

Paediatric Radiography

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Preface

Paediatric radiography, despite being acknowledged as an imaging specialism, does not have a strong presence in either undergraduate or postgraduate radiography education programmes, and the availability of current published literature aimed at general radiographers is extremely limited. Consequently, the aim of *Paediatric Radiography* is to provide a reference text for radiographers and student radiographers working within general imaging departments and highlights aspects of paediatric healthcare that may influence paediatric radiography practice.

Importantly, when writing this text, we have not sought to provide a description of all paediatric imaging techniques or provide answers to all imaging dilemmas, because many of these will be dependent upon local expertise, radiographic equipment and availability of alternative imaging modalities. Instead we have attempted to raise important aspects of paediatric healthcare that should inform radiographic practice and hope that these will be discussed openly within imaging departments. As a consequence of the current shortage of paediatric radiography texts we have considered literature from other health professions, particularly nursing, and have attempted to adopt some of their good practice models. Therefore this text may also be useful for nurses, physiotherapists and junior doctors interested in the imaging of children and its role in current paediatric healthcare practice.

The development of this book has enriched our understanding of paediatric healthcare and the role of diagnostic imaging within the discipline. Our hope is that this book will help enhance paediatric radiographic practice to ensure that children attending imaging departments will receive informed and appropriate paediatric care.

Maryann Hardy and Stephen Boynes

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We would also like to offer our thanks to Gill Marles, Superintendent Radiographer, Clarendon Wing X-ray Department, the General Infirmary at Leeds, for allowing us access to the department for photographic purposes, and also to those patients and their families who consented to being photographed. In addition, thanks must go to the young models who were patient with us during very long photographic sessions; Benjamin Hardy, Peter Hardy, Robin Errington, Eve Errington, Alexander Errington, Benjamin Lodge, Jody Lodge and Theo Scally.

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Clarendon Wing X-ray Department, The General Infirmary at Leeds
Sheffield Children's Hospital
Manchester Children's Hospital (Booth Hall)
Hull A&E Department
Bradford Royal Infirmary

Chapter 1

Understanding childhood

A child is, as defined by English law, any person under the age of 18 years. It is assumed that by the age of 18 a person has reached such a level of maturity as to be capable of making fully informed decisions. However, it is the process of growth and development during childhood and adolescence that results in maturity and not chronological age alone.

Growth is the progressive development of a living being, or any part of it, from its earliest stage to maturity¹. In health care we usually restrict the term to mean the physiological and anatomical changes that occur. Growth is not constant. Different parts of the human body grow at different rates and the growth of one system can be affected by the activity of another (e.g. human growth hormone produced by the endocrine system affects growth within the musculoskeletal system). In contrast, the term development is commonly used to describe the psychological and cognitive advancement of a child and the acquisition of motor and sensory skills.

Growth and development are variables of childhood and children of the same age can be at different growth and developmental stages. Consequently, when deciding the most appropriate health care approach it is important to allow for a child's individuality and to avoid making assumptions about a child based upon preconceived ideas pertaining to specific chronological ages. However, although children of the same age can be at different developmental stages, the order in which growth and development occurs is generally consistent for all children². For example, ossification of the carpus occurs in the same order for all children, but the exact age at which the carpal bones ossify can vary markedly.

As a result of predictable developmental staging, many texts, including this one, have provided general growth and development charts that are loosely linked to chronological age. Figures 1.1 and 1.2 have been designed to highlight important stages in growth and development that may be useful to clinical radiographers and to indicate the approximate ages at which they occur. These charts are not definitive and radiographers should not rely upon them solely but should combine them with a general understanding of the child development process. The inclusion of school children and adolescents in Fig. 1.2 has been purposeful as although radiographic technique may not vary dramatically from that used for adults, the radiographer's approach to the patient will need to be modified. Appreciating the social, physical and cognitive developments that occur during these phases of childhood will assist the radiographer in selecting a suitable approach to the examination and will ensure appropriate and effective patient communication and co-operation.

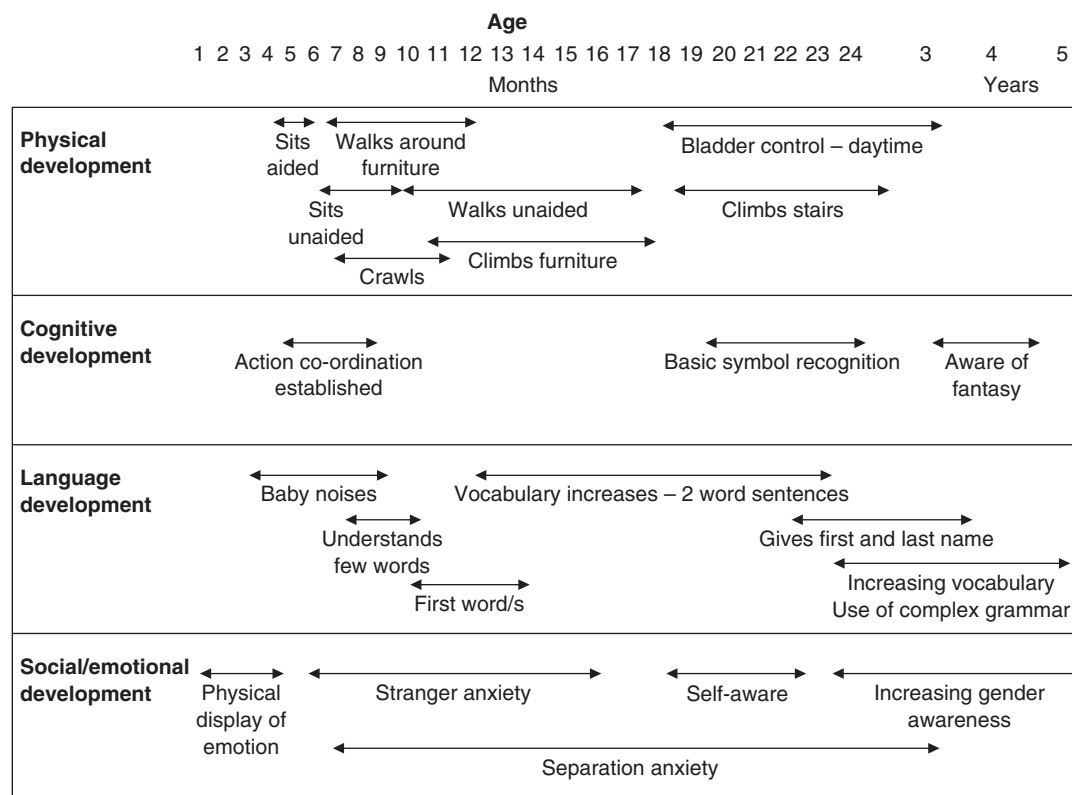


Fig. 1.1 Growth and development staging chart (birth–5 years).

Physical growth

The peculiarity of growth is what physically differentiates a child from an adult. Infants grow rapidly in the first year of life, increasing their body length by approximately 50%. Between 1 and 2 years of age, a child's height increases by approximately 12 cm and thereafter, until puberty, children increase in height by approximately 6 cm per annum. The onset of puberty is associated with a sudden and marked increase in growth (the adolescence spurt) and this phase lasts for approximately 2 to 3 years in both boys and girls.

It is not only height that varies with age but also body proportion. Each organ or system grows at a different rate and therefore the relationship between one part of a growing body and another changes over time³. These changing body proportions are evident in Fig. 1.3. It is important to note that at birth the head and upper body are larger and functionally more advanced than the lower body. As the child grows, a leaner shape with longer legs is gradually adopted and the relative size of the upper body and head decreases.

The rate at which growth occurs varies between children and is also inconsistent within an individual child. Growth is episodic rather than constant and

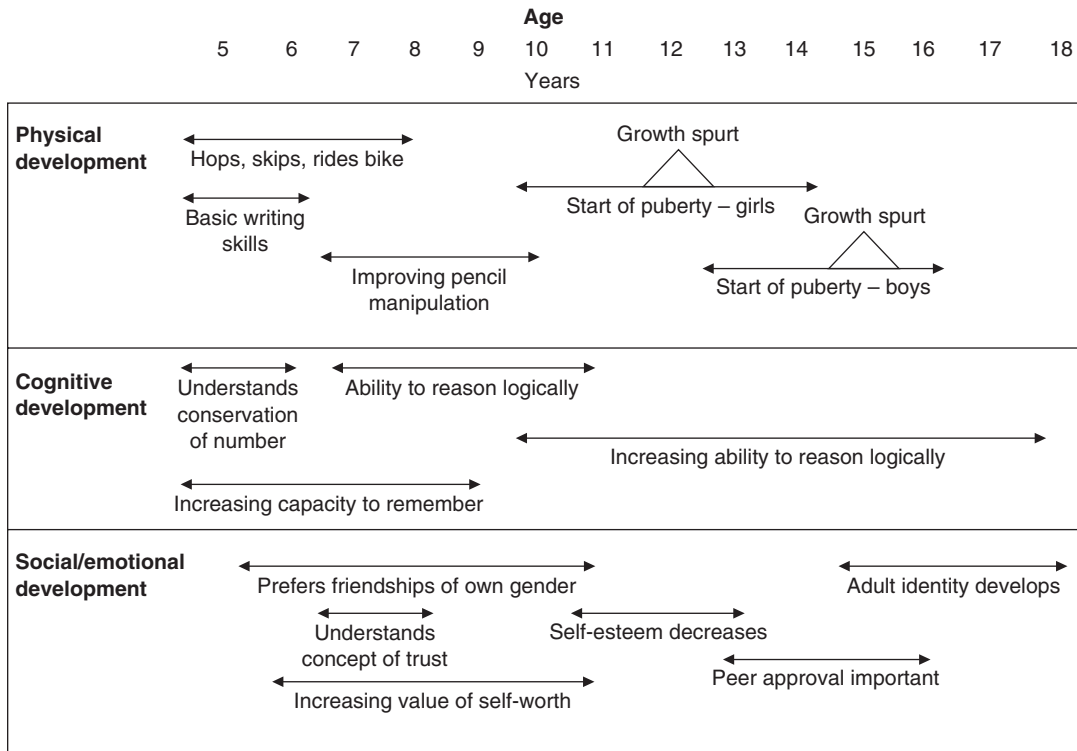


Fig. 1.2 Growth and development staging chart (5 years–18 years).

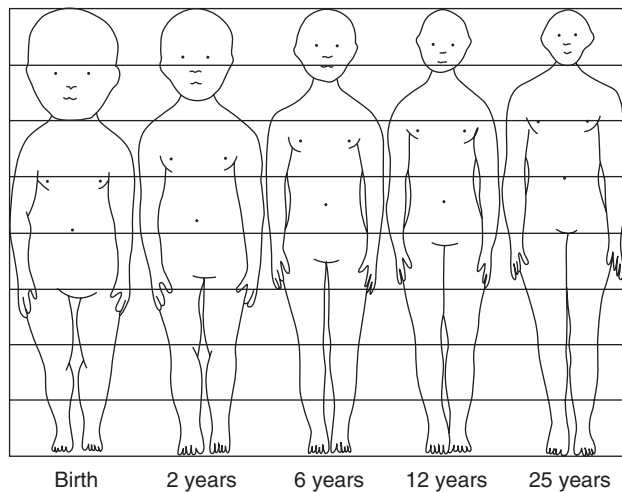


Fig. 1.3 Changes in body proportions from birth to adulthood.

therefore results in growth spurts. The natural cyclic nature of growth can be adversely affected by serious childhood illness, resulting in decreased growth, and in some children noticeable growth retardation, but upon recovery these children will usually experience a period of accelerated growth until their 'normal' height has been achieved. The causes and reasons for episodic rather than constant growth are not yet understood and research in this area continues. However, it appears that each child carries an internal 'blue print' that determines their correct growth/height at a particular age and this is likely to be linked to hereditary and environmental factors.

Psychological and cognitive development

A variety of child development theories have been proposed but, since the 1960s, education theory of child development in the UK has been dominated by Piaget's cognitive development theory. Piaget believed that the development of cognitive ability (acquisition of knowledge including perception, intuition and reasoning) occurred in sequential stages and he linked these to the chronological age of a child rather than to the intellectual or emotional maturity of the child as favoured by modern theorists.

Cognitive development, like physical growth, is individual to the child and their personal experiences. However, a child's level of cognition directly influences their understanding of, and reaction to, illness⁴ and there is considerable evidence that a child's interpretation of health and illness progresses systematically⁵. However, because not all children have the same experiences, some children will understand more than others at each age. As a result, age is not a good, nor an accurate, indicator of understanding.

Birth to 3 years

A very young child has little direct understanding of illness but during this period strong attachments to family members are made and children experience stranger and separation anxiety when in new and unfamiliar situations. To maintain the security and comfort of the child it is important to include the guardians in the care of their child. Explanation of the procedure should be made in a friendly manner and facial expressions should be welcoming. The attention span and memory of a toddler is short and therefore distraction techniques (e.g. bubbles and pop-up books) may need to be considered as a tool to ensure a high-quality examination (see Chapter 2).

3 to 7 years

Children within this age group perceive illness to be an external occurrence but different levels of perception exist and understanding is enhanced by education and experience of illness. Explanation of a procedure should be made using language that the child will understand and the use of pictures, books and toys to

aid explanation⁵ and a demonstration of equipment to be used (if possible) will help allay fears and gain the child's co-operation⁶. Children in this age group will still require the support of a guardian in strange situations and this involvement should be encouraged.

7 to 11 years

The ability to understand and reason improves within this age range and any display of lack of understanding may have more to do with a lack of specific knowledge than immature development⁷. Care needs to be taken not to undermine the child and to provide appropriate information that will allow comprehension and understanding of the medical procedure. For these children, fear of the unknown is still a real problem but expression of this fear or other emotion may be difficult and so a display of 'bravado' may occur to mask inner uncertainties. It is important for radiographers to appreciate that children may 'put on an act' of confidence when in strange situations but they will still require considerable care and attention and the involvement and support of a guardian.

Adolescents

The young adolescent experiences many emotional and physical changes and early adolescence is often associated with a period of low self-esteem and self-doubt⁸. These young people are much more sensitive and socially self-conscious than any other age group and therefore have particular needs within the health care setting. A major cause of this sensitivity is the onset of puberty.

During the pubescent stage, the young adolescent is egocentric and physically self-conscious, not wanting to be perceived as different from his or her peers. Confidentiality and privacy is particularly important and reassurance and support is required from the health care professional⁹. Many young adolescents will want to have their guardian present during examination, particularly if it is an invasive procedure, but, as they progress through adolescence, they may prefer to be accompanied by a health care chaperone of the same sex. It should not be assumed that the teenager will or will not wish to be accompanied by a guardian and the choice, where possible, should be offered to the adolescent.

Middle adolescents (15–17 years) are more confident of their personal identity, although those who, through disease or illness, are perceived to be 'different from the norm' will still require substantial emotional support. During this phase, a subculture of experimentation and boundary testing exists¹⁰. A consistent approach to the examination and a non-judgemental attitude is required of the radiographer dealing with this age group. The teenager should be involved in any decision-making process regarding their health care treatment and indeed, in English law, young people of age 16 years or older have the right to consent to medical, surgical and dental treatment (see Chapter 2). The end of this phase results in transition to late adolescence/adulthood and this stage

brings with it new responsibilities and challenges (e.g. first job, learning to drive, sexual relationships). Unfortunately, it is also the stage at which the frequency of psycho-social disorders (e.g. depression) increases¹¹ and therefore radiographers need to be sensitive to the continuing emotional needs of the young patient.

Role of family

The health of a child is dependent not only on the child's physical and mental well-being, but is also influenced by cultural, social and environmental factors. In the past patients, including children, have been treated as clinical cases rather than individuals in their own right, and attention has been given almost exclusively to the medical condition. The emphasis within health care has now changed and children are treated not only as individuals but also as part of a family, community and culture. This change has not occurred overnight but has resulted from a number of initiatives to involve guardians and family in the care of hospitalised children and to help the family maintain normal functioning (family centred care)¹².

The Department of Health document *Welfare of Children and Young People in Hospital*¹³ and the Audit Commission document *Children First: A Study of Hospital Services*¹⁴ both promote family centred care as the essential ethos behind successful paediatric nursing. Unfortunately, the term 'family centred care', although commonly used within the literature, has yet to be successfully defined. However, the ethos of family centred care (involving and caring for the whole family) underpins current paediatric nursing theory and aims to facilitate care based upon the needs of the child *and* his/her family¹⁵. Its implementation has been successful for families with hospitalised children, and guardians are becoming more actively involved in the nursing care and treatment of their child. However, within the acute setting its success has been limited and it has been suggested that alternative approaches to family centred care need to be devised if successful partnerships between guardians and health professionals are to be achieved¹⁶. Radiographers, therefore, need to consider their working practices and introduce new ways of including guardians in the examination process if successful short-term partnerships are to be achieved.

Accepting this partnership in the care of child patients has not been easy for paediatric health professionals and, in particular, the changes that have occurred within nursing, from primarily undertaking all clinical care tasks to negotiating and agreeing care plans with guardians, have developed over a period of years. Family centred care empowers the guardians and involves them in the care and health decisions pertaining to their child¹⁷. The philosophy for this is that it is in the child's best interests to be cared for by their family as this facilitates and promotes the continuation of normal family function. Unfortunately, the reality of modern lifestyles may prevent effective family care of a hospitalised child occurring (e.g. if the child is from a single parent family with other siblings at

home then it may not be possible for the parent to be fully involved with the hospital care of the child) and it is important not to make guardians feel pressured or guilty if they are unable to fulfil the hospital carer role.

Role of play

Play is an inherent part of childhood and a child's approach to play changes greatly in line with their physical and cognitive development, most particularly during preschool years¹⁵. Play is a part of the socialisation process allowing the child to imitate and experiment in the learning of social roles and values⁷. Unfortunately, a child's ability to play can be affected by illness, and immobility can leave a child frustrated, particularly in the generally active 7–11-year age group. To counteract this, professional play specialists are increasingly being employed to provide children with play opportunities suitable for their age and ability.

The role of the play specialist is now seen as essential to the care and well-being of hospitalised children and their role within the multidisciplinary team is increasingly being recognised. For example, they can take time to explain and demonstrate procedures to children (e.g. catheterisation procedure for a micraturating cystogram can be demonstrated on a doll), time that often radiographers cannot spare, and they can suggest many easy ideas for distracting and comforting children during an examination. Their ability to incorporate play successfully into the daily care of hospitalised children has been shown to reduce anxiety and promote normality within an alien environment. Play has also been proven to be an invaluable tool in helping children understand procedures and treatments and enables both children and guardians to gain familiarity with unusual hospital equipment¹⁸.

Unfortunately, play specialists are rarely found in radiology departments. Play equipment (books and toys) is commonly provided in waiting rooms but the standard and range of equipment varies and provision may only be made for the very youngest of children. It is essential that waiting areas are attractive and child-friendly environments. There should be opportunities for play appropriate to all ages¹⁹ and particular attention should be paid to adolescents with regard to reading material. Whatever the play equipment provided within the department, it is essential that it is regularly inspected to ensure that broken toys and torn books are removed before they become hazardous to the child. It is also a psychological barrier to effective communication if the waiting room is untidy and available toys are broken or dirty. It is important that radiographers appreciate their working environment from the patient's viewpoint – in this case the child and guardian⁵. By sitting for a period of time in a waiting area or imaging room and looking at the environment with critical eyes it may be possible for simple, cheap improvements to be identified that will provide comfort to children of all ages without causing concern to other more mature patients.

Summary

In summary, this chapter has aimed to outline some important features of growth and development in children in order to assist the radiographer in understanding the fears and anxiety of the young patient. It has also been important to introduce the concept of family centred care and emphasise the role of the family in the physical care and emotional support of a child as being of paramount importance in the modern National Health Service (NHS).

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