011/12.

Glossary

A&E	Accident & Emergency
AHNH	Alice Ho Miu Ling Nethersole Hospital
AHSC	Academic Health Science Centre
AHSS	Academic Health Science System
AIDS	Acquired Immune Deficiency Syndrome
ALOS	Average Length of Stay
APN	Advanced Practice Nurse
CAPD	Continuous Ambulatory Peritoneal Dialysis
CEP	Centre of Excellence in Paediatrics
CEN	Centre of Excellence in Neuroscience
CGH	Comparative genomic hybridization
CMC	Caritas Medical Centre
COC	Clinical Coordinating Committee
CT	Computed Tomography
DH	Department of Health
DKCH	Duchess of Kent Children Hospital at Sandy Bay
DNA	Deoxyribonucleic Acid
DOM	Department Operations Manager
DOSA	The Day of Surgery Admission
DP	Day-patient
ECMO	Extracorporeal Membrane Oxygenation
ENT	Ear, Nose & Throat
ERCP	Endoscopic Retrograde Cholangiopancreatography
ESRD	End Stage Renal Disease
FISH	Fluorescence In Situ Hyrbridization
GI	Gastrointestinal
HA	Hospital Authority
HDU	High Dependency Unit
HIV	Human Immunodeficiency Virus
HKEC	Hong Kong East Cluster
HKWC	Hong Kong West Cluster
IDC	HA Infectious Disease Centre
IEM	Inborn Error of Metabolism
IP	Inpatient
IR	Interventional Radiology
IRA	Immunology, Rheumatology & Allergy

KCC	Kowloon Central Cluster
KEC	Kowloon East Cluster
KH	Kowloon Hospital
KWC	Kowloon West Cluster
KWH	Kwong Wah Hospital
MRI	Magnetic Resonance Imaging
NICU	Neonatal Intensive Care Unit
NO	Nursing Officer
NS	Nurse Specialist
NTEC	New Territories East Cluster
NTWC	New Territories West Cluster
PAU	Paediatric Assessment Unit
PYNEH	Pamela Youde Nethersole Eastern Hospital
PICU	Paediatric Intensive Care Unit
PMH	Princess Margaret Hospital
PWH	Prince of Wales Hospital
QEH	Queen Elizabeth Hospital
QMH	Queen Mary Hospital
SCBU	Special Care Baby Unit
SNO	Senior Nursing Officer
SOP	Specialist Outpatient
SPECT	Single Photon Emission Computed Tomography
TKOH	Tseung Kwan O Hospital
TMH	Tuen Mun Hospital
UCH	United Christian Hospital
VAD	Ventricular Assist Device
WM	Ward Manager
YCH	Yan Chai Hospital

Appendices

Appendices

Appendix 1

STEERING COMMITTEE ON PAEDIATRIC SERVICES REVIEW

TERMS OF REFERENCE AND MEMBERSHIP

I Terms of Reference

(1) To oversee the work of the Consultant Panel and steer the strategic direction for the review on paediatric services in HA in context of the Centre of Excellence in Paediatrics

(2) To receive an interim report on collated survey responses and summary of the face-to-face consultation interviews on the Paediatric Services Review from the Project Consultant and the HA Head Office project team.

(3) To receive the final report and advise on the recommendations on the Paediatric Services Review.

II Membership

Chairman: Mr Shane SOLOMON, *Chief Executive of HA (up to September 2010)*

Members: Dr W L CHEUNG, *Director (Cluster Services), HA Head Office*

Dr P Y LEUNG, *Director (Quality & Safety), HA Head Office (up to Oct 2010)*

Dr S V LO, *Director (Strategy & Planning), HA Head Office*

Dr C T HUNG, *Cluster Chief Executive, Kowloon Central Cluster*

Prof P C NG, *President, Hong Kong College of Paediatricians*

Dr C K LI, *Chief of Service, Department of Paediatrics, Prince of Wales Hospital*

Prof LAU Yu-lung, *Chief of Service, Department of Paediatrics & Adolescent Medicine, Queen Mary Hospital*

Appendix 2

CONSULTANT PANEL ON PAEDIATRIC SERVICES REVIEW

TERMS OF REFERENCE AND MEMBERSHIP

I Terms of Reference

(1) To address issues and formulate strategies on the reorganization of paediatric services in HA in context of the proposed Centre of Excellence in Paediatrics

(2) To comment on the key recommendations of the review for report to the Steering Committee regarding the reorganization of paediatric services in HA

II Membership

Sir Cyril CHANTLER, *Chairman of UCL Academic Health Science Partnership, London, United Kingdom, and world renowned paediatrician*

Dr Peter BRENNAN, *Director, MA International Pty Ltd., Australia*

Dr Pamela LEUNG, *former Cluster Chief Executive (Hong Kong East) and experienced obstetrician*

Dr Lily CHIU, *former Cluster Chief Executive (Kowloon West) and experienced paediatrician*

Appendix 3

CHAIRS AND CO-CHAIRS OF SUBSPECIALTY GROUPS

Paediatric subspecialty / related specialty	Chair / Co-Chair
Paediatric Oncology & Haematology	**Dr C K LI** *Chief of Service, Department of Paediatrics, Prince of Wales Hospital*
Paediatric Cardiology and Cardiac-thoracic Surgery	**Dr K T CHAU Adolphus** *Chief of Service, Department of Paediatric Cardiology, Queen Mary Hospital* **Dr L Y SO** *Chief of Service, Department of Paediatrics & Adolescent Medicine, Pamela Youde Nethersole Eastern Hospital*
Paediatric Nephrology & Urology	**Dr M C CHIU** *Chief of Service, Department of Paediatrics and Adolescent Medicine, Princess Margaret Hospital (up to September 2010)*
Paediatric Neurology & Neuro-development	**Prof Virginia WONG** *Professor, Department of Paediatrics & Adolescent Medicine, The University of Hong Kong*
Paediatric Respirology	**Dr Daniel NG** *Chief of Service, Department of Paediatrics, Kwong Wah Hospital*
Paediatric Endocrinology & Metabolism	**Dr K F HUEN** *Chief of Service, Department of Paediatrics & Adolescent Medicine, Tseung Kwan O Hospital*
Clinical Genetics, Paediatric Immunology, Rheumatology & Allergy	**Prof LAU Yu-lung** *Chief of Service, Department of Paediatrics & Adolescent Medicine, Queen Mary Hospital*
Paediatric Gastroenterology, Hepatology & Nutrition	**Dr TSE Kong** *Consultant, Department of Paediatrics & Adolescent Medicine, Tuen Mun Hospital*
Neonatology	**Dr Bill CHAN** *Chief of Service, Department of Paediatrics & Adolescent Medicine, United Christian Hospital* **Dr W H LEE** *Chief of Service, Department of Paediatrics, Queen Elizabeth Hospital*

Paediatric subspecialty / related specialty	Chair / Co-Chair
Paediatric Intensive Care	**Dr TSOI Nai Shun** *Consultant, Department of Paediatrics & Adolescent Medicine, Queen Mary Hospital*
Paediatric Infectious Disease	**Dr LEUNG Chi-wai** *Consultant, Department of Paediatrics & Adolescent Medicine, Princess Margaret Hospital*
Paediatric Rehabilitation	**Dr C M YU** *Consultant i/c, Department of Paediatrics and Adolescent Medicine, Caritas Medical Centre (up to September 2010)*
Paediatric Surgery & Surgical Subspecialties	**Dr Kelvin LIU** *Consultant, Department of Surgery, United Christian Hospital*
Paediatric Neurosurgery	**Dr Dawson FONG** *Chief of Service, Department of Neurosurgery, Tuen Mun Hospital*
Paediatric Orthopaedic Surgery	**Dr Bobby NG** *Consultant, Department of Orthopaedics & Traumatology, Prince of Wales Hospital*
Paediatric Pathology	**Dr Albert CHAN** *Consultant Chemical Pathologist, Department of Pathology, Princess Margaret Hospital*
Paediatric Radiology	**Dr Susan CHAN** *Chief of Service, Department of Radiology & Imaging, Queen Elizabeth Hospital*
General Paediatrics, Community Paediatrics, & Adolescent Medicine	**Dr N S KWONG** *Chief of Service, Department of Paediatrics & Adolescent Medicine, Tuen Mun Hospital* **Dr Luke TONG** *Chief of Service, Department of Paediatrics & Adolescent Medicine, Alice Ho Miu Ling Nethersole Hospital*

Appendix 4

SUMMARY OF PAEDIATRIC SERVICES TO BE PROVIDED BY CENTRE OF EXCELLENCE IN PAEDIATRICS AND REGIONAL HOSPITALS

Specialty / Subspecialty	Services provided by Centre of Excellence in Paediatrics
Paediatric Oncology & Haematology	• Newly diagnosed paediatric oncology cases • Intrathecal, high-dose chemotherapy and febrile neutropenia • Severe haematological conditions with life-threatening complication, e.g., severe aplastic anaemia, hereditary thrombotic and bleeding conditions • Newly diagnosed cases requiring multidisciplinary care, e.g., haemophilia • Rare conditions, e.g., sickle cell disease and paroxysmal nocturnal haemoglobinuria (PNH) • Special treatment or procedures, e.g., radioactive synovectomy and haemophilia treatment with inhibitor • Radiotherapy service in collaboration with Centre of Excellence in Neuroscience
Paediatric Cardiology & Cardiac Surgery	• Paediatric cardiac-thoracic surgery including both open and closed heart surgery • Invasive procedures such as diagnostic and interventional cardiac catheterization • Inpatient and outpatient services for managing conditions like: - end-stage heart failure, mechanical circulatory support and cardiac transplantation - cardiac electrophysiology, complex cardiac arrhythmia, ablation of abnormal pathways, and pacemaker implantation - cardiac intensive care for paediatric patients and neonates - severe pulmonary hypertension - other complex cases requiring multidisciplinary management
Paediatric Nephrology & Urology	Complicated paediatric renal and urological cases, including: • Cases requiring various acute renal replacement therapy and plasmapheresis in paediatric and neonatal intensive care settings • End stage renal disease program for managing late-stage chronic kidney disease • Automated peritoneal dialysis • Chronic haemodialysis • Paediatric renal transplantation New services, e.g.: • Haemoperfusion & dialysis for drug poisoning & detoxification • Combined liver and renal transplantation • Renal function and physiology assessment • Combined spine clinic • Molecular diagnosis of genetic renal diseases

Shared care services between CEP and regional hospitals of HA	Services provided by regional hospitals
• Regional hospitals to provide step-down care for patients whose conditions have been stabilized • Collaboration between regional hospitals and CEP to develop shared care services such as outreach clinics • Join hands to train more paediatric oncologists and haematologists • Develop with CEP an integrated territory-wide palliative service network to enhance bereavement care in inpatient, outreach and home settings with participation of non-government organizations	• Provide less intensive treatment and outpatient oncology services to improve service accessibility • Provide long-term follow-up and multidisciplinary support to long-term cancer survivors • Take care of common haematological conditions such as idiopathic thrombocytopenic purpura (ITP), iron deficiency anaemia and thalassaemia intermedia • Provide paediatric haematology consultation service to other clinical departments
• Regional hospitals to provide step-down care for patients referred back from CEP • Collaboration between regional hospitals and CEP to build up a coordinated network of paediatric cardiology services • Cooperate with CEP to organize outreach cardiology clinic services at regional hospitals • Join hands to train more paediatric cardiology specialists and cardiac surgeons	• Provide secondary care, e.g., non-interventional procedures such as echocardiogram and Holter ECG monitoring, emergency assessment of cyanotic newborns, pre- and post-operative care, consultation support to paediatric and neonatal intensive care units, as well as outpatient cardiology consultations • Provide acute care and emergency cardiac assessment for paediatric patients
• Jointly develop a coordinated network of nephrology & urology services in Hong Kong with agreed shared care protocols and referral guidelines • Regional hospitals to provide step-down and follow-up care for patients referred back from CEP • Join hands to train more doctors and nurses specialized in nephrology & urology	• Provide secondary nephrology & urology services for local populations, e.g., management of nephritic syndrome, various kinds of glomerulonephritis and congenital kidney diseases • Provide emergency consultation support to other clinical departments • Outpatient and community-based programmes

Specialty / Subspecialty	Services provided by Centre of Excellence in Paediatrics
Paediatric Neurology & Neuro-development	• Intractable epilepsy, including epilepsy surgery and use of ketogenic diet • Cerebral palsy with difficult management issues including use of a gait laboratory, selective dorsal rhizotomy, and intrathecal baclofen pump • Intractable movement disorders including use of deep brain stimulation • Neurometabolic, neurodegenerative, neurogenetic and neuromuscular diseases • Various neuro-immunological diseases • Developmental assessment for children with complex disabilities
Respirology	Complex respirology cases, surgeries and procedures requiring multidisciplinary management and strong paramedic support, including: • Complex or rare respiratory diseases, e.g., pulmonary hemosiderosis, interstitial lung disease, cystic fibrosis, obstructive sleep apnoea with multiple morbidities, dysfunctional swallowing with upper airway obstruction requiring aero-digestive assessment, and congenital central hypoventilation • Complex surgeries, e.g., tracheoplasty, Treacher-Collins syndrome, lung transplant, tracheostomy in young children, and diaphgramatic pacing • Complex procedures, e.g., infant lung function test, infant overnight polysomnography (PSG), flight simulation test / hypoxic challenge, cilia function study, sweat test, and respiratory muscle assessment
Paediatric Endocrinology and Metabolism	Complex endocrine problems, such as: • Post bone marrow transplant, chemotherapy and neurosurgery cases requiring endocrine follow-up • Complex cases of disorder of sex development • Diabetic ketoacidosis and annual screening on diabetes complications and treatment protocols • Growth Hormone (GH) and Luteinizing Hormone-Releasing Hormone (LHRH) Analogue treatment Complex metabolic problems, such as: • Complex metabolic diseases such as inborn error of metabolism • Enzyme replacement therapy for rare metabolic disorders • Nutritional therapy for inborn error of metabolism cases • Newborn screening of inborn error of metabolism (universal or high risk screening) • Joint management of neuro-metabolic diseases with neurologists

Shared care services between CEP and regional hospitals of HA	Services provided by regional hospitals
• Regional hospitals to provide step-down care (including ventilator care) and follow-up care for patients referred back from CEP • Collaborate with CEP to develop an integrated network of paediatric neurology services across Hong Kong • Joint management of selected neurological conditions • Provide step-down neuro-rehabilitation services for CEP patients • Provide community interface for the CEP Programmes • Cooperate with CEP to train more paediatric neurologists	• Child Assessment Centre • Ambulatory neurological rehabilitation • Autism Programme • ADHD Drug Titration Programme • Chinese Medicine/Western Medicine Rehabilitation Programme • Community Developmental paediatric services • Other secondary level neurology and neuro-development services including consultation support to other clinical departments
• Collaborate with CEP to fill the service gaps such as lack of central registry and diagnostic service for rare respiratory diseases • Regional hospitals to provide step-down care for children with complex special healthcare needs with a view to delivering a continuum of care that meets the ongoing needs of these patients from infancy to early adulthood • Develop shared care models, e.g., outreach respiratory clinics • Organize joint rehab programmes with CEP for improving exercise tolerance, dyspnoea management and self-empowerment of paediatric patients suffering from asthma and cardio-pulmonary diseases • Jointly provide multidisciplinary care for paediatric patients requiring long-term invasive ventilation • Join hands to train more specialists in paediatric respiratory medicine	• Manage high-volume respiratory diseases such as asthma, chronic lung diseases & sleep disorder • Provide community-based rehabilitation support to patients with complex special healthcare needs after discharge • Provide medium term support for pre- and post-operation care • Provide paediatric endoscopy & bronchoscopy services to take care of acute respiratory cases • Provide multidisciplinary support to patients ventilated in both institutional and home settings • Develop nurse or allied health professional led respiratory clinics • Organize community education programmes on respiratory medicine
• Regional hospitals to provide step-down care and community interface for CEP programmes and develop shared care services such as outreach clinics and transitional care for grown-up patients • Jointly develop annual screening programmes on diabetes complications and treatment protocols • Collaboration between regional hospitals, CEP and DH to develop newborn screening for metabolic diseases • Join hands to train up more specialists in metabolic medicine & diabetes, paediatric lab experts, dieticians, counsellors and nurses • Close collaboration to translate research findings to clinical application	• Provide secondary care for patients with endocrine problems such as children with puberty or growth problems, obesity, diabetes and thyroid disorders • Provide step-down and follow-up care for patients referred back from CEP • Provide endocrinology support to other clinical departments • Develop patient support groups and community network for management of endocrine and metabolic diseases • Conduct community studies on endocrine and metabolic disease • Participate in the work of setting up registries for inborn error of metabolism, diabetes and other paediatric endocrine disorders

Specialty / Subspecialty	Services provided by Centre of Excellence in Paediatrics
Clinical Genetics	• The clinical genetic services developed in the CEP should include clinical assessment of complex genetic cases leading to a definitive diagnosis, acting as source of information for consultation from other clinicians and provision of genetic counselling as well as molecular and functional diagnostics • These areas should be service, research and education driven and be backed up by a robust reference laboratory, which can perform a full range of genetic tests from basic molecular and cytogenetic tests, DNA & tissue banking to state-of-the-art technologies in genetics and genomics.
Paediatric Immunology, Rheumatology & Allergy	Tertiary immunology and allergy services, including: • Diagnostic evaluation and clinical care of conditions like: - primary immunodeficiency or immune dysregulation - multiple food allergy - anaphylaxis or anaphylactoid reactions - multiple drug allergy, latex and insect allergy with systemic reactions - rare disorders, e.g., hypereosinophilic syndrome, mastocytosis, etc. - recalcitrant eczema for considering systemic immuno-suppressive or evaluation of alternative diagnosis • Stem cell transplantation for immunodeficiency • Immune-replacement and immunomodulatory therapy • Allergen immunotherapy • Drug desensitization • Food allergy – oral tolerance induction • Use of various biologics, e.g., Anti-IL 5 antibody, Anti-IgE therapy Tertiary rheumatology services, including the management of: • All uncommon and/or complex diseases such as juvenile dermatomyositis (JDM), systemic sclerosis, and chronic vasculitis syndrome • Cases with multisystem problems requiring joint management with other subspecialties • Patients receiving specific treatment modalities such as: - biologics or cellular therapies - multidisciplinary assessment or intervention - intra-articular steroid injection - autologous stem cell transplantation • High-volume but complex diseases such as juvenile idiopathic arthritis (JIA) and systemic lupus erythematosus (SLE) [shared care with regional hospitals]

Shared care services between CEP and regional hospitals of HA	Services provided by regional hospitals
• Formulate shared care guidelines and protocols to involve regional hospitals in providing step-down and transitional care for patients • Close collaborations to conduct clinical genetics research and training, including the development of newborn screening programme and birth defect registries • Establish two-way communication channels through academic meetings, teleconferences, genetic counselling letters and management letters to facilitate knowledge transfer and territory-wide basic and clinical genetic/genomic research	• provide step-down and transitional care for patients referred back from CEP • genetic consultation support to the paediatric- related specialists in the respective hospital clusters
• Formulate common clinical protocols for managing specific immunology, rheumatology & allergy (IRA) diseases to facilitate development of shared care services between CEP and regional hospitals • Develop joint staff training and research programmes on IRA between CEP and regional hospitals • Organize exchange programmes for paediatricians working at CEP and regional hospitals to enrich their clinical experience and exposure in the respective subspecialties	• Manage acute and secondary IRA conditions, such as asthma, rhinitis, dermatitis, simple food/drug allergy, inflammation disorders, and rheumatology cases not requiring special treatment • Provide step-down and follow-up care for patients referred back from CEP • Provide IRA consultation support to other clinical departments • Organize community-based IRA programmes through close interface with private practitioners and voluntary organizations

Specialty / Subspecialty	Services provided by Centre of Excellence in Paediatrics
Gastroenterology, Hepatology & Nutrition	Complicated gastrointestinal diseases, for example: • Congenital gut anomalies • Severe feeding difficulty • Complicated gastro-esophageal reflux disease (GERD) • Severe motility disorders and pseudo-obstruction • Complex food allergy • Intestinal mal-absorption, chronic diarrhoea and steatorrhea • Short gut or other forms of intestinal failure • Inflammatory bowel diseases • Gastrointestinal bleeding • Complicated constipation • Rare diseases of alimentary tract Complicated liver diseases, for example: • Chronic hepatitis, including hepatitis B and hepatitis C • Acute / fulminant / chronic liver failure • Biliary atresia • Cholestatic liver disease • Wilson's disease • Cirrhosis / portal hypertension • Work-up and follow-up for liver transplant patients Complicated nutritional disorders such as enteral and parenteral nutritional support for: • Children with chronic debilitating disease • Critically ill infants and children • Children requiring long-term / home parenteral nutrition Complicated GI procedures such as: • Liver biopsy • Upper and lower GI endoscopy, Percutaneous Endoscopic Gastrostomy (PEG) • Endoscopic ultrasound (EUS) • Capsule endoscopy • Enteroscopy • Endoscopic retrograde cholangiopancreatography (ERCP) • Breath tests • Functional GI lab service – stool assays / stool antigen test / GI hormonal / gut mucosal enzyme assay • Motility study, manometry, Electrogastrogram (EGG), combined 24-hour PH & impedance study • Other advanced procedures

Shared care services between CEP and regional hospitals of HA	Services provided by regional hospitals
• Regional hospitals to provide step-down and follow-up care for patients referred back from CEP according to shared protocols and guidelines for specific diseases • Jointly develop a coordinated network of paediatric gastroenterology, hepatology & nutrition services across Hong Kong • Collaboration in form of regular monitoring of cases, outreach clinic consultation, and emergency consultation support	• Provide secondary GI and liver outpatient service and GI investigations such as colonoscopy & oesophageal PH monitoring • Manage patients with mild and non-specific GI symptoms • Take care of patients referred back from CEP • Enhance primary and secondary GI services through the organization of public education campaigns / nutrition promotion programmes, provision of stoma care and multidisciplinary management of community-based GI nutritional cases • Provide GI consultation support to paediatric-related specialties • Develop case management, play therapy, patient support groups and transitional care programmes for grown-up patients

Specialty / Subspecialty	Services provided by Centre of Excellence in Paediatrics
Neonatology	Complex neonatology cases requiring surgical intervention and multidisciplinary management, including: • Complicated neonatal surgical or neurosurgical cases (in-utero or post delivery) • Severe necrotizing enterocolitis cases • Complex neonatal congenital heart diseases • Neonates with difficult and unstable airways • Neonatal oncology cases • Neonatal cases requiring acute renal replacement or ECMO therapy • Complicated neonatal congenital diseases requiring multidisciplinary and specialized management, e.g., ambiguous external genitalia, inborn error of metabolism and multiple congenital anomalies • Babies requiring special treatment modalities not available in regional hospitals, e.g., hypothermia for Hypoxic-Ischemic Encephalopathy (HIE) • 24-hour neonatal retrieval service
Paediatric Intensive Care	All cardiology cases requiring operation and interventional procedures • Complex paediatric surgical and neurosurgical cases • Complex paediatric orthopaedics cases • Critical cases with multi-organ failure or requiring renal replacement therapy / multidisciplinary support • Complicated trauma / burn cases • Paediatric emergency transport service
Infectious Disease	Severe or complicated cases of non-communicable infectious disease, including: • Opportunistic infections in immuno-compromised hosts suffering from primary immuno-deficiencies, HIV / AIDS, or those receiving intensive immuno-suppressive therapy, chemotherapy and haematopoietic stem cell / bone marrow / solid organ transplantation • Severe or complex infections requiring organ / surgical support and multidisciplinary care, e.g., - HIV / AIDS - Complicated intra-thoracic and extra-pulmonary tuberculosis - Chronic hepatitis requiring antiviral / immuno-modulatory therapy - Severe neurological infections - Severe sepsis, toxic shock syndrome - Infection-triggered haemolytic uraemic syndrome (HUS) and haemophagocytic lympho-histiocytosis (HLH) - Unresolved pneumonia, empyema thoracis - Infective endocarditis, myocarditis, pericarditis - Solid organ abscesses, ocular, ENT, skin, soft tissue and musculoskeletal infections - Device-associated infections (prosthesis, foreign body implant and shunt) - Infections caused by multi-drug resistant organisms - Disseminated infection with herpes group of viruses - Invasive / systemic fungal, atypical mycobacterial and parasitic infections

Shared care services between CEP and regional hospitals of HA	Services provided by regional hospitals
• Develop shared care services according to common clinical protocols and guidelines, e.g., management of stable post-op surgical neonates in regional hospitals, and performance of emergency operation by CEP specialists in regional hospital when the baby is too unstable to be transferred • Organize joint staff training programmes to train more specialists in neonatal care, including neonatal nurses with specialization in paediatric surgery, neurosurgery, neonatal transport, renal replacement therapy or ECMO, physiotherapists, occupational therapists and speech therapists • Conduct joint research programmes on neonatology	• Contribute cases and expertise to CEP • Provide neonatal services to support the newborn deliveries in their respective hospitals, including antenatal counselling, standby services at delivery, and management of high-risk deliveries not transferred to CEP or its co-located acute hospital • Provide follow-up care for those stable post-op surgical neonates and other stable neonates transferred back from CEP • Enhance neonatal services through development of clinical pharmacy support and respiratory therapy
• Regional hospitals to provide step-down and follow-up care for patients referred back from CEP • Collaborate with CEP to develop ECMO services in Hong Kong • Join hands to provide comprehensive intensive care training for clinicians • Regional hospitals to provide emergency support for managing infectious disease outbreaks	• Paediatric intensive care units in regional hospitals to manage less complex paediatric trauma and medical conditions requiring admission to their respective hospitals
Develop shared care models between CEP and regional hospitals to provide the following services: • Diagnostic evaluation of unexplained or undefined conditions suspected to be caused by infectious agents • Investigation of congenital infections, pyrexia of unknown origin, periodic fevers, recurrent infections, and chronic fatigue syndrome, etc. • Treatment and follow-up plans for problematic conditions after diagnostic evaluation with regular monitoring and re-assessment • Shared protocols and guidelines for management of important infectious diseases • Territory-wide infectious disease consultation service	Provide secondary and step-down infectious disease services, including: • Management of community acquired respiratory and gastrointestinal infections • Mitigation of second wave of major community outbreak of infectious diseases • Step-down care for patients referred back from the CEP • Treatment and follow-up of specific conditions after assessment and diagnostic evaluation at the CEP • Provision of consultation service on infection control and hospital outbreak management to paediatric-related specialties • Development of outreach service according to local needs

Specialty / Subspecialty	Services provided by Centre of Excellence in Paediatrics
Paediatric Dermatology	• Rare and severe skin problems, e.g., eczema and psoriasis cases requiring light therapy
Paediatric Rehabilitation	Paediatric tertiary rehab services which are technologically demanding, highly specialized and multidisciplinary, including: • Acute rehabilitation • Complex and low-volume tertiary services such as rehabilitation after selective dorsal rhizotomy, Botox injection, and various operative interventions (neurosurgical, orthopaedic, cranio-facial, gastrostomy & tracheostomy) • Services involving multi-specialties, e.g., neurological / functional assessment, hearing impairment, and diagnostic evaluation such as respiratory dysfunction
Paediatric Surgery	• All neonatal surgery (including diaphragmatic hernia / eventration, bowel atresia, intestinal malrotation and volvulus, necrotizing enterocolitis requiring operation and fit for transfer, and sacrococcygeal teratoma) • Upper GI surgery (including oesophageal atresia, fundoplication for gastro-oesophageal reflux, and peptic ulcer) • Lower GI surgery (including Hirschsprung's disease, anorectal malformation, short bowel syndrome, inflammatory bowel diseases, and polyposis coli) • Hepatobiliary & pancreatic surgery (including biliary atresia, choledochal cyst, nesidioblastosis, and portal hypertension) • Paediatric urology (including pelvic-ureteric obstruction, vesicoureteric reflux & obstruction, posterior urethral valves, neurogenic bladder, duplex kidney with or without ectopic ureter, renal cystic diseases, renal stones, complicated hypospadias repair, intersex, and renal transplant) • Oncological surgery • Thoracic surgery (including congenital lung anomalies, chest wall anomalies, and pneumothorax) • Cleft lip / palate & craniofacial surgery (including primary surgery and secondary dental & maxillofacial surgery) • Burns • Severe vascular and lymphatic malformations • Endocrine and metabolic surgery (including thyroid and adrenal) • Fetal medicine / Antenatal diagnosed anomaly / ex-utero intrapartum treatment procedure (EXIT)
Paediatric Neurosurgery	Complex paediatric neurosurgery cases including: • Neuro-oncology cases • Neuro-vascular cases • Epilepsy surgery • Spasticity in cerebral palsy and other form of movement disorders • Congenital conditions such as bony condition of the skull and spine • Traumatic brain injury cases • Neuro-rehabilitation

Shared care services between CEP and regional hospitals of HA	Services provided by regional hospitals
• Collaborate with CEP, family physicians and general paediatricians to develop shared care models and coordinated network of paediatric dermatology services across Hong Kong • Regional hospitals to provide step-down care for patients referred back from CEP according to shared protocols	• Manage common dermatological conditions such as mild eczema • Provide dermatology consultation service to other clinical departments
• Collaborate with CEP to develop two to three rehabilitation centres in HA to deliver non-acute and specialized services for children with special needs, e.g., children requiring assistive device prescription, alternative augmentative communication, gait and seating assessment and long term mechanical ventilation • Jointly develop a coordinated network of paediatric rehab services across Hong Kong	• Long-term maintenance service for discharges from CEP whose conditions have been stabilized • Ambulatory rehab programs for children with neuro-developmental disorders, behaviour or emotional disorders, acute adjustment disorders, etc. • Community-based programs in special education and other settings • Limited short-term hospital rehab services, depending on parent's choice, local expertise and resources
• Jointly develop a coordinated network of paediatric surgery services across Hong Kong • Provide step-down care for patients referred back from CEP • Formulate common clinical protocols on specific paediatric surgical procedures to facilitate development of shared care services • Collaborate with CEP to train more paediatric surgeons, nurses and allied health professionals with specialization in paediatric surgical care	• Contribute cases and expertise to CEP • Handle high-volume, elementary paediatric surgical cases in both inpatient and ambulatory settings, including elective cases such as circumcision, inguinal hernia, orchidopexy for undescended testes, superficial lumps excision, simple vascular access, branchial anomalies & thyroglossal cyst, varicocele, stoma fashioning & closure, and oesophago-gastro-duodenoscopy & colonoscopy • Provide paediatric surgical support for emergency cases such as acute abdomen, appendicitis, intussusceptions, acute scrotum and incarcerated hernia
• Regional hospitals to provide step-down and follow-up care for patients referred back from CEP according to agreed shared care model and protocols • Provide step-down neuro-rehabilitation services for CEP patients	• Handle those life-threatening situations where transfer is too risky or limited by time and experienced surgeons are available for stabilizing the patient's condition • Examples of these situations may include critical intracranial hypertension, traumatic brain injury cases, and newborns not ready for transfer

Specialty / Subspecialty	Services provided by Centre of Excellence in Paediatrics
Paediatric Orthopaedics	Tertiary orthopaedic cases, including: • Operative scoliosis, in particular, severe and complex spinal deformities such as congenital, syndromic and early onset scoliosis below age 16 • All malignant musculo-skeletal tumours requiring multidisciplinary support • Complex upper and limb deformities reconstruction including obstetric brachial plexus injuries • Neuromuscular disorders such as cerebral palsy, spinal bifida and muscular dystrophy • All rare conditions where orthopaedic input form a major part of patient care such as those with metabolic disease leading to bone deformities • Osteogenesis imperfecta, renal rickets, mucopolysaccharidosis, polyostotic fibrous dysplasia, and marble bone diseases
Paediatric Ear, Nose & Throat	Tertiary complex cases, such as: • Congenital intra- and post-partum emergency airway conditions • Congenital rhinological conditions such as paediatric functional endoscopic sinus surgery as well as nasal, head and neck tumours • Congenital otological conditions such as deafness and otological malformations • Conditions requiring multidisciplinary surgical intervention, e.g., cleft palate, syndromic child, drooling child (neurological cases), obstructive sleep apnoea due to airway problems, oral-maxillo-facial conditions, and facial plastic procedures (rhino / otological) • Universal hearing screening and genetics • Hearing and speech / dysphagia assessment and therapy • Immunoallergology / Rhinoallergology cases • Paediatric otological conditions such as middle ear effusions, chronic suppurative otitis media, and cholesteatoma (congenital or early acquired) • Adenotonsillar conditions such as obstructive sleep apnoea syndrome
Paediatric Ophthalmology	• Complex cases such as visual electrophysiology, ocular genetics, and low vision rehabilitation • Complex cases requiring multidisciplinary intervention such as retinoblastoma, Graves Disease, and uveitis of juvenile rheumatoid arthritis
Paediatric Oral-maxillofacial and Dental Surgery	Complex tertiary cases such as: • Cleft lip and palate • Cranio-maxillofacial deformities • Obstructive sleep apnoea syndrome • Dental and maxillofacial trauma • Oro-facial infection • Oral-maxillofacial pathology • Oral-maxillofacial vascular malformation

Shared care services between CEP and regional hospitals of HA	Services provided by regional hospitals
• Jointly develop an integrated service network of paediatric orthopaedics across Hong Kong • Regional hospitals to provide follow-up care for patients referred back from CEP according to shared clinical protocols • Regional hospitals to provide longer term rehabilitation services for CEP patients • Join hands to train more clinicians specialized in paediatric orthopaedics	• Conduct screening, assessment and initial work-up for tertiary cases • Perform less complex elective orthopaedic procedures such as fracture operations • Manage less complex acute trauma and infection cases • Provide paediatric orthopaedics consultation service to other clinical departments
• Develop practical shared care models in service provision, research and training between CEP and regional hospitals • Regional hospitals to provide step-down care for patients referred back from CEP according to common clinical protocols, e.g., follow-up care for cochlear implant	• Provide emergency acute and secondary services for paediatric patients including day surgery
• Jointly develop a coordinated service network for paediatric ophthalmology, particularly on visual electrophysiology and ocular genetics • Regional hospitals to provide step-down care for patients referred back from CEP according to common clinical protocols, e.g., follow-up care for retinoblastoma, Graves Disease and uveitis of juvenile rheumatoid arthritis • Join hands to train more ophthalmologists with expertise in paediatrics	• Provide emergency acute and secondary paediatric ophthalmic services for local populations, e.g., the management of Strabismus, Amblyopia, and congenital cataract • Develop ocular rehabilitation services
• Develop practical shared care models in service provision, research and training between CEP and regional hospitals • Regional hospitals to provide step-down care for patients referred back from CEP according to common clinical protocols	• Provide emergency acute and secondary services for paediatric patients

Specialty / Subspecialty	Services provided by Centre of Excellence in Paediatrics
Paediatric Anaesthesiology	• Centralized paediatric anaesthesiology services to be developed in CEP to support all its major and ultra-major paediatric operations, especially for neonates and children with significant co-morbidities • New system for organisation of peri-operative care for paediatric patients • Acute and chronic pain management • Sedation / anaesthesia for diagnostic and interventional radiology • Anaesthesia for cardiac catheterization, endoscopy and other painful procedures
Paediatric Pathology	• Pathologist-led paediatric-friendly laboratory services to be developed for each of the following pathology discipline in CEP: chemical pathology, molecular genetics, cytogenetics, clinical microbiology & infection, anatomical pathology, haematology & transfusion medicine, as well as immunology, transplantation & immuno-genetics.
Paediatric Radiology	• Complicated paediatric interventional radiology procedures • Complicated neurosurgical cases requiring multidisciplinary management and close collaboration with the Centre of Excellence in Neuroscience • Radiological support in diagnosis and management of paediatric illnesses
Paediatric Psychiatry	• Complicated paediatric psychiatric cases requiring multidisciplinary management by CEP specialists
General Paediatrics, Community Paediatrics and Adolescent Medicine	Complex cases with multiple problems, those having difficulties in diagnosis / work-up, and chronic conditions requiring formulation of multidisciplinary care plan, e.g.: • Eating disorders requiring specialist input and child psychiatry support such as anorexia nervosa with profound metabolic disturbance • Very Complex cases of non-accidental injury such as “shaken baby syndrome” with subdural hematoma, sexual abuse cases requiring expert input, and cases requiring colposcopy • Adolescent drug abuse, attempted suicide and obesity with severe co-morbidities requiring multidisciplinary input and child psychiatry support • Specialized programs for adolescent patients, e.g., anti-obesity program

Shared care services between CEP and regional hospitals of HA	Services provided by regional hospitals
• Close collaboration between CEP and regional hospitals to train more anaesthetists specialized in paediatrics	• Provide anaesthesiology services for paediatric patients of regional hospitals
• Formulate common protocols for specific pathology tests to facilitate development of shared care services between CEP and regional hospitals • Jointly develop a coordinated network of paediatric pathology services • Organize joint research & training programmes on paediatric pathology	• Refer specimens and complicated/rare cases to CEP for special investigation and consultation • Provide core and emergency lab services for paediatric patients
• CEP to provide radiological consultation service to all regional hospitals, including the choice of imaging method • Jointly develop sub-specialization & training in paediatric radiology such as neuro-radiology, musculoskeletal radiology, cardiac radiology and interventional radiology	• Provide paediatric radiology service for patients of regional hospitals • Provide radiological support to paediatric patients referred back from CEP for follow-up care at regional hospitals
• Regional hospitals to provide follow-up care for patients referred back from CEP according to shared protocols • Establish a coordinated network of child psychiatry services across Hong Kong, with psychiatric liaison consultation support to clinicians in both CEP and regional hospitals	• Child psychiatric beds, outpatient clinic sessions and consultation liaison teams at regional hospitals to provide secondary care for local populations
• Collaborate with CEP and Department of Health (DH) to promote child health in Hong Kong and develop an effective system for measuring and monitoring child health status • Work with CEP to develop shared care models of providing follow-up, transitional care and rehabilitation services for CEP patients at regional hospitals • Reach-out consultation clinics by CEP specialists at regional hospitals • Jointly develop a few training centres for general and community paediatrics • Cooperate with CEP and its Research Institute to conduct epidemiological studies & research on models of care • Regional hospitals to help CEP integrate its services with those in secondary & primary healthcare sectors for prevention and treatment of chronic illnesses in children • Collaborate with CEP to develop a coordinated network for managing high-risk adolescent cases such as drug abuse	• Provide emergency, general and community paediatric services for local populations • Provide paediatric consultation service to A&E and other clinical departments • Provide rehabilitation care for paediatric patients with development disability, mental handicap and special rehabilitation needs • Child Protection Service • Provide comprehensive child development service in collaboration with DH • Provide comprehensive adolescent medicine services including substance abuse and obesity for local populations • Enhance the development of psycho-behavioural paediatrics in collaboration with child psychiatrists • Organize more community-based and outreach programmes to promote child health outside hospital setting

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