Module B1: Growth and puberty

Entry Scenario: The entry scenario addresses a variety of issues and problems associated with the module topic. It may be used at the beginning of the course to stimulate the students to identify their own needs and interests (see appendix 1). The results may be utilized by the individual to assess own learning process, or be integrated with class objectives.

A 14.5 year-old boy comes to clinic with his parents because the coach of the football (soccer) team where the boy has been playing since he was 8 complained about the boy’s short stature. The father (179 cm) who played sports himself was shocked and angered by the coach’s comment and attitude. The mother, a 155 cm tall woman whose menses began at age 15, thinks her son should be able to manage the situation by himself as she did when she was an adolescent. She, however, is concerned that her son does not eat much. The boy says he does not care and wants to quit the team.

Although he has nearly finished secondary school, the boy is failing and will probably have to repeat a grade. He does not like school. There is nothing unusual in the medical history. The growth curve drawn from school health service visits indicates growth in height along the 25th centile until age 12, at which time a failure in growth began. The boy’s height is now at the 3rd centile. A physical exam shows Tanner stages P1, A1, G2 with bilateral testicular volume of 5 ml. Weight is appropriate for height. During the physical exam, while the parents are back in the waiting room, the boy expresses concern about his delayed pubic hair and penile development because his teammates tease him in the showers after practice. You explain that there are normal age variations in the onset of puberty, and that his testicular volume indicates his puberty just started. Also, you explain that his growth will accelerate, although not immediately, and that he has a choice of either following his spontaneous development process or receiving intramuscular injections of low testosterone doses monthly for 6 months. The boy hesitates to choose the treatment. At the end of the consultation, you present a summary to the parents. His father says treatment should be started immediately. His mother is afraid about giving hormones. You propose to assess bone maturation, and see the boy with his parents in 1 to 3 months for re-evaluation and further discussion about treatment, depending on how the boy feels about it.

General Goals for Learners By completing the module the participant will be able to:
I. Evaluate an adolescent’s growth status and pubertal development in context with the bio-psychosocial development, and communicate the findings and their significance to the adolescent and the parents
II. Identify disorders of growth and/or puberty and causal conditions; initiate specific diagnostic assessments and therapeutic management

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Goal I. Evaluate an adolescent’s growth status and pubertal development in context with the bio-psychosocial development, and communicate the findings and their significance to the adolescent and the parents

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<th>Educational Methodology</th>
<th>Activities, Issues, and Questions</th>
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<td><strong>Know.</strong> A. Describe physical changes occurring in the early, middle, and late phases of puberty in both sexes and correlate these with hormonal changes, using appropriate standards of comparison</td>
<td>Readings Interactive lecture</td>
<td>Lecture highlights physical manifestations in different phases of puberty, indicating such differences between girls and boys as follows, early phase: obvious breast budding and acceleration of growth (girls) versus imperceptible increase in testicular volume (boys). Middle phase: menarche at a precise age (girls) versus mature spermatogenesis at a non-precise age and growth acceleration (boys). Late phase: body fat increase and change in distribution (girls) versus voice deepening, facial hair and increased muscle mass (boys).</td>
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| - Tanner staging, growth charts  
- Principal endocrine changes in adolescence  
- Gender determined differences  
- Other sex steroid effects (eg. bone mineralization)  
- Average ages, upper and lower limits of normal | Individual/group work | Plot growth and puberty data of an adolescent on growth charts; interpret hormonal data of an adolescent. Participants decide if the following examples are within physiological limits of young people of racial/ethnic groups within their own countries/practices:  
- A girl with pubic hair development begun at 7.5 yrs  
- A girl with breast development started at 8.5 yrs  
- A girl with menarche at 9.5 yrs  
- A girl with primary amenorrhea at 15.5 yrs  
- A boy with prepubertal penis at 14 yrs |
| **Attit.** B. Describe the typical complaints and questions a boy or girl | Focus group | List and rank by order of frequency the questions or problems brought up by female and male adolescents about growth and puberty. Compare the two sexes. |
may mention or ask that show concern about growth and puberty, and compare the two sexes.

### C. Identify the impact of the bio-psychosocial context on the individual adolescent perception of the normality/abnormality of his or her own growth and pubertal development

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| D. Indicate how to obtain relevant information on growth and puberty during history taking and physical examination | Participants formulate and discuss examples in which a particular context may affect an adolescent’s perception of height and pubertal development (e.g. being shorter than a twin brother/sister; being similar to a short parent who did or did not accept his/her stature; being normal but “short” relative to peers on a football team; feeling physically over-developed when compared with peers after repeating a grade in school). | Groups develop recommendations on interviewing adolescents for school doctors responsible for routine health visits. Answers are compared and evaluated during plenary with discussion about the issues of communication, confidentiality/consent and contexts (cultural, religious, etc.)

1. Should pubertal development be assessed and why? What are suitable conditions to do so?
2. What are the key questions to be used when taking a history from an adolescent boy or girl to evaluate pubertal development and the adolescent’s perception of it?
3. What are ways of respectfully assessing pubertal development through a physical examination? | Case study: A boy of 15 complains about his short stature (3rd centile) citing negative remarks from the coach of his football team. Your findings: target height (sex-corrected mid-parental height) at 10th centile; born full term small at 2.4 kg; puberty stage P4 G4; previous growth regular between the 3rd and 10th centiles. When and how do you comment on these findings? |

E. Demonstrate how to explain the findings on growth and puberty to the adolescent patient, and how to describe what is normal and what
needs further clarification

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**Some considerations for use with case study (with attention paid in role play to the use of proper timing during interview, and proper wording to address these issues):**

- Height has a familial/genetic component that does not result from a choice by the parents nor by their children.
- Small size at birth may also account for relatively short height later in life.
- Normal growth along a normal centile indicates that growth and sex hormone are in order.
- Being short does not prevent one from being a good athlete.
- Treatment manipulation of growth is not efficient and not necessarily safe in such a case.

**Case study:**

A 13.5 year-old boy consults for mild obesity (BMI +2.3 SD). Your findings: breasts (B3 appearance) with prominent fat and little true gynecomastia; testes are 5 ml but penis is still pre-pubertal (G2) and partly hidden in pubic fat. How do you comment on these findings?

**Some considerations for case study:**

- Fat tissue in excess may result in a breast-like appearance.
- True glandular breast tissue does develop slightly but transiently during puberty in a majority of normal boys.
- Breast tissue does not indicate wrong sex orientation or wrong (female) hormones in blood. The tissue may result from local transformation into estrogens of the increased male hormones produced by the testes.
- A hidden penis appears smaller than it is.
- Increased testicular volume indicates that puberty just started and the signs of hormonal effects (pubic hair, penile growth) are to be expected soon.
- **Being age 13.5 at such a stage corresponds to the lower limit of a normal range of 4 years between the fastest and slowest maturers.**
GOAL II. Identify disorders of growth and/or puberty and causal conditions; initiate specific diagnostic assessments and therapeutic management

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|      | A. List common conditions with growth and/or pubertal problems, and recognize their associated growth patterns and etiologies.  
- Familial short stature  
- Precocious puberty  
- Intrauterine growth retardation  
- Constitutional delay of puberty  
- Panhypopituitarism (craniopharyngioma)  
- Turner syndrome (non-limiting list) | Interactive lecture | The lecturer lists the common etiologies of short stature or delayed puberty in adolescent boys and girls, noting the prominent features. Participants identify and juxtapose the constitutional versus non-constitutional etiologies (e.g. familial pubertal delay vs Kallmann syndrome, idiopathic central precocious puberty vs sexual precocity in children from international adoption, idiopathic GH deficiency vs craniopharyngioma). Participants interpret growth charts suggestive of the common conditions, and explain their conclusions.  
**Case study:** A girl of 14 consults because of her short stature. She had recurrent otitis in childhood, and occasional school problems. The exam indicates P3 B1. She has a mild dysmorphic appearance (short neck). |
|      | B. List the essential assessment procedures required for an adolescent boy or girl | | Define the appropriate examination procedures, including other medical opinions, that you would request for an adolescent in whom you suspect  
- Turner syndrome  
- GH deficiency |
| with short stature and/or delayed puberty | - Kallmann syndrome  
- Anorexia nervosa  
Which specialists would possibly be involved? |
|----------------------------------------|-----------------------------------------------------------------|
| Attit. C. Identify subjective reasons for diagnostic and therapeutic intervention in non-specific disorders of growth or puberty | Focus group  
Individual reflection, small group discussion  
Case study:  
An adolescent boy with borderline (3rd centile) short stature who just entered puberty at the age of 14 is referred by his general practitioner. Examination reveals no specific etiological condition. Although the boy and his parents are not particularly worried, you have some concerns.  
Discuss:  
What could be reasons for considering and proposing minimal diagnostic assessment?  
What could be reasons for considering referral for therapeutic intervention? |
| Skill D. Demonstrate an ability to elicit from an adolescent with a growth/puberty problem information about the possible influence of situational factors | Group work with role play  
For Objectives D and E, group formulates questions (sample questions provided below) and uses them to role-play case study.  
Case study:  
A 14 year old girl is seen at consultation for absence of breast development (B1). The findings: pubic hair P4 ; girl is involved in gymnastics 10 hours/week ; mother’s menarcheal age 15 years. You take her history, paying attention to uncovering situational factors that impact the patient’s feelings and condition. What areas need to be considered in an assessment of situational factors? For what purpose? Using which questions?  
Sample questions:  
- Does it bother you that your breasts have not developed yet? Are your parents worried about it?  
- How do you feel when compared to your schoolmates? Or to your classmates in gymnastic training?  
- Do you feel happy or pressured by your gymnastic training?  
- How about your height and your growth? Did it slow down recently?  
- How do you feel about the way your body looks right now? How do you feel when compared to your classmates?  
- What does your coach think about your size?  
- Have you done anything to try to gain or lose weight? Dieting? Restricting what you eat? Intentionally
**E. Identify the possible consequences of precocious or delayed growth and abnormal puberty on psychosocial functioning in an individual boy or girl, and respond appropriately.**

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<th>Group work with role play</th>
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**Case study:**
A boy of 15 complains about breast development (B3) that occurred a year ago and did not change for the last 6 months. Take history and pay attention to identifying consequences of his problem. What are helpful ways of assessing and responding to an adolescent’s emotionally loaded complaint? Using which questions/statements?

**Sample questions for assessment:**
- Your breast development started about a year ago. Were there changes in your life at that time, or during the past year?
- Does the breast development bother you? Worry you? When does it bother you the most?
- How do you feel about it in relation to your friends or classmates?
- What do you think about the rest of the way your body is developing and changing?
- How is life at home? Do you feel cool or nervous, aggressive?
- Taking any medicine on a regular basis?
- Smoking tobacco? Using any drug or substance?

**Sample statements for response:**
- I can understand your concern.
- This is a very common, almost normal problem that is bothering you, perhaps because it is a little more obvious than usual.
- It should resolve spontaneously, but it can take months or even years.
- If you are bothered in the gymnastic class, we can talk about whether you’d want a certificate of exemption.
- Minor corrective surgery could be indicated, depending on how you feel now and in some months from now.
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<th>F. Demonstrate how you would involve the adolescent and the family in the management of the situation</th>
<th>Focus group Role play</th>
<th>Case study: A boy aged 14.5 presents with delayed puberty (G2P2, test. vol. 5 ml). He has school problems (repeated a grade) and exhibits social withdrawal. He wants treatment if possible, but his parents are reluctant. They were also late bloomers and could manage their lives without therapy. Question: What kind of information should be provided to facilitate the adolescent and family's input in the decision-making process regarding therapy? Participants formulate responses and practice in role-play.</th>
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**Guideline statements:**

- DP is not a disease; it is an extreme variant of normal development and a self-limiting condition.
- DP does not harm physically and will ultimately result in normal adult development and function (height, sexuality, fertility).
- DP may harm psychologically.
- In such conditions, a treatment may be useful because there are still several months or years of delay before the growth spurt.
- Testosterone therapy is transient, lasting for 6-12 months with the aim of attaining a blood level of testosterone consistent with age.
- The treatment will accelerate growth and pubertal development (penile growth, pubic hair) but will not change the final height and development outcome.
- Both options (treatment or no therapy) are medically acceptable and safe.
- Give priority to the adolescent’s opinion, while listening to and answering the parent’s concerns and questions.
- Whatever the patient’s decision is may change with time and development. The decision might be revised during follow up.
Resources

http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(07)60366-3/abstract

- Adolescent Health Curriculum - USC Keck School of Medicine
http://www.usc.edu/student-affairs/Health_Center/adolhealth/content/a1.html

- Adolescent Growth and Development - Virginia Cooperative Extension

- Ohio State University Medical Center
http://medicalcenter.osu.edu/patientcare/healthcare_services/mens_health/puberty_adolescent_male/Pages/index.aspx

- Neinstein L. Puberty
www.usc.edu/adolhealth
## Module B1: Growth and puberty

**ISSUES/TRAINING OBJECTIVES**

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<td><strong>What should I know to manage this situation?</strong></td>
<td><strong>What could the adolescent, the family and myself feel which could influence the management of this situation?</strong></td>
<td><strong>What should I do to manage this situation?</strong></td>
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