

AUSTRALIAN AND NEW ZEALAND EDITION

Jarvis's
**PHYSICAL
EXAMINATION &
Health Assessment**

Carolyn Jarvis

Australian Adapting Editors

Helen Forbes
Elizabeth Watt

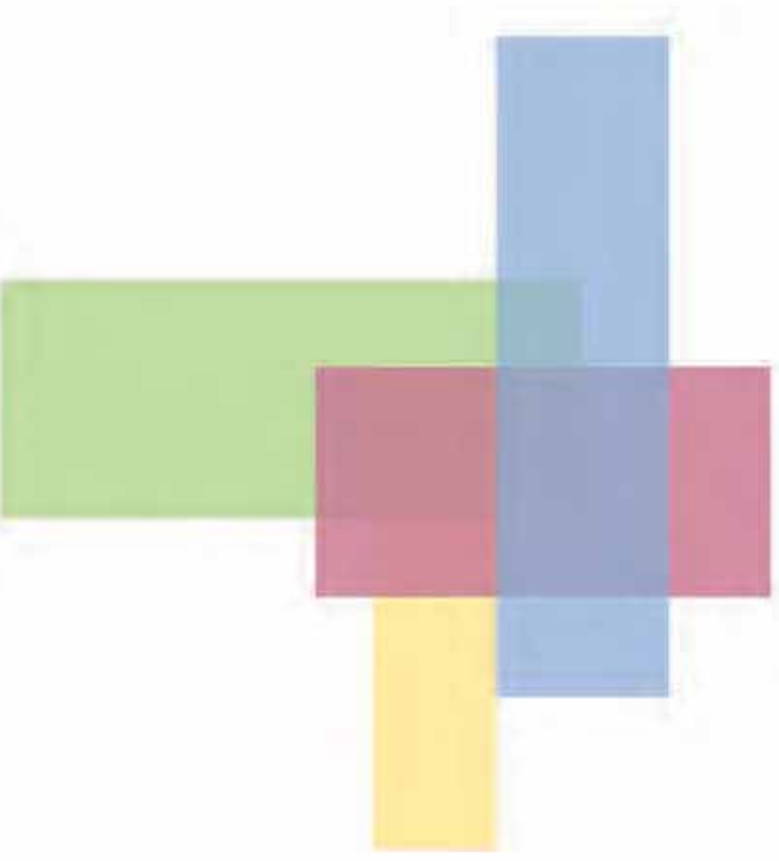
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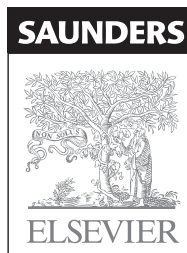
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Contents

About the author

About the Australian adapting editors

Australian and New Zealand contributors

Contributors to the US edition

Australian and New Zealand reviewers

Preface

Acknowledgments

Unit 1 Approaches and contexts of health assessment in nursing

Chapter 1 The context of health assessment

Assessment—point of entry in an ongoing process

What is health?

What is nursing?

Chapter 2 Critical thinking in health assessment

Critical thinking and clinical decision making

Diagnostic reasoning in clinical decision making

Using a conceptual framework to guide nursing practice

Collecting four types of data

Frequency of assessment

High-level assessment skills

Chapter 3 Developmental tasks and health promotion across the life cycle

Infancy (birth to 1 year)

Early childhood, toddler (1 to 3 years)

Early childhood, preschool (3 to 5 or 6 years)

Middle childhood, school-age child (6 to 10 or 12 years)

Preadolescence (10 to 12 or 13 years)

Adolescence (12 or 13 to 19 years)

Early adulthood (20 to 40 years)

Middle adulthood (40 to 64 years)

Late adulthood (65+ years)

Developmental screening tests

Chapter 4 Cultural safety: cultural considerations

Australia: colonisation and the current population context

Aotearoa: colonisation and the current population context

Definitions of culture, ethnicity, race and health

Cultural safety

Cultural competence and cultural safety

<i>xi</i>	Communication	51
<i>xiii</i>	Cultural identity	52
<i>xiv</i>	Causes of illness and disease	54
<i>xv</i>	Cultural expression of illness	54
<i>xvi</i>	Australian nursing standards	55
<i>xvii</i>	New Zealand guidelines for cultural safety	55
<i>xix</i>	Conclusion: culturally safe nursing	57

1 Chapter 5 Screening for family violence and abuse 61

1	Terminology and key concepts	62
	Family violence defined	62
2	Intimate partner violence defined	62
2	Child abuse and neglect defined	63
3	Elder abuse and neglect defined	63
	Health effects of family violence	64
5	Assessing for family violence	67
	Assessing for intimate partner violence	68
7	Assessing for child abuse and neglect	69
10	Assessing for elder and vulnerable person abuse and neglect	69
10	Physical examination	70
12	Documentation	72
13		

Unit 2 Health assessment tools and techniques 77

Chapter 6 The health assessment interview 77

	The process of communication	78
	Techniques of communication	80
	Interviewing people with special needs	88
	Overcoming communication barriers	93

Chapter 7 The health history 97

	The health history—the adult	98
	Present health or history of present illness	99

40 Chapter 8 Physical assessment techniques 109

42	Cultivating your senses	110
43	Setting	115
45	Equipment	115
47	A safer environment	115
51	The clinical setting	116

<i>Subjective data</i>	289	<i>Further objective assessment for advanced practice</i>	414
Health history questions	289	Summary checklist: nutritional assessment	419
<i>Objective data</i>	292	<i>Documentation and critical thinking</i>	419
Preparation	292	<i>Abnormal findings</i>	421
Inspect the posterior chest	292	<i>Abnormal findings for advanced practice</i>	426
Palpate the posterior chest	293		
Auscultate the posterior chest	293	Chapter 17 Skin, hair and nails	431
Inspect the anterior chest	297	Introduction	432
Palpate the anterior chest	298	<i>Structure and function</i>	432
Auscultate the anterior chest	298	Skin	432
<i>Further subjective and objective assessment for advanced practice</i>	302	Epidermal appendages	433
Summary checklist: thorax and lung exam	307	Function of the skin	433
<i>Documentation and critical thinking</i>	309	<i>Subjective data</i>	435
<i>Abnormal findings</i>	310	Health history questions	435
<i>Abnormal findings for advanced practice</i>	315	<i>Objective data</i>	440
		Preparation	440
Unit 5 Assessing musculoskeletal function	325	Inspect and palpate the skin	441
Chapter 15 Musculoskeletal system	325	Inspect and palpate the hair and scalp	446
Introduction	326	Inspect and palpate the nails	447
<i>Structure and function</i>	326	Promoting health and self-care	448
Components of the musculoskeletal system	326	Summary checklist: skin, hair and nails exam	457
<i>Subjective data</i>	335	<i>Documentation and critical thinking</i>	458
Health history questions	335	<i>Abnormal findings</i>	459
<i>Objective data</i>	340	<i>Abnormal findings for advanced practice</i>	467
Gait Arms Legs and Spine (GALS) screening assessment	341		
<i>Further objective assessment for advanced practice</i>	342	Unit 7 Assessing kidney, bladder and bowel function	481
Temporomandibular joint	344	Chapter 18 Urinary system	481
Cervical spine	345	Introduction	482
Upper extremity	346	<i>Structure and function</i>	482
Lower extremity	355	Kidneys	482
Spine	361	Ureters	483
Summary checklist: musculoskeletal exam	373	Bladder	483
<i>Documentation and critical thinking</i>	375	Urethra	483
<i>Abnormal findings for advanced practice</i>	376	<i>Subjective data</i>	485
		Health history questions	485
Unit 6 Assessing nutrition and metabolism	389	<i>Objective data</i>	492
Chapter 16 Nutritional assessment	389	Preparation	493
Introduction	390	Vital signs	493
<i>Structure and function</i>	390	Abdominal examination	493
The mouth	390	Summary checklist: urinary tract function	495
The thyroid gland	390	<i>Documentation and critical thinking</i>	496
Defining nutritional status	392	<i>Abnormal findings</i>	497
Purposes and components of nutritional assessment	395		
<i>Subjective data</i>	397	Chapter 19 Abdomen	499
Health history questions	397	Introduction	499
<i>Objective data</i>	403	<i>Structure and function</i>	499
Anthropometric measures	403	Surface landmarks	499
Inspect the mouth	404	Internal anatomy	499
Inspect the throat	408	<i>Subjective data</i>	504
Other measurements	410	Health history questions	504
Serial assessment	413	<i>Objective data</i>	506
		Preparation	506
		General inspection	506
		Inspect the abdomen	506

Auscultate bowel sounds	509	<i>Objective data</i>	590
Percuss general tympany	510	Preparation	591
Palpate surface and deep areas	510	Ongoing neurological observations	591
<i>Further objective assessment for advanced practice</i>	515	Using the Glasgow Coma Scale	595
Summary checklist: abdomen exam	527	<i>Further objective assessment for advanced practice</i>	596
<i>Documentation and critical thinking</i>	528	Inspect head, face and neck	596
<i>Abnormal findings</i>	529	Test cranial nerves	597
<i>Abnormal findings for advanced practice</i>	531	Inspect and palpate the motor system	601
		Assess the sensory system	607
		Test the reflexes	610
		Summary checklist: neurological exam	628
		<i>Documentation and critical thinking</i>	629
		<i>Abnormal findings</i>	630
		<i>Abnormal findings for advanced practice</i>	635
Chapter 20 Bowel function	537		
Introduction	538	Chapter 23 Eyes	644
<i>Structure and function</i>	538	Introduction	645
Anus and rectum	538	<i>Structure and function</i>	645
Regional structures	539	External anatomy	645
<i>Subjective data</i>	540	Internal anatomy	647
Health history questions	540	Visual pathways and visual fields	648
<i>Objective data</i>	544	Visual reflexes	649
Preparation	544	<i>Subjective data</i>	651
Inspect the perianal area	545	Health history questions	651
Inspection of stool	545	<i>Objective data</i>	654
<i>Further objective assessment for advanced practice</i>	546	Preparation	654
Palpate the anus and rectum	546	Inspect external ocular structures	654
Summary checklist: anus and rectum exam	548	Inspect anterior eyeball structures	656
<i>Documentation and critical thinking</i>	549	Test visual fields	657
<i>Abnormal findings</i>	550	<i>Further objective assessment for advanced practice</i>	662
		Advanced practice skills for infants and children (birth to 12 years)	674
		Advanced practice skills for the adult over 65 years	675
		Summary checklist: eye exam	676
		<i>Documentation and critical thinking</i>	677
		<i>Abnormal findings</i>	678
		<i>Abnormal findings for advanced practice</i>	683
Unit 8 Assessing mental status, neurological and sensory function	555	Chapter 24 Ears	689
Chapter 21 Mental status assessment	555	Introduction	690
Introduction	556	<i>Structure and function</i>	690
<i>Structure and function</i>	556	External ear	690
Defining mental status	556	Middle ear	690
<i>Subjective data</i>	557	Inner ear	691
Components of the mental status examination	557	Hearing	691
<i>Objective data</i>	558	<i>Subjective data</i>	694
Appearance	558	Health history questions	694
Behaviour	558	<i>Objective data</i>	697
Cognitive functions	559	Preparation	697
Thought processes and perceptions	560	Inspect and palpate the external ear	698
Supplemental mental status examination	561	Inspect with the otoscope	698
Summary checklist: mental status assessment	565	Test hearing acuity	701
<i>Documentation and critical thinking</i>	565	<i>Further objective assessment for advanced practice</i>	702
<i>Abnormal findings</i>	566	Test hearing acuity	702
<i>Abnormal findings for advanced practice</i>	567	The vestibular apparatus	703
		Summary checklist: ear exam	707
Chapter 22 Neurological system	575		
Introduction	576		
<i>Structure and function</i>	576		
The head	576		
The neck	577		
The central nervous system	577		
The peripheral nervous system	581		
<i>Subjective data</i>	586		
Health history questions	586		

Documentation and critical thinking 708
Abnormal findings 709
Abnormal findings for advanced practice 712

Unit 9 Assessing sexuality and reproductive function 721

Chapter 25 Female sexual and reproductive function 721

Introduction 722
Structure and function 722
 External genitalia 722
 Pelvic floor muscles and perineum 723
 Internal genitalia 723
Subjective data 725
 Health history questions 726
Objective data 729
 Preparation 729
 Position 729
 External genitalia 730
Further objective assessment for advanced practice 733
 Position 733
 Internal genitalia 736
 Summary checklist: female genitalia exam 746
Documentation and critical thinking 747
Abnormal findings for advanced practice 747

Chapter 26 Male sexual and reproductive function 758

Introduction 759
Structure and function 759
 The male reproductive system 759
 Pelvic floor muscles and perineum 760
Subjective data 764
 Health history questions 764
Objective data 767
 Preparation 767
 Inspect the penis 768
 Inspect the scrotum 768
Further objective assessment for advanced practice 770
 Preparation 770
 Palpate the penis 770
 Palpate the scrotum 771
 Inspect and palpate for hernia 773
 Palpate inguinal lymph nodes 773
 Palpate the prostate gland via the rectum 774
 Summary checklist: male genitalia exam 777
Documentation and critical thinking 778
Abnormal findings for advanced practice 778

Chapter 27 Breasts and regional lymphatics 788

Introduction 789
Structure and function 789
 Surface anatomy 789
 Internal anatomy 789

Lymphatics 790
 The male breast 793
Subjective data 794
 Health history questions 794
Objective data 799
 Preparation 799
 Inspect the breasts 800
 Inspect and palpate the axillae 802
 Palpate the breasts 803
 The male breast 805
 Summary checklist: breasts and regional lymphatics exam 808
Documentation and critical thinking 809
Abnormal findings 810
Abnormal findings for advanced practice 812

Chapter 28 The pregnant female 816

Introduction 817
Structure and function 817
 Pregnancy and the endocrine placenta 817
 Changes during normal pregnancy 817
Subjective data 821
 Health history questions 821
Objective data 828
 Preparation 828
 General survey 828
 Skin 829
 Mouth 829
 Neck 829
 Breasts 829
 Heart 830
 Lungs 830
 Peripheral vasculature 830
 Neurological system 831
 Inspect and palpate the abdomen 831
 Auscultate the fetal heart beat 835
 Pelvic examination 836
 Routine laboratory and radiological imaging studies 841
 Summary checklist: the pregnant female 841
Documentation and critical thinking 842
Abnormal findings for advanced practice 843

Unit 10 The complete health assessment in practice: putting it all together 849

Chapter 29 The complete health assessment 849

The adult 850
 The neonate and infant 858
 The young child 863
 The school-age child, the adolescent and the adult over 65 years 867
Documentation and critical thinking 868

Chapter 30 Focused assessment

General survey	874	Skin	877
General appearance	875	Nutrition and metabolism	877
Measurement	875	Abdomen/bowel function	878
Mental status	875	Renal/bladder function	878
Neurological and sensory function	876	Musculoskeletal function	878
Respiratory function	876	Illustration credits	879
Cardiovascular function	877	Index	886



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Preface

Health assessment is central to nursing practice. By practising and developing the knowledge and skills of health assessment you will develop confidence in understanding and responding to each patient's situation. You need to listen to the cues from your patients as these will guide and direct your questioning and physical examination. Whether you are an undergraduate nursing student, a newly qualified registered nurse or an experienced nurse seeking to advance your practice, this book holds the content you need to develop and refine your health assessment skills. The first edition of this text is contextualised to suit the Australian and New Zealand healthcare environments. We hope this text will become an invaluable part of your professional library and look forward to ongoing feedback from you, our readers.

NEW TO THE AUSTRALIAN AND NEW ZEALAND EDITION

The ANZ edition of *Jarvis Physical Examination and Health Assessment* has been fully revised and updated for the Australian and New Zealand contexts and structured to enhance learning for undergraduate and postgraduate students and clinicians.

Each chapter begins with an overview highlighting the importance and relevance of given topics to nursing practice. The introductory chapter describes the purpose of health assessment in nursing practice and how it contributes to a multidisciplinary patient assessment. All spelling, terminology, measurements, cultural and social considerations, clinical procedures and best practice reflect the Australian and New Zealand contexts.

- Updated table of contents to assist the reader to understand the relevance of the health assessment areas to the functional status of the person
- *Each chapter contextualises the particular health assessment skills* highlighting the importance and relevance of given topics to nursing practice
- *New* introductory chapter describes the purpose of health assessment in nursing practice and how this contributes to a multidisciplinary patient assessment
- *New* chapters on assessment of urinary and bowel function—key areas for nursing assessment in a variety of clinical settings including acute care, community health and aged care
- Each chapter has clearly identified health assessment skills for beginning and advanced clinicians.

DUAL FOCUS AS TEXT AND REFERENCE

Physical Examination & Health Assessment is a **text for beginning students** of health assessment as well as a **text and**

reference for advanced practitioners. The chapter progression and format permit this scope without sacrificing one use for the other.

Chapters 1 to 5 focus on **approaches and contexts of health assessment in nursing**, including critical thinking, developmental tasks and health promotion for all age groups, cultural safety and screening for family violence and abuse.

Chapters 6 to 10 focus on **health assessment tools and techniques**, including the health interview and health history, physical assessment techniques, general survey, measurement vital signs and pain assessment.

Chapters 11 to 28 focus on the **key areas for health assessment** which are organised around functional areas relevant to nursing practice. **Each chapter has five major sections:** Structure and Function, Subjective Data (history), Objective Data (procedures and normal findings/abnormal findings and clinical alerts), Documentation and Critical Thinking and Abnormal Findings. The beginning nurse can review anatomy and physiology and learn the skills, normal findings and common variations for generally healthy people and selected abnormal findings in the Objective Data sections. They will also be prompted to report and refer clinically significant abnormal findings. The advanced practice nurse will be able to review anatomy and physiology and fundamental health assessment skills, while focusing on more the more complex knowledge and skills required for specialty nursing practice. Students can also study the extensive pathology illustrations and detailed text in the Abnormal Findings sections.

Chapters 29 and 30 focus on **integrating health assessment in practice.** Chapter 29 describes the complete health assessment using a head-to-toe approach for a complete screening examination in various age groups. Chapter 30 describes a more focused approach to assessment in response to a change in the patient's condition.

CONCEPTUAL APPROACH

Physical Examination & Health Assessment reflects a commitment to:

- **Holism**, in the focus on the individual as a whole, both in wellness needs and illness needs
- **Health promotion**, in the health history questions that elicit self-care behaviours, the age-specific charts for periodic health examinations, the Promoting a Healthy Lifestyle boxes, and the self-examination teaching presented for skin, breast, testicles and nutrition
- Interacting with the person as an **active participant in healthcare**, by encouraging discussion of what the person currently is doing to promote health and by engaging the person to participate in self-care

- **Cultural considerations** that take into account the global society in which culturally diverse people seek healthcare
- Individuals **across the life cycle**, supported by the belief that a person's state of health must be considered in light of developmental stage. Chapter 3 presents a baseline of developmental tasks and topics expected for each age grouping, and subsequent chapters integrate relevant developmental content. Developmental anatomy, modifications of history taking and examination technique, and expected findings are given for infants and children, adolescents, pregnant females, and ageing adults.

FEATURES FROM EARLIER EDITIONS

Physical Examination & Health Assessment is built on the strengths of the previous US edition and is designed to engage students and enhance learning:

1. **The two-column format** begins in the Subjective Data section, where the running column highlights the rationales for asking history questions. In the Objective Data section, the running column highlights selected abnormal findings to show a clear relationship between normal and abnormal findings.
2. **Method of examination** (Objective Data section) is clear, orderly and easy to follow. Hundreds of original examination illustrations are linked directly with the text to demonstrate the physical examination in a step-by-step format.
3. **Abnormal Findings tables** organise and expand on material in the examination section. The atlas format of these extensive collections of pathology and original illustrations helps students recognise, sort and describe abnormal findings. When applicable, the text under a table entry is presented in a Subjective Data–Objective Data format.
4. **Developmental approach** in each chapter presents prototypical content on the adult, then age-specific content for the infant, child, adolescent, pregnant female and ageing adult so that students can learn common variations for all age groups.
5. **Cultural considerations** are extensive throughout and present the expected variations for culturally diverse people.
6. **Stunning full-colour art** shows detailed human anatomy, physiology, examination techniques and abnormal findings.
7. **Health history** (Subjective Data) appears in two places: In Chapter 7, The complete health history, and in pertinent history questions that are repeated and expanded in each regional examination chapter, including history questions that highlight health promotion and self-care. This presentation helps students understand the relationship between subjective and objective data. Considering

the history and examination data together, as you do in the clinical setting, means that each chapter can stand on its own if a person has a specific problem related to that body system.

Chapter 6, The health assessment interview, has the most complete discussion available on the process of communication, interviewing skills, techniques and traps and cultural considerations.

8. **Summary checklists** towards the end of each chapter provide a quick review of examination steps to help develop a mental checklist.
9. **Focused assessment/clinical case studies** of frequently encountered situations show the application of assessment techniques to patients of different ages in differing clinical situations.
10. **Integration of the complete health assessment** for the adult is presented in Chapter 29. This approach integrates all the steps into a choreographed whole.
11. **User-friendly design** makes the book easy to use. Frequent subheadings and instructional headings assist in easy retrieval of material.

SUPPLEMENTS

- The *EVOLVE Website* (located at <http://evolve.elsevier.com/AU/Jarvis/>) provides lecturers with PowerPoints and Test Banks for each of the 30 chapters, an Image Collection, and a *Student Lab Manual* Answer Key. Students have access to Appendices, Multiple Choice Review Questions, Quick Assessments for 20 Common Conditions and WebLinks—in effect, a comprehensive online resource that takes advantage of the dynamic nature of electronic content and online delivery.
- The *Pocket Companion for Physical Examination & Health Assessment* is a handy and current clinical reference that provides pertinent material in full colour and includes illustrations from the textbook.
- The *Student Laboratory Manual* is a workbook that includes a student study guide for each chapter, glossary of key terms, clinical objectives, regional write-up forms and review questions.
- *Health Assessment Online* is an innovative and dynamic teaching and learning tool featuring comprehensive **Self-Paced Learning Modules**, which offer increased flexibility to lecturers who wish to provide students with tutorial learning modules and in-depth case studies for each body system chapter in the text. Animations, sounds, images, interactive activities, and video clips are embedded in the learning modules and case studies to provide a dynamic, multimodal learning environment for today's learners. *Health Assessment Online* also provides **Multiple Choice Review Questions** exclusive to Health Assessment Online and which align to the ANZ text.

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We would like to dedicate this edition to the nursing students and registered nurses who will use this text to develop their clinical skills. We encourage you to continually strive to develop and refine your health assessment skills. Your efforts will contribute to improving the patient/client experience and the overall quality and safety of nursing care.

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Unit 1

Approaches and contexts of health assessment in nursing

Chapter One

The context of health assessment

Written by Helen Forbes and Elizabeth Watt

Assessment—point of entry in an ongoing process
What is health?
What is nursing?

evolve resources

<http://evolve.elsevier.com/AU/Forbes/assessment>

- Multiple review questions
- Appendices
- WebLinks

ASSESSMENT—POINT OF ENTRY IN AN ONGOING PROCESS

Assessment is the collection of data about an individual's health state. Throughout this text, you will be studying the techniques of collecting and analysing **subjective data** (i.e. what the person *says* about themselves during history taking) and **objective data** (i.e. what you as the health professional *observe* by inspecting, percussing, palpating and auscultating during the physical examination). Together with the patient's record and laboratory studies, these elements form the **database** of the assessment of the person's health.

From the database, you make a clinical judgment or diagnosis about the individual's health state or response to actual or risk for health issues. Thus, the purpose of a health assessment is to make a judgment or diagnosis. Because all healthcare treatments and decisions are based on the data gathered during assessment, it is paramount that the assessment be factual and complete, providing the foundation for clinical decision making. Chapter 2 provides more detail about the process of clinical decision making that requires critical thinking and health assessment.

WHAT IS HEALTH?

Assessment is the collection of data about an individual's health state. Therefore, a clear idea of health is important because this determines which assessment data should be collected. In general, the list of data that must be collected has lengthened as our concept of health has broadened. The World Health Organization (WHO) (2001) defines health as 'a state of complete physical, mental, and social well-being and not merely the absence of disease, or infirmity'. While this is a broad definition it is important to recognise that health is an emerging state and is not merely the absence of disease. In order to achieve an adequate quality of life in later years, actively promoting good health is vital throughout life.

The situations in which people are born, grow, live and play have an important role in determining health. The WHO (2008) states: 'The social determinants of health are the conditions in which people are born, grow, live, work and age, including the health system. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels, which are themselves influenced by policy choices. The social determinants of health are mostly responsible for health inequities—the unfair and avoidable differences in health status seen within and between countries.'

Therefore, conducting health assessment on a person requires acknowledgment of both the social and the environmental context in which they live. For example, consider the discharge needs of a homeless young male patient following a motor cycle accident. How could his wound care and nutritional needs be managed in the community context if he has no fixed address?

Models of health

The **social model of health** acknowledges the effect of social, economic, cultural and political factors and conditions on

a person's state of health and wellbeing. Use of the model aims to improve health outcomes, prevent and reduce illness and address the inequalities and disadvantage that exist within the community. Community healthcare, as a part of primary healthcare, is informed by the values and principles supported in the Alma-Ata Declaration on Primary Health Care (World Health Organization, 1978) and the Ottawa Charter for Health Promotion (WHO, 1986).

The social model of health recognises:

- The social, economic and environmental determinants of health and illness
- The importance of health promotion and disease prevention
- The importance of community participation in decision making
- The importance of working with sectors outside the health sector
- That equity is an important outcome of health service intervention.

The **biomedical model** of Western tradition views health as the absence of disease. Health and disease are opposites, extremes on a linear continuum. Disease is caused by specific agents or pathogens. Thus, the biomedical focus is the diagnosis and treatment of those pathogens and the curing of disease. Assessment factors are a list of biophysical symptoms and signs. The person is certified as healthy when these symptoms and signs have been eliminated. When disease does exist, medical diagnosis is worded to identify and explain the cause of disease.

The accurate diagnosis and treatment of illness is an important part of healthcare but the medical model has limiting boundaries. The public's concept of health has expanded since the 1950s. Now we view health in a wider context. We have an increasing interest in lifestyle, personal habits, exercise and nutrition, and the social and natural environment. **Wellness** is a dynamic process, a move towards optimal functioning. Different levels of wellness exist, with optimal health described as 'high-level wellness'. Wellness is a direction of progress. Healthcare providers serve to maximise the person's potential, to assist the person to grow towards high-level wellness.

Consideration of the whole person is the essence of **holistic health**. Holistic health views the mind, body and spirit as interdependent and functioning as a whole within the environment. Health depends on all these factors working together. The basis of disease is multifaceted, originating both from within the person and from the external environment. Thus, the treatment of disease requires the services of numerous providers.

A natural progression to **health promotion and disease prevention** now rounds out our concept of health. Guidelines to prevention emphasise the link between health and personal behaviour. Reports from the Department of Health and Ageing, Australian Government (2009) and the New Zealand Public Health Advisory Committee (2006) assert that the majority of deaths among Australians and New Zealanders under age 65 are preventable. Prevention can be achieved through counselling by primary care providers which is

designed to change people's unhealthy behaviours related to smoking, alcohol and other drug use, lack of exercise, poor nutrition, injuries and sexually transmitted infections. Health promotion is a much broader concept than disease prevention. Health promotion was defined in the Ottawa Charter for Health Promotion (WHO) (1986) and includes building public health policy, creating supportive environments for healthy living, strengthening community action, developing personal knowledge and skills and reorienting the healthcare system (Talbot and Verinder, 2010).

WHAT IS NURSING?

The International Council of Nurses (ICN) states that nursing includes 'collaborative care of individuals of all ages, families, groups and communities, sick or well and in all settings. Nursing includes the promotion of health, prevention of illness, and the care of ill, disabled and dying people . . .' (ICN, 2010). This implies that the nursing approach to healthcare is holistic in nature and therefore health assessment should reflect that philosophy with its focus on the whole person and their context.

There are a range of clinical contexts in which you may work as a nurse. These include community health settings, mental healthcare, acute and critical care contexts, remote and rural settings, rehabilitation or residential aged care. The nature of the context will usually determine the type and focus of health assessment required. In the community you may focus on assessing an individual, a family or a community and be interested in gathering information about wellness as opposed to illness. In an acute setting, whether it is in critical care or more general ward areas, your focus will be a little different. Patient problems may vary across the treatment trajectory, which means that you will time and focus your health assessment accordingly.

In the provision of care, nurses and midwives are ethically responsible and accountable to the recipient of care (ICN, 2006). From an ethical point of view it is expected that nurses and midwives will respect, promote, protect and uphold the rights of people either receiving care or providing healthcare. The nursing and midwifery codes of ethics outline minimum national standards of conduct that members of the professions are expected to uphold. These codes inform the community of the standards of professional conduct it can expect nurses and midwives to uphold and provide the consumer, regulatory, employing and professional bodies with a basis for evaluating their professional conduct. The Australian Nursing & Midwifery Council code of professional conduct provides guidelines about expected behaviour of nurses and midwives. Nurses and midwives are expected to conduct their practice using exemplary standards of behaviour. In summary, it is expected that each professional will be safe and competent and practise in accordance with the standards of nursing and the broader health system. Nurses must conduct their practice according to laws relevant to nursing. Nurses and midwives are also legally responsible for their practice and answerable to the professional registering body (Australian Health Practitioner Regulation Agency, 2010; Nursing

Council of New Zealand, 2010). All nurses and midwives in Australia and New Zealand must demonstrate competence in a range of domains, one of which relates to the conduct of comprehensive and systematic nursing health assessment (Australian Nursing & Midwifery Council, 2006a; Nursing Council of New Zealand, 2007). Advanced practice nurses, for example nurse practitioners, also have legal requirements for competence in their specialist area related to advanced health assessment (Australian Nursing & Midwifery Council, 2006b; Nursing Council of New Zealand, 2008). (See bibliography for references to the relevant codes of ethics and professional conduct for nurses and midwives in Australia and New Zealand.)

Quality and safety

Once a person accesses the healthcare system for treatment of illness, a number of factors pose potential risk for harm. Examples include increasing age, comorbidity and the increasing use of complex technology, the use of numerous and complex interventions during an episode of illness, movement between community and hospital health sectors giving rise to possible duplication of, or gaps in, care and/or communication breakdown. The Australian Charter of Healthcare Rights describes the rights of patients and other people using the Australian health system. One of the principles of this Charter recognises that every person has the right to the highest standard of care (Australian Charter of Healthcare Rights, 2008). While the solutions to decreasing risk to the person are complex, improving the use, availability and communication of health information is critical to the provision of high quality and safe care (The Australian Commission on Safety and Quality in Healthcare, 2009). Quality and safe care of patients and clients requires that nurses assess in order to determine care needs. Assessment is conducted in collaboration with the patient and the multidisciplinary healthcare team to achieve positive goals and health outcomes for the recipient of care.

Life span considerations

It is important to consider health assessment from a life cycle approach, no matter what clinical context you are working in. First, you must be familiar with the usual and expected developmental tasks for each age group (Ch 3). This alerts you to which physical, psychosocial, cognitive and behavioural tasks are important for each person. For example, if you are assessing a 6-year-old child with asthma, your approach will need to take into account the developmental tasks for that child's age group which include mastering skills that will be needed later as an adult, building self-esteem and a positive self-concept, adopting moral standards and taking a place in a peer group. This knowledge will guide how you approach the collection of subjective and objective data. The data from the physical examination is more accurate when you consider age-specific information about anatomy, method of examination, normal findings and abnormal findings. For example, an average normal respiratory rate for a 6-year-old child is 21–26 breaths per minute.

Cultural and social considerations

The population of Australia is in excess of 22 million; New Zealand in excess of 4 million. The Australian community now includes people from about 200 countries (Department of Foreign Affairs & Trade, 2009). Similarly, the New Zealand population includes people from over 145 countries

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Unit 5

Assessing musculoskeletal function

Chapter Fifteen

Musculoskeletal system

Written by Carolyn Jarvis
Adapted by Fran Pearce

Introduction

Structure and function

Components of the musculoskeletal system

Subjective data

Health history questions

Objective data

Gait Arms Legs and Spine (GALS) screening assessment

Further objective assessment for advanced practice

Temporomandibular joint

Cervical spine

Upper extremity

Lower extremity

Spine

Summary checklist: musculoskeletal exam

Documentation and critical thinking

Abnormal findings for advanced practice

 evolve resources

<http://evolve.elsevier.com/AU/Forbes/assessment>

- Quick assessments for 20 common conditions
- Multiple review questions
- Appendices
- WebLinks

INTRODUCTION

The musculoskeletal system is a vast organ system that provides locomotion, and an upright posture and protection for the body. It is composed of various forms of connective

tissue which include bones, skeletal muscle, cartilage, ligaments, tendons and joints. In order to appreciate the impact of disease and trauma to this complex and dynamic system you are advised to first review the structure and function of bones, skeletal muscle, cartilage, ligaments, tendons and joints.

STRUCTURE AND FUNCTION

The musculoskeletal system has both structural and metabolic functions. Its structural function is essential for locomotion, respiration and the protection of internal organs and the central nervous system. The marrow within bones contains critical components of the haematopoietic and immune system. The bone marrow produces B cells, granulocytes and immature thymocytes, in addition to red blood cells and platelets.

Its metabolic function is as a storehouse for calcium, phosphorus and carbonate, and as a buffering system in hydrogen ion concentration. Bone plays a major role in conjunction with the renal system in blood calcium level regulation (Barnato and Sprague, 2009). The enormous mineral surface of the skeleton can also bind toxins and heavy metals, minimising their ability to cause cellular damage.

COMPONENTS OF THE MUSCULOSKELETAL SYSTEM

Bone

Bone is a mineralised connective tissue consisting of cells embedded in a protein matrix of collagen, alkaline phosphatase and osteopontin. This dynamic tissue responds to mechanical stresses through a complex process of remodelling. The remodelling process involves the resorption of micro-damaged bone by osteoclast cells followed by a phase of bone formation by osteoblast cells. In healthy adults this process is coupled to ensure bone density remains stable. Gonadal steroid hormones, parathyroid hormone and various growth factors have been shown to affect this process, indicating a central regulatory mechanism (Karsenty, 2000). When this process becomes uncoupled, normal bone density is altered, leading to a change in the normal architecture of bone seen in diseases such as osteoporosis (Seeman et al, 2006), and Paget's disease (Matthews and Cundy, 2009).

Cartilage

This connective tissue is a firm gel-like substance characterised by resilience and the ability to absorb mechanical forces. The human body contains three major types of cartilage: hyaline cartilage, elastic cartilage and fibrocartilage. Hyaline cartilage is the most common type of cartilage found in parts of the respiratory tract and on joint surfaces. Within joints, articular cartilage protects the joint by distributing applied loads, and by providing a low-friction-bearing surface to

maximise movement. Fibrocartilage is found in the intervertebral discs, menisci of the knee joint and the symphysis pubis. Its structure provides resistance to the compression and shearing forces within these joints. All types of cartilage are avascular and aneural, therefore tears in cartilage cannot heal.

Ligaments and tendons

Ligaments and tendons are connective tissues with complex biomechanical properties. Ligaments connect bone to bone and tendons connect muscles to bone. Injury to a ligament or tendon results in a drastic change in structure, resulting in the formation of scar tissue that is biomechanically inferior. For example, repair of the anterior cruciate ligament (ACL) in the knee requires a new piece of tissue graft from a hamstring muscle. The resultant graft does not possess the same qualities of strength and stability as the original ACL.

Muscles

There are three types of muscle in the human body: smooth, cardiac and skeletal muscle. Skeletal muscles are innervated by the motor nerve fibres of peripheral nerves. Conscious and subconscious contractions of muscles affect posture and locomotion and also generate reflexes. The human body contains over 400 skeletal muscles representing 40–50% of total body weight. A whole skeletal muscle is considered an organ of the muscular system. Skeletal muscle fibres have an abundant blood and nerve supply and are bundled together in a compartment wrapped in a tough fibrous connective tissue called fascia.

Diseases and disorders of the muscular system are diverse and include infections, hormonal, genetic and autoimmune disorders and malignancies. Minor traumatic injuries are the most common disorders of the muscular skeletal system. When major injury to muscles occurs as in limb trauma, intracompartmental tissue pressure can quickly rise. A rise in intracompartmental tissue pressure is known as compartment syndrome. This syndrome is characterised by muscle necrosis called rhabdomyolysis. Rhabdomyolysis ultimately leads to the release of cellular contents—including myoglobin into the circulatory system. This may result in potential life-threatening complications including myoglobinuric acute renal failure, hyperkalaemia and cardiac arrest (Malik et al, 2009; Rupert, 2002).

Joints

Joints are the functional units of the skeleton. Individual joints are described and classified by two qualities—the structure of the joint and the range of movement permitted by the joint.

Classification of joints by range of movement

Diarthroses—moveable joints

Synarthroses—immoveable joints

Amphiarthroses—‘mixed’ joints of limited movement

Classification of joints by structure

Fibrous (synarthrotic) joints. The articulating bones are joined by fibrous connective tissue; for example, the joints (sutures) of the skull bones.

Cartilaginous (amphiarthrotic) joints. The articulating bones are joined by cartilage; for example, the pubic symphysis.

Synovial (diarthrotic) joints. These are freely mobile joints characterised by a joint cavity lined with synovial tissue and supported by ligaments, tendons and bursae (Fig 15.1). Synovial joints may be also sub-classified according to the type of movement that they permit; for example, the ball and socket joint of the hip and hinge joint of the knee.

Each joint reflects a compromise between stability and range of motion. The bones of the skull, for example, are stable but immobile, whereas the shoulder joint allows for a full range of motion but is a relatively unstable joint.

Movement of joints involving muscle contraction produces the following patterns of motion (Fig 15.2):

- 1 Flexion—bending a limb at a joint
- 2 Extension—straightening a limb at a joint
- 3 Abduction—moving a limb away from the midline of the body
- 4 Adduction—moving a limb towards the midline of the body

- 5 Pronation—turning the forearm so that the palm is down
- 6 Supination—turning the forearm so that the palm is up
- 7 Circumduction—moving the arm in a circle around the shoulder
- 8 Inversion—moving the sole of the foot inwards at the ankle
- 9 Eversion—moving the sole of the foot outwards at the ankle
- 10 Rotation—moving the head around a central axis
- 11 Protraction—moving a body part forwards and parallel to the ground
- 12 Retraction—moving a body part backwards and parallel to the ground
- 13 Elevation—raising a body part
- 14 Depression—lowering a body part.

Joint anatomy

Temporomandibular joint. The temporomandibular joint (TMJ) is the articulation of the mandible and the temporal bone (Fig 15.3). The TMJ permits jaw function for speaking and chewing. The joint allows three motions: (1) hinge action to open and close the jaws, (2) gliding action for protrusion and retraction and (3) gliding for side-to-side movement of the lower jaw.

Spinal column. The **vertebrae** are 33 connecting bones stacked in a vertical column (Fig 15.4). The spinous processes can be palpated as a furrow down the midline of the back. The furrow has paravertebral muscles mounded on either side down to the sacrum, where it flattens. Humans have 7 cervical, 12 thoracic, 5 lumbar, 5 sacral and 3 or 4 coccygeal vertebrae. The following surface landmarks will orient you to their levels:

- The spinous processes of C7 and T1 are prominent at the base of the neck.

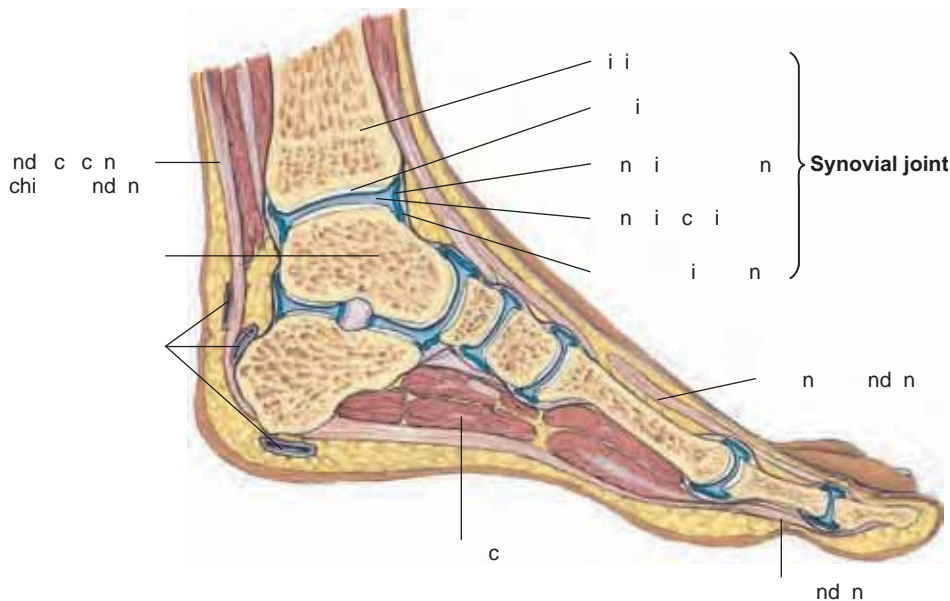


Figure 15.1

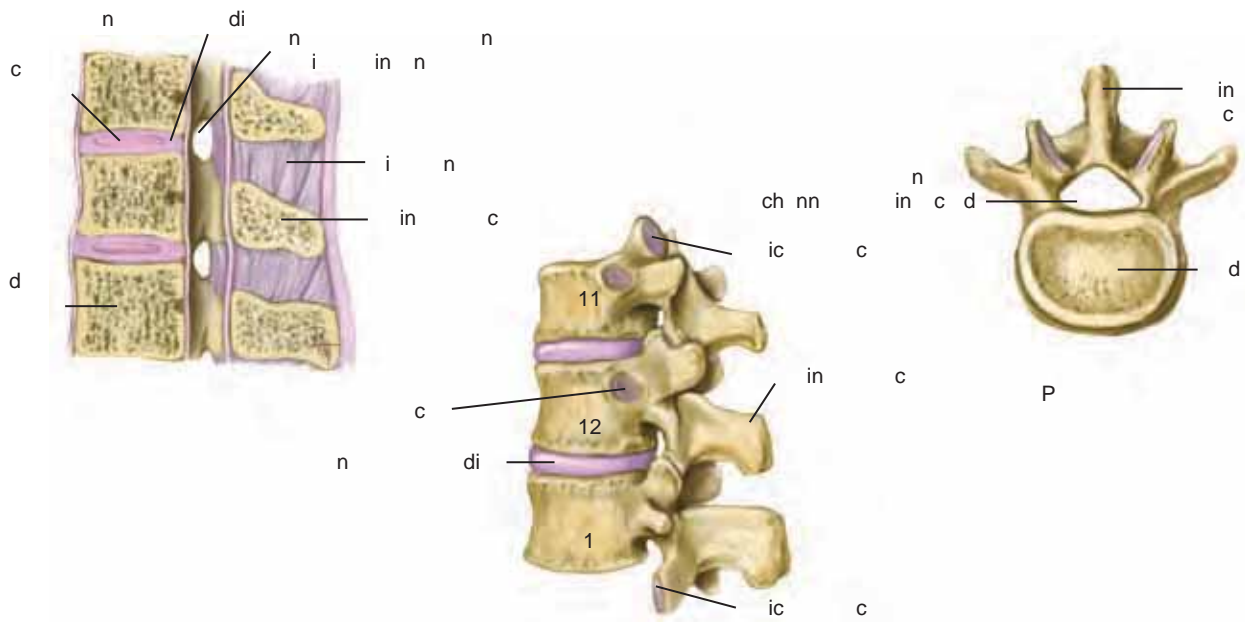


Figure 15.6

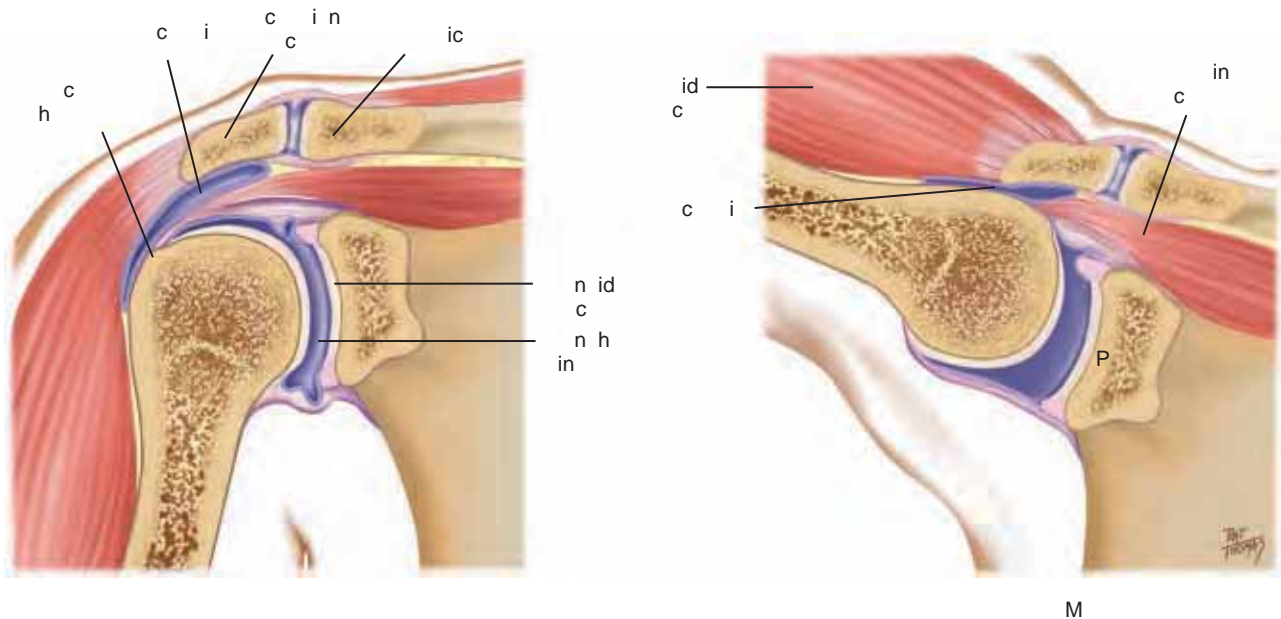


Figure 15.7

The radius and ulna articulate with each other at two radioulnar joints, one at the elbow and one at the wrist. These move together to permit pronation and supination of the hand and forearm.

Wrist and carpals. Of the body's 206 bones, over half are in the hands and feet. The wrist or **radiocarpal joint** is the articulation of the radius (on the thumb side) and a row of carpal bones (Fig 15.10). Its condyloid action permits movement in two planes at right angles: flexion and extension, and side-to-side deviation. The groove of this joint can be palpated on the dorsum of the wrist.

The **midcarpal** joint is the articulation between the two parallel rows of carpal bones. It allows flexion, extension and some rotation. The **metacarpophalangeal** and the **interphalangeal** joints permit finger flexion and extension. The flexor tendons of the wrist and hand are enclosed in synovial sheaths.

Hip. The hip joint is the articulation between the acetabulum and the head of the femur (Fig 15.11). As in the shoulder, ball-and-socket action permits a wide range of motion on many axes. The hip has somewhat less range of motion (ROM) than the shoulder, but it has more stability as befits its weight-

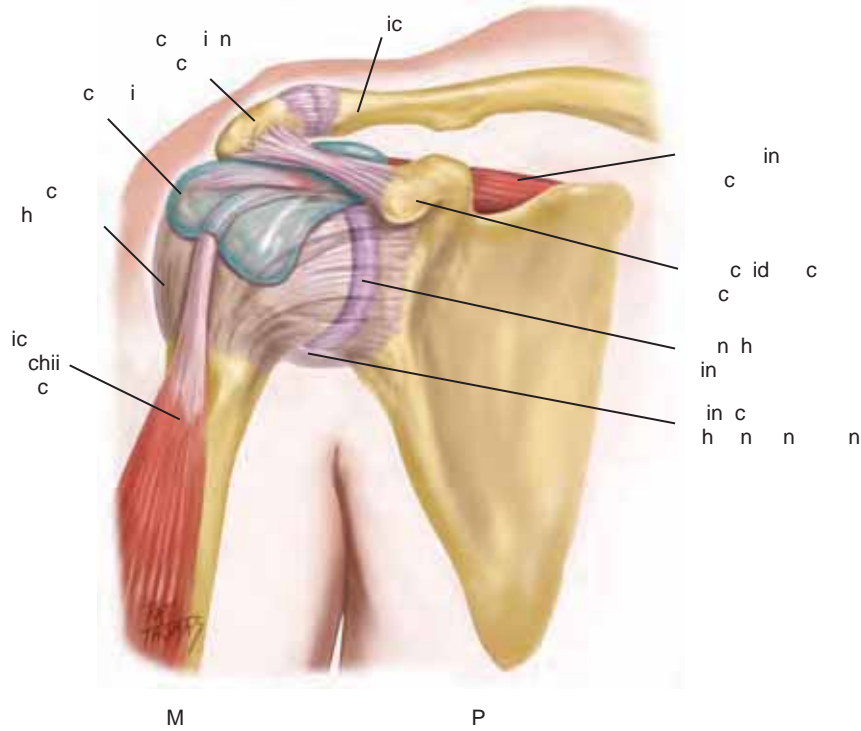


Figure 15.8

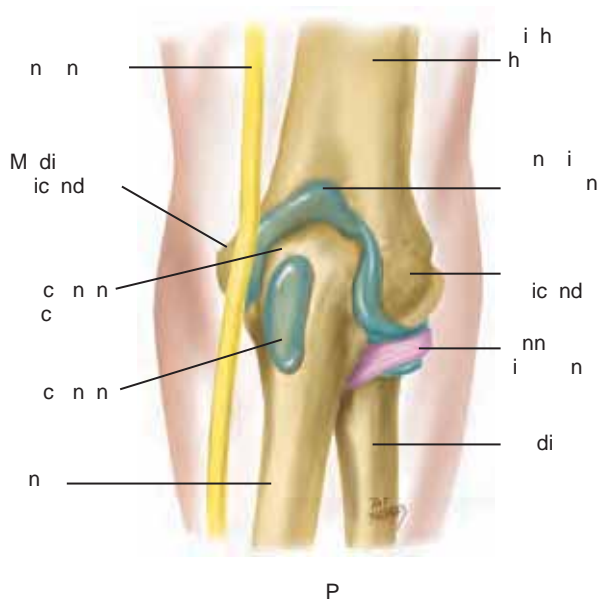


Figure 15.9

bearing function. Hip stability is due to powerful muscles that spread over the joint, a strong fibrous articular capsule and the very deep insertion of the head of the femur. Three bursae facilitate movement.

Palpation of these bony landmarks will guide your examination. You can feel the entire iliac crest, from the **anterior superior iliac spine** to the posterior. The **ischial tuberosity** lies under the gluteus maximus muscle and is palpable when the hip is flexed. The **greater trochanter** of the femur is normally the width of the person's palm below the iliac crest and halfway between the anterior superior iliac spine and the

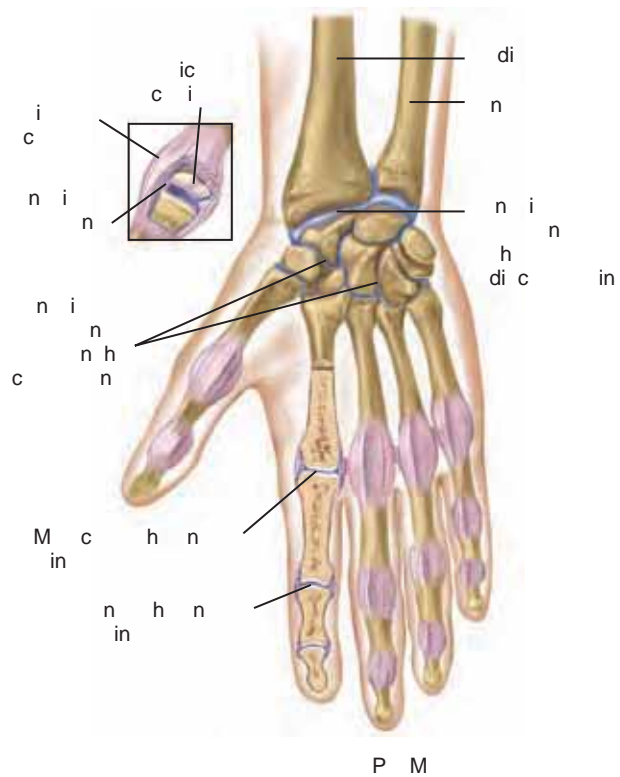


Figure 15.10

ischial tuberosity. This landmark is best palpated when the person is standing, in a flat depression on the upper lateral side of the thigh.

Knee. The knee joint is the articulation of three bones—the femur, the tibia and the patella (kneecap)—in one common

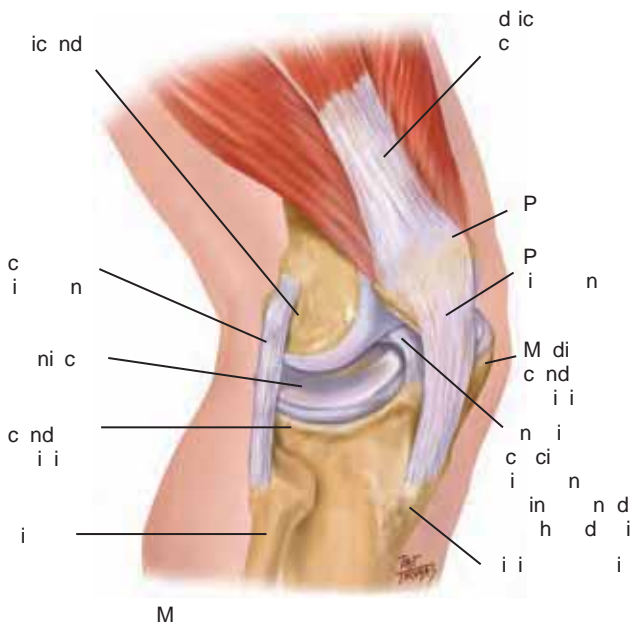


Figure 15.13

midline. Move to the sides and superiorly and note the lateral and medial condyles of the tibia. Superior to these on either side of the patella are the medial and lateral epicondyles of the femur.

Ankle and foot. The ankle or **tibiotalar joint** is the articulation of the tibia, fibula and talus (Fig 15.14). It is a hinge joint, limited to flexion (dorsiflexion) and extension (plantar flexion) on one plane. Landmarks are two bony prominences on either side—the **medial malleolus** and the **lateral malleolus**. Strong, tight medial and lateral ligaments extend from each malleolus onto the foot. These help the lateral stability of the ankle joint, although they may be torn in eversion or inversion sprains of the ankle.

Joints distal to the ankle give additional mobility to the foot. The subtalar joint permits inversion and eversion of the foot. The foot has a longitudinal arch, with weight-bearing distributed between the parts that touch the ground—the heads of the metatarsals and the calcaneus (heel).

DEVELOPMENTAL CONSIDERATIONS

Infants and children

By 3 months gestation, the fetus has formed a ‘scale model’ of the skeleton that is made up of cartilage. During succeeding months in utero, the cartilage ossifies into true bone and starts to grow. Bone growth continues after birth—rapidly during infancy and then steadily during childhood—until adolescence, when both boys and girls undergo a rapid growth spurt.

Long bones grow in two dimensions. They increase in width or diameter by deposition of new bony tissue around the shafts. Lengthening occurs at the epiphyses, or growth plates. These specialised growth centres are transverse discs located at the ends of long bone. Any trauma or infection at this location puts the growing child at risk for bone deformity. This longitudinal growth continues until closure of the epiphyses; the last closure occurs at about age 20 years.

Skeletal contour changes are apparent at the vertebral column. At birth the spine has a single C-shaped curve. At 3 to 4 months, raising the baby’s head from prone position develops the anterior curve in the cervical neck region. From 1 year to 18 months, standing erect develops the anterior curve in the lumbar region.

Musculoskeletal conditions seen in the neonatal period include developmental dysplasia of the hip (DDH), talipes equinovarus (clubfoot) and upper and lower limb development deformities.

The term developmental dysplasia of the hip (DDH) describes a wide range of hip abnormalities found within the neonatal period in which the femoral head has an abnormal relationship to the acetabulum. Variances in these disorders range from stable hips with acetabular dysplasia to complete displacement of the femoral head out of an abnormal acetabulum. The prevalence of DDH varies due to diagnostic criteria, examiner skills and disorder progress. Minor hip dysplasia often resolves spontaneously (Hart et al, 2006). The incidence in Australia is cited as ≥19 per 1000 births (Goss, 2002). Successful clinical DDH screening programs within Australia using midwives, maternal child health nurses and

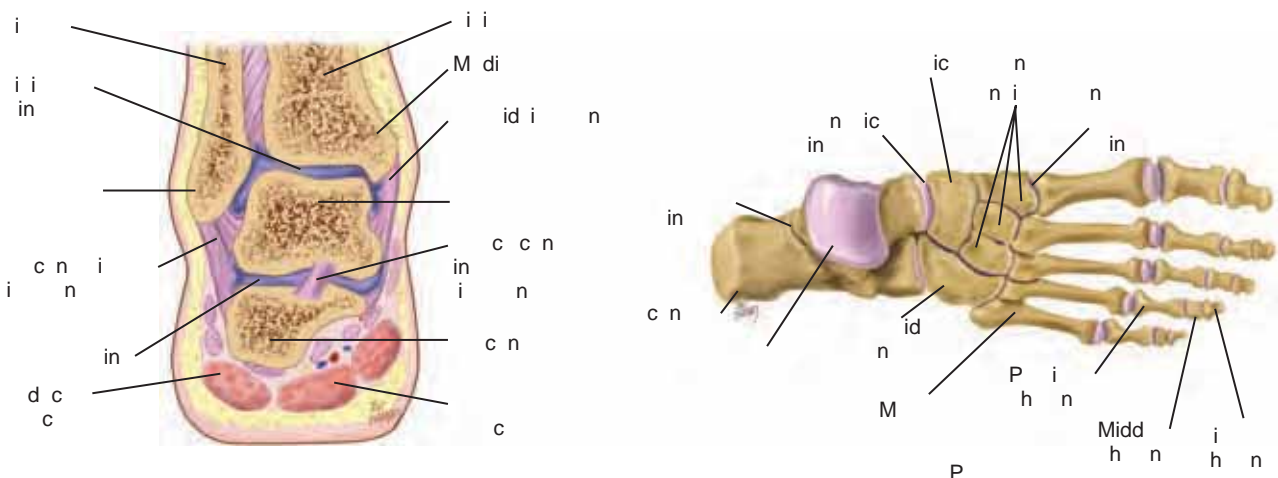


Figure 15.14

primary care clinicians have been created since the 1960s in order to eliminate 'late diagnosed' DDH. Untreated DDH has the potential to prevent long-term hip dysplasia and arthritis. Ultrasound imaging can be a valuable adjunct to the physical examination and a means of monitoring treatment in those high-risk infants—breech presentation, familial history of DDH, structural foot deformity or infants suffering a neuromuscular disease (Green and Oddie, 2008).

Musculoskeletal conditions, however, are evident throughout childhood, affecting up to 30% of children and adolescents. The majority are self-limiting, and often trauma related. These conditions also include life-threatening disorders such as malignant disease and infection (Foster and Kimura, 2009). Chronic musculoskeletal conditions include a spectrum of autoimmune/inflammatory joint and muscle disorders. An estimated 4600 Australian children in 2004–05 had arthritis (AIHW, 2008a). Juvenile arthritis affects the child's growth and musculoskeletal development. The associated disability and chronic pain symptoms impacts on all aspects of the child's life and family dynamics.

The pregnant female

It has been reported that almost all women experience some degree of musculoskeletal discomfort during pregnancy and 25% have at least temporarily disabling symptoms with low back pain cited as the most common complaint (Borg-Stein and Dugan, 2007).

Increased levels of circulating hormones (oestrogen, relaxin from the corpus luteum and corticosteroids) cause increased mobility in the joints. Increased mobility in the sacroiliac, sacrococcygeal and symphysis pubis joints in the pelvis contributes to the noticeable changes in maternal posture. The most characteristic change is progressive lordosis, which compensates for the enlarging fetus; otherwise, the centre of balance would shift forwards. Lordosis compensates by shifting the weight further back on the lower extremities. This shift in balance in turn creates strain on the low back muscles, which in some women is felt as low back pain during late pregnancy.

Anterior flexion of the neck and slumping of the shoulder girdle are other postural changes that compensate for the lordosis. These upper back changes may put pressure on the ulnar and median nerves during the third trimester. Carpal tunnel syndrome, for example, has a reported incidence of up to 25%. It is more common in older pregnant women with generalised oedema. Carpal tunnel syndrome found in association with pregnancy almost always resolves within 4 weeks of delivery (Van Slobbe et al, 2004).

Effects of pregnancy on preexisting musculoskeletal conditions

Pregnancy and the associated changes in circulating hormones and postural changes impact on a diverse range of preexisting musculoskeletal conditions. Examples include remission rates up to 75% of women with preexisting rheumatoid arthritis who become pregnant. The remission often continues until approximately 6 weeks postpartum, commonly followed by

an exacerbation of symptoms. The exact aetiology of this remission is unknown (De Man et al, 2008). Knowledge of the effects of pregnancy on the musculoskeletal system is vital to ensure patients with preexisting conditions receive effective counselling and support during pregnancy.

Late adulthood (65+ years)

With ageing, loss of bone matrix (resorption) occurs more rapidly than new bone growth (deposition). The net effect is a loss of bone density, or **osteoporosis**. While the age-adjusted incidence of osteoporotic hip fracture in Australia appears to have decreased over recent years, the actual number of cases has increased in both sexes when population growth and the proportion of older people are taken into account. 2.2 million Australians have an osteoporosis related condition—this will become 3 million by 2021 with 1.65 million women and 0.51 million men affected (AIHW, 2008b). (See also 'Promoting a healthy lifestyle: osteoporosis—"the silent disease"' below.)

Postural changes are evident with ageing, and decreased height is the most noticeable. Long bones do not shorten with age. Decreased height is due to shortening of the vertebral column. This is caused by the gradual loss of water and associated thinning of the intervertebral discs. Both men and women can expect a progressive decrease in height beginning at age 40 years in males and age 43 years in females, although this decrease is not significant until age 60 years. A greater decrease occurs in the 70s and 80s as a result of osteoporotic collapse of the vertebrae. The result is a shortening of the trunk and comparatively long extremities. Other postural changes are kyphosis, and a backwards head tilt to compensate for the kyphosis, and a slight flexion of hips and knees.

The distribution of subcutaneous fat changes through life. Usually, men and women gain weight in their 40s and 50s. The contour is different, even if the weight is the same as when younger. They begin to lose fat in the face and deposit it in the abdomen and hips. In the 80s and 90s, fat further decreases in the periphery, which is especially noticeable in the forearms and apparent over the abdomen and hips. Loss of subcutaneous fat leaves bony prominences more marked (e.g. tips of vertebrae, ribs, iliac crests) and body hollows deeper, for example, cheeks and axillae.

An absolute loss in muscle mass occurs; some muscles decrease in size, and some atrophy, producing weakness. The contour of muscles becomes more prominent, and muscle bundles and tendons feel more distinct.

It has become more apparent that lifestyle affects musculoskeletal changes. A sedentary lifestyle hastens the musculoskeletal changes of ageing. High-impact exercise may increase bone strength and reduce hip fragility fractures, but research indicates that exercise needs to be performed frequently for an optimal response (Bailey and Brooke-Wavell, 2010).

The musculoskeletal changes and the associated musculoskeletal degenerative diseases have a major impact on the older person's safety. Gait pattern changes include slowing down and shorter stride length (Moc et al, 2007). Every year, approximately 30% of Australians over 65 years old fall,

with 10% of these falls leading to injury (ACSQHC, 2009). Falls-related injury is one of the leading causes of morbidity and mortality in older Australians. More than 80% of injury-related hospital admissions in people aged 65 years and over are due to falls and falls related injuries (ACSQHC, 2009). Falls are also associated with an increased incidence of death in people over 65 (Bradley and Pointer, 2008). The impact of a fall may lead to a fear of falling which spirals into self-imposed restriction of activity, and general functional decline, reducing both physical and social activities (Zijlstra et al, 2007). Falls prevention programs are thus widespread at both State and Commonwealth level within Australia (DOHA, 2007).

CULTURAL AND SOCIAL CONSIDERATIONS

Musculoskeletal conditions affect over one-third of the Australian population and represent some of the most common causes of pain and disability (ABS, 2006; AIHW, 2008a). The most common musculoskeletal conditions affecting Australians include arthritis, back pain and osteoporosis (ABS, 2006). Since 2002, arthritis and related musculoskeletal conditions have been an Australian National Health Priority Area (ABS, 2006).

This situation is evident globally with musculoskeletal conditions identified as being among the world's leading causes of long-term pain and disability. The impact of musculoskeletal conditions includes chronic pain, deformity, mobility restriction and functional impairment, as well as

affecting mental health and quality of life (Lidgren, 2003). Musculoskeletal conditions impact on families, and society in general, through reduced social interaction, role restrictions, lost productivity and the significant cost of ongoing management and treatment (WHO, 2004).

Road trauma represents a leading cause of traumatic musculoskeletal injury worldwide. In 2001, 495 300 Australians reported a long-term condition caused by a road trauma (ABS, 2003). Over 60% of road trauma victims were adults under 40 years of age (DoITRD, 2009). Sequelae include not only physical and functional impairments such as chronic pain and joint disorders, but also a range of psychological and social problems (Donaldson et al, 2009).

Indigenous Australian males are twice as likely to have a hip fracture as other Australian males, whereas Indigenous females are 26% more likely to have a hip fracture than other Australian females. Indigenous Australians are on average much younger than other Australians at the time of their hip fracture, aged 65 years (compared with 81 years) for males and 74 years (compared with 83 years) for females (AIHW, 2010b). Chronic musculoskeletal diseases and trauma statistics for Indigenous Australians are incomplete. However, higher incidence of smoking, excessive alcohol consumption, poor diet and obesity combined with major deficits in preventative healthcare programs would suggest a likely increased incidence of hip fracture in the future (AHMAC, 2006). (Refer to Ch 4 for further discussion of cultural considerations in health assessment.)

SUBJECTIVE DATA

General principles

As noted previously, musculoskeletal disorders cause pain, stiffness and impairment to activities of daily living.

A comprehensive musculoskeletal assessment should be integrated into a patient's health assessment as numerous general health issues and prescribed medications affect this system. For example, chronic heart and lung disease impacts on mobility. Visual deficits, Vitamin B₁₂ deficiency and incontinence all increase falls risks.

Musculoskeletal assessment is a systematic process involving application of knowledge of functional anatomy, and the mechanisms of injury and disease across the life span. As nursing roles expand within Australia it is often the nurse who has the first point of contact with the person in both community and hospital settings.

This assessment process involves initially allowing the patient to tell their story, through history taking, of the impact of their joint dysfunction and pain on their lives. Due to the often chronic nature of musculoskeletal disorders it

is important to ask about previous complementary therapies, non-prescription medications and remedies. A thorough history will assist in identifying the nature of the musculoskeletal problems; for example, acute injury, degenerative, inflammatory, infective or malignant disorders.

A current medical history including medications is an essential part of musculoskeletal assessment. A variety of endocrine/metabolic disorders, nutritional conditions and medications can impact on bone health. Diseases such as hyperthyroidism, diabetes, renal disease, malabsorption syndromes and glucocorticoids, loop diuretics and aluminium are the most common risk factors (Hansberger, 2006). There is also a strong genetic link associated with musculoskeletal health so the patient should be asked to discuss any family history of fractures or arthritis (Giangregorio and Leslie, 2010).

As the musculoskeletal system is closely linked with the neurological system, it is suggested you refer to Chapter 22. As acute and chronic pain is also often associated with musculoskeletal disorders it is suggested you refer to Chapter 10.

Assessment components

- | | |
|--|---|
| 1 Gait, arms, legs and spine (GALS) screening assessment | 4 Bones |
| 2 Joints | Pain |
| Pain | Deformity |
| Stiffness | Trauma (fractures, sprains, dislocations) |
| Swelling, heat, redness | 5 Functional assessment (activities of daily living (ADLs)) |
| Limitation of movement | 6 Self-care behaviours |
| 3 Muscles | |
| Pain (cramps) | |
| Weakness | |

Assessment guidelines

1 Gait Arms Legs and Spine (GALS) screening assessment

A **screening** musculoskeletal examination can rapidly identify those people who require comprehensive musculoskeletal assessment. The Gait Arms Legs and Spine (GALS) screening assessment is a highly sensitive, specific and well-validated screening assessment for the detection of joint abnormalities (ARC, 2005; Doherty, 1992; Lillicrap et al, 2003). Subjective data from this screening assessment involves 3 core questions.

‘Have you any pain or stiffness in your muscles, joints or back?’

‘Can you dress yourself completely without any difficulty?’ and

‘Can you walk up and down stairs without any difficulty?’

Positive responses indicate a detailed history should be taken. A paediatric-specific GALS assessment has also proved highly sensitive, specific and well-validated (ARC, 2005; Foster et al, 2006).

2 Joints.

- Any problems with your joints? Tell me about your pain?
- Location: Which joints? On one side or both sides?
- Quality: What does the pain feel like: aching, stiff, sharp or dull, shooting?
- Severity: How strong is the pain?
- Onset: When did this pain start?
- Timing: What time of day does the pain occur? How long does it last? How often does it occur?
- Is the pain aggravated by movement, rest, position, weather? Is the pain relieved by rest, medications, application of heat or ice?

Clinical significance and clinical alerts

Joint pain and loss of function are the most common musculoskeletal concerns that prompt a person to seek care.

Rheumatoid arthritis (RA) involves symmetrical joints; other musculoskeletal illnesses and trauma involve isolated or unilateral joints.

Exquisitely tender felt with acute inflammation.

Chronic pain is often associated with degenerative musculoskeletal disorders.

RA pain is worse in morning when arising; osteoarthritis is worse later in the day; tendinitis is worse in morning, improves during the day.

Most joint pain is mechanical except in RA, when deformities restrict movement. Many patients have tried prescribed medications, homeopathic remedies, over-the-counter (OTC) medications or combination formulations. These need to be identified and included in your assessment.

Assessment guidelines

- Is the pain associated with chills, fever, recent sore throat, trauma and repetitive activity?
- Any stiffness in your joints?
- Any swelling, heat, redness in the joints?
- Any limitation of movement in any joint? Which joint?
- Which activities give you problems? (See Functional assessment below)

3 Muscles.

- Any problems in the muscles, such as any pain or cramping? Which muscles?
- If in calf muscles: Is the pain with walking? Does it go away with rest?
- Are your muscle aches associated with fever, chills, the 'flu'?
- Any weakness in muscles?
- Location: Where is the weakness? How long have you noticed weakness?
- Do the muscles look different there?

4 Bones.

- Any bone pain? Is the pain affected by movement?
- Any deformity of any bone or joint? Is the deformity due to injury or trauma? Does the deformity affect ROM?
- Any accidents or trauma ever affected the bones or joints: fractures, joint strain, sprain, dislocation? Which ones?
- When did this occur? What treatment was given? Any problems or limitations now as a result?
- Any back pain? In which part of your back? Is pain felt anywhere else, like shooting down your leg or arm?
- How long have you had this pain?
- Any numbness and tingling? Any limping?

5 Functional assessment (ADLs).

How do your joint (muscle, bone) problems create any limits on your usual activities of daily living (ADLs)? Which ones? (Note: Ask about each category; if the person answers 'yes', ask specifically about each activity in category.)

- Bathing—getting in and out of the shower/ bath, turning on taps? Can you wash your back, legs, feet, hair?

Clinical significance and clinical alerts

Joint pain 10 to 14 days after an untreated strep throat suggests rheumatic fever. Joint injury occurs from trauma or repetitive motion.

RA stiffness occurs in morning and after rest periods.

Suggests acute inflammation.

Decreased ROM may be due to joint disease or to muscle contracture.

Myalgia is usually felt as cramping or aching.

Suggests intermittent claudication (Ch 11).

Viral illness often includes myalgia.

Weakness may involve peripheral vascular system or neurological systems (Chs 11 and 22).

Smaller muscles indicate atrophy. Swelling may indicate haematoma or tumour.

Trauma causes sharp pain that increases with movement. Other bone pain usually feels 'dull' and 'deep' and is unrelated to movement.

Injury to ligaments affects joint kinematics, e.g. whiplash trauma may result in cervical ligament laxity and chronic pain syndromes.

Previous joint trauma increases risk of degenerative arthritis.

Many patients with back pain have sought treatments provided by physiotherapists, chiropractors, osteopaths or acupuncturists.

The aetiology is diverse, i.e. degenerative or traumatic conditions of the spine, fibrositis, inflammatory spondyloarthropathy and metabolic bone conditions are also cited as causes.

Spinal nerve-root dysfunction is associated with altered sensory and motor function. See Chapter 22.

Functional assessment screens the safety of independent living, the need for community supports and quality of life.

Degenerative lower limb joint dysfunction affects mobility and steppage and increases risk of falls. Upper limb nerve compression affects precision and grip, e.g. carpal tunnel syndrome.

Assessment guidelines

- Toileting—urinating, moving bowels, able to get self on/off toilet, wipe self?
- Dressing—doing buttons, zipper, fasten opening behind neck, pulling dress or sweater over head, pulling up pants. Tying shoelaces, getting shoes that fit?
- Grooming—shaving, brushing teeth, brushing or fixing hair, applying make-up?
- Eating—preparing meals, pouring liquids, cutting up foods, bringing food to mouth, drinking?
- Mobility—walking, walking up or down stairs, getting in/out of bed, getting out of house?
- Communicating—talking, using phone, writing?

6 Self-care behaviours. Any occupational hazards that could affect the muscles and joints? Does your work involve heavy lifting? Is there any repetitive motion or chronic stress to joints in your work? What measures have you used to alleviate these?

- Tell me about your exercise program. Describe the type of exercise, frequency, the warm-up program.
- Any pain during exercise? How do you treat it?
- Has your weight changed recently? Please describe your usual daily diet. (Note the person's usual caloric intake, all four food groups, daily amount of protein, calcium.)
- Are you taking any medications for musculoskeletal system: aspirin, anti-inflammatory, muscle relaxant, pain reliever? Are you taking any herbal supplements, vitamins or other 'natural remedies'?
- If person has chronic disability and/or severe musculoskeletal dysfunction:
 - How have these symptoms/illness affected:
 - Your interaction with family and friends
 - Your employment and leisure activities
 - The way you view yourself
 - How you manage your health
 - The impact on your social life
 - The impact on your stress levels and coping ability?

Clinical significance and clinical alerts

Altered bowel and bladder function may be an indication of cauda equina syndrome.

Indicates upper limb dysfunction.

Degenerative processes lead to foot deformity, pain and disability. The person over 65 years also loses their ability to care for their feet. Foot deformities and ill-fitting shoes all increase falls risk.

Indicates upper limb dysfunction or psychosocial issues.

Indicates upper limb dysfunction or psychosocial issues.

When the person is found to have significant impairment of mobility a falls risk screening must be conducted.

Indicates upper limb/hand dysfunction.

Chronic diseases can cause social isolation and depression.

Assess risk for back injury, rotator cuff damage or carpal tunnel syndrome.

Where the workplace is identified as contributing to potential injury the person should undergo a formal workplace assessment.

Weight impacts on joint function.

Low calcium and vitamin D together with smoking and excessive alcohol are associated with osteoporosis.

Over-the-counter medications are common first-line treatments for joint pain, e.g. glucosamine.

Chronic pain sufferers often use multiple analgesia. Herbal medications have iatrogenic effects. The potential interactions of herbal medicines with allopathic medicines have been well documented (Moses and McGuire, 2010).

Assess for

- Self-esteem disturbance
- Loss of independence
- Body image disturbance
- Role performance disturbance
- Social isolation/stress and coping.

Health management ability.

Significant issues in any of these areas may indicate the need for further focused assessment.

Assessment guidelines

Additional history for infants and children

Children with musculoskeletal problems often present to primary care services with traumatic or non-traumatic injuries. The majority of problems are self-limiting; however, the presentation of life-threatening illnesses such as malignancy or septic arthritis will require urgent referrals to specialty services. Chronic illnesses such as juvenile arthritis and the muscular dystrophies also require urgent referrals to improve care outcomes. Delays in access to care are well reported in childhood musculoskeletal illnesses (Dang-Tan and Franco, 2007; Foster et al, 2009; Mohamed et al, 2000).

Ask the parent the following questions:

- 1 Were you told about any trauma to infant during labour and delivery? Did the baby's come head first? Was there a need for forceps?
- 2 Did the baby need resuscitation?
- 3 Were the baby's motor milestones achieved at about the same time as siblings or age mates? Have any of the baby's milestones changed recently?
- 4 Has your child been well? Any weight loss, fever or malaise?
- 5 Has your child ever broken any bones? Any bruising or dislocations? Where and how were these treated?
- 6 Have you ever noticed any bone deformity? Head tilting or spinal curvature? Unusual shape of toes or feet? At what age? Have you ever sought treatment for any of these?

Additional history for adolescents

- 1 Involved in any sports at school or after school? How frequently (times per week)?

Clinical significance and clinical alerts

Children with growing pains do not limp or experience morning stiffness.

Non-accidental injury

Non-accidental injury (NAI) can present as unexplained fracture patterns or bruising with incongruity between child's and the carer's/parent's history. Ensuring the child's safety and completing detailed documentation are priorities. Refer to your local State and Territory legislation on non-accidental injury and your local hospital/community guidelines for assessment and treatment plans.

The nurse within the emergency department and primary setting requires a comprehensive knowledge of growth and development patterns from neonate to adolescent and the associated disease and injury profiles at different stages. Effective pain management is also essential if a comprehensive and targeted history is to be obtained.

Traumatic delivery increases risk for fractures (e.g. humerus, clavicle) and hip dysplasia.

Period of anoxia may result in hypotonia of muscles.

Pain, joint dysfunction, malaise and fever all impact on activity and learning capacity, hence milestones may be affected. For example, toddler may stop walking, develop enuresis or have sleep disturbances.

Recent fever with pain and/or swelling of one joint or bone may indicate an infective or inflammatory process.

Fractures of the epiphyseal plate may lead to deformity.

Immediate pain and swelling following traumatic injury and mechanical dysfunction may indicate a musculoskeletal condition.

Gait changes can indicate normal development or undiagnosed hip problems, e.g. DDH, Perthes and slipped upper femoral epiphysis (SUFE).

Spinal problems may present as asymmetrical ribs or waist and head tilting.

40% of bone mass accumulates during adolescence. This is achieved through exercise and a healthy diet.

Assessment guidelines

- 2 Do you use any special equipment? Does any training program exist for your sport?
- 3 What is the nature of your daily warm-up?
- 4 What do you do if you get hurt?
- 5 Have you ever noticed any bone deformity? Spinal curvature?

Additional history for the adult over 65 years

The questions you should ask the adult should be focused on functional abilities. The aim is to elicit any loss of function, self-care deficit, or safety risk that may occur as a process of ageing or musculoskeletal illness.

- 1 Any change in weakness over the past months or years?
- 2 Any increase in falls or stumbling over the past months or years?
- 3 Do you use any walking aids to help you get around inside your home and outside your home? Where did you purchase these walking aids?

Clinical significance and clinical alerts

Assess use of safety equipment (e.g. mouth guards, helmets) and safe sporting practices.

Use of safety equipment and presence of adult supervision decreases risk of sports injuries.

Lack of adequate warm-up increases risk of sports injury.

Students may not report injury or pain for fear of limiting participation in sport.

Adolescents with scoliosis may report unilateral changes in shoulders, rib cage, hip levels and an uneven waist.

Pain/joint dysfunction impacts on activity and increases weakness and lethargy.

It is essential to focus on exploring all falls risks in a positive manner.

All gait aids should be supplied as part of a comprehensive mobility assessment performed by a physiotherapist.

OBJECTIVE DATA

The purpose of the musculoskeletal examination is to assess patterns of pain, joint abnormalities, and the impact these have on the person's activities of daily living (ADLs) and psychosocial functioning. Note additional ADL information as the person goes through the motions necessary for an examination: gait, posture, how the person sits in a chair, rises from chair, takes off jacket, manipulates a small object such as a pen and rises from the supine position. It is essential to identify painful joints during the history to ensure these are examined last.

The subjective data will assist in targeting your objective assessment and referral criteria. Musculoskeletal assessment can be challenging for the nurse and the person. It often involves asking intimate questions as well as requiring the person to be partially undressed and therefore vulnerable. You need to ensure the privacy and comfort of the person during musculoskeletal assessment (Ch 6).

All forms of musculoskeletal assessment require a systematic approach:

- Head to toe
- Proximal to distal
- Compare corresponding paired joint.
 - Expect symmetry of structure and function and normal parameters for that joint.
 - In addition, a neurovascular assessment of upper and lower limbs is a mandatory component for all musculoskeletal assessments (see Chs 11 and 22 for details of vascular and neurological assessment).
 - As you approach this examination, focus on the principles of 'look, feel, then move'.
- Look (inspect)**—asymmetry of joints, joint swelling, deformity, abnormalities of muscle and soft tissue bulk, erythema, ecchymosis, lesions and rashes, general health of the patient
- Feel (palpate)**—soft tissue swelling, bony or crystal nodules, tenderness, joint warmth and pain
- Move**—active movement first followed by passive movement. Perform painful movements last.

Procedures and normal findings

Abnormal findings and clinical alerts

GALS SCREENING ASSESSMENT**Gait**

Observe the person walking, turning then walking back.

Observe for symmetry and smoothness of gait.

Does the patient limp?

Observe for any reduced muscle bulk in the gluteals.

Can the person turn quickly?

Arms

Shoulder movements (Figs 15.15, A and B)

Ask the patient to place their hands behind their head, with their elbows back.

This movement assesses abduction, external rotation of the shoulder and elbow flexion.

Palpate each shoulder for rotator cuff problems.

Elbow movements and hands

Ask the patient to extend their arms fully and turn their hands over so palms are down (Fig 15.15, C).

Following this ask the patient to turn their hands over.

Observe the elbow and hands for any joint/tissue swelling or deformities.

Grip strength (Figs 15.15, D and E)

Ask the patient to make a fist. Observe the hand and finger movements.

Ask the patient to grip your fingers and assess the degree of grip strength.

Squeeze across the second to fifth metacarpal. Observe for pain.

Legs

Patient is lying down with upper torso covered.

Hip movement

Hold the knee and hip flexed to 90 degrees. Assess the degree of internal rotation in each hip (Fig 15.15, F).

Knee

Observe for any reduced muscle bulk especially in quadriceps.

Assess: ask patient to flex and extend both knees.

Palpate the knee for crepitus and warmth.

Inspection of feet

Inspect the feet for any swelling, deformity or any callosities (Fig 15.15, G).

Look at patient's shoes for unequal wear.

Spine

Inspect the spinal column for any abnormalities including kyphosis, scoliosis or lordosis.

Observe for symmetry of legs and pelvis.

Cervical spine

Ask the patient to bring their ear towards their shoulder—assesses lateral cervical flexion (Fig 15.15, I).

Thoracolumbar spine

Hold the patient's pelvis from behind and ask them to turn from side to side—assesses thoracolumbar rotation.

Ask the patient to touch their toes. Palpate for the range of lumbar movement (Fig 15.15, H). Place two fingers over the lumbar vertebrae. Your fingers should move apart as the patient bends forwards—assesses lumbar spine movement.

Record results using the framework of Figure 15.15, J. When abnormal results are obtained on the screening GALS assessment proceed to a more detailed physical examination.

Antalgic gait is a symptom of pain with weight bearing. The stance phase of the gait is abnormally shortened relative to the swing phase.

Ataxia is gross lack of coordination of muscle movement. It is a neurological sign (see Ch 22).

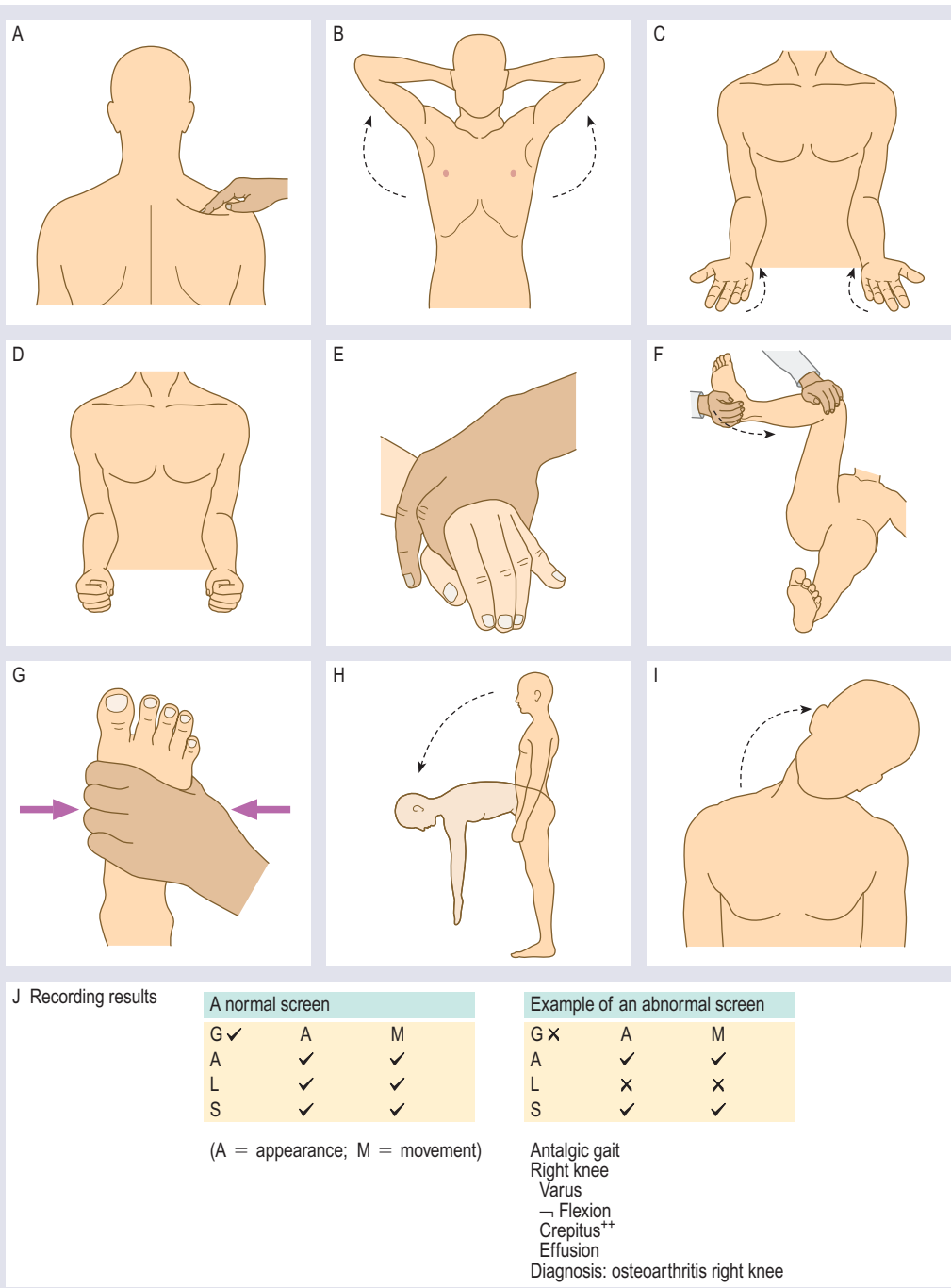
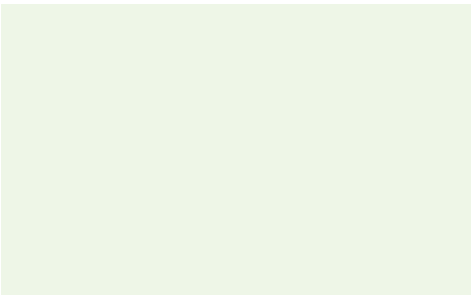


Figure 15.15 The GALS screening assessment.

FURTHER OBJECTIVE ASSESSMENT FOR ADVANCED PRACTICE

The assessments that are described in the following sections require advanced skill and scope of practice. A complete musculoskeletal examination, as described in the following section, is appropriate for persons with a positive musculoskeletal screening assessment.



Procedures and normal findings

Abnormal findings and clinical alerts

Inspection

Note the **size** and **contour** of the joint. Inspect the skin and tissues over the joints for **colour**, **swelling** and any **masses** or **deformity**. Presence of swelling is significant and signals joint irritation.

Palpation

Palpate each joint, including its skin for temperature, its muscles, bony articulations and area of joint capsule. Notice any heat, tenderness, swelling or masses. Joints are not normally tender to palpation. If any tenderness does occur, try to localise it to specific anatomical structures (e.g. skin, muscles, bursae, ligaments, tendons, fat pads or joint capsule).

The synovial membrane is not normally palpable. When thickened, it feels 'doughy' or 'boggy'. A small amount of fluid is present in the normal joint, but it is not palpable.

Range of motion (ROM)

Ask for **active ROM** while stabilising the body area proximal to that being moved. Familiarise yourself with the type of each joint and its normal ROM so that you can recognise limitations. If you see a limitation, gently attempt **passive motion**. Anchor the joint with one hand while your other hand slowly moves it to its limit. The normal ranges of active and passive motion should be the same.

If any limitation or any increase in ROM occurs, use a goniometer to measure the angles precisely (Fig 15.16). First extend the joint to neutral or 0 degrees. Center the 0 point of the goniometer on the joint. Keep the fixed arm of the goniometer on the 0 line and use the movable arm to measure; then flex the joint and measure through the goniometer to determine the angle of greatest flexion.



Figure 15.16

Swelling may be excess joint fluid (effusion), thickening of the synovial lining, inflammation of surrounding soft tissue (bursae, tendons) or bony enlargement.

Deformities include dislocation (one or more bones in a joint being out of position), **subluxation** (partial dislocation of a joint), **contracture** (shortening of a muscle leading to limited ROM of joint) or **ankylosis** (stiffness or fixation of a joint).

Palpable fluid is abnormal. Because fluid is contained in an enclosed sac, if you push on one side of the sac, the fluid will shift and cause a visible bulging on another side.

Procedures and normal findings

Joint motion normally causes no tenderness, pain or crepitation. Do not confuse crepitation with the normal discrete 'crack' heard as a tendon or ligament slips over bone during motion, such as when you do a knee bend.

Muscle testing

Test the strength of the prime mover muscle groups for each joint. Repeat the motions you elicited for active ROM. Now ask the person to flex and hold as you apply opposing force. Muscle strength should be equal bilaterally and should fully resist your opposing force. (Note: Muscle status and joint status are interdependent and should be interpreted together. Ch 22 discusses the examination of muscles for size and development, tone and presence of tenderness.)

A wide variability of strength exists among people. You may wish to use a grading system from no voluntary movement to full strength, as shown.

Grade	Description	% Normal	Assessment
5	Full ROM against gravity, full resistance	100	Normal
4	Full ROM against gravity, some resistance	75	Good
3	Full ROM with gravity	50	Fair
2	Full ROM with gravity eliminated (passive motion)	25	Poor
1	Slight contraction	10	Trace
0	No contraction	0	Zero

TEMPOROMANDIBULAR JOINT

With the person seated, **inspect** the area just anterior to the ear. Place the tips of your first two fingers in front of each ear and ask the person to open and close the mouth. Drop your fingers into the depressed area over the joint, and note smooth motion of the mandible. An audible and palpable snap or click occurs in many healthy people as the mouth opens (Fig 15.17). Then ask the person to:

Instructions to person

- Open mouth maximally.
- Partially open mouth, protrude lower jaw and move it side to side.
- Stick out lower jaw.

Motion and expected range

Vertical motion. You can measure the space between the upper and lower incisors. Normal is 3 to 6 cm, or three fingers inserted sideways.

Lateral motion. Normal extent is 1 to 2 cm (Fig 15.18).

Protrude without deviation.

Abnormal findings and clinical alerts

Crepitation is an audible and palpable crunching or grating that accompanies movement. It occurs when the articular surfaces in the joints are roughened, as with rheumatoid arthritis (see Table 15.1).

Swelling looks like a round bulge over the joint, although it must be moderate or marked to be visible.

Crepitus and pain occur with temporomandibular joint dysfunction

Lateral motion may be lost earlier and more significantly than vertical.

Procedures and normal findings

Abnormal findings and clinical alerts



Figure 15.17



Figure 15.18

Palpate the contracted temporalis and masseter muscles as the person clenches the teeth. Compare right and left sides for size, firmness and strength. Ask the person to move the jaw forwards and laterally against your resistance, and to open mouth against your resistance. This also tests the integrity of cranial nerve V (trigeminal).

CERVICAL SPINE

Inspect the alignment of head and neck. The spine should be straight and the head erect. **Palpate** the spinous processes and the sternomastoid, trapezius and paravertebral muscles. They should feel firm, with no muscle spasm or tenderness.

Head tilted to one side.
Asymmetry of muscles.
Tenderness and hard muscles with muscle spasm.

Procedures and normal findings

Ask the person to follow these motions (Fig 15.19):

Instructions to person

- Touch chin to chest.
- Lift the chin towards the ceiling.
- Touch each ear towards the corresponding shoulder. Do not lift up the shoulder.
- Turn the chin towards each shoulder.

Motion and expected range

Flexion of 45 degrees (Fig 15.19, A).

Hyperextension of 55 degrees.

Lateral bending of 40 degrees (Fig 15.19, B)

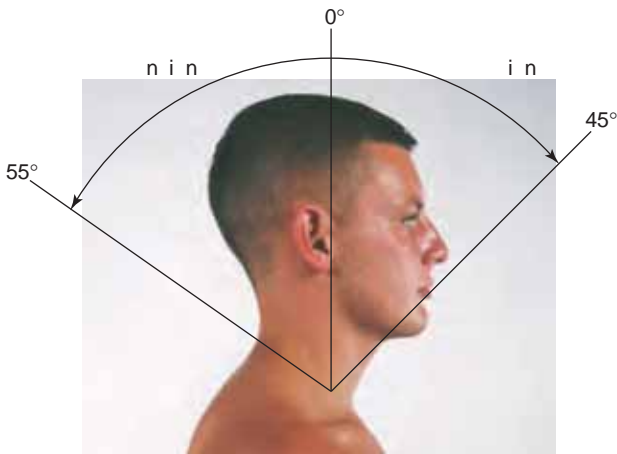
Rotation of 70 degrees (Fig 15.19, C).

Abnormal findings and clinical alerts

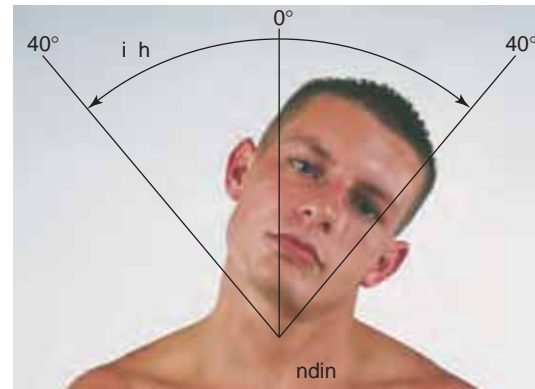
Practice alert—do not examine neck movement where there is any suspicion of neck trauma.

Limited ROM.

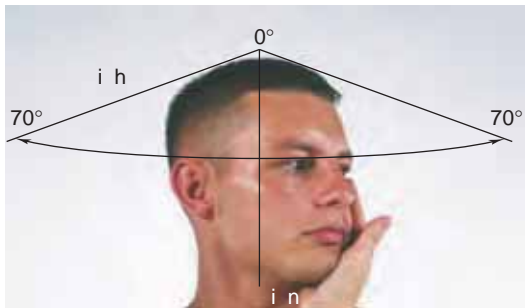
Pain with movement.



A



B



C

Figure 15.19

Repeat the motions while applying opposing force. The person normally can maintain flexion against your full resistance. This also tests integrity of cranial nerve XI (spinal).

UPPER EXTREMITY

Shoulder

Inspect and compare both shoulders posteriorly and anteriorly. Check the size and contour of the joint and compare shoulders for equality of bony landmarks. Normally, no redness, muscular atrophy, deformity or swelling is present. Check the anterior aspect of the joint capsule and the subacromial bursa for abnormal swelling.

The person cannot hold flexion.

Redness.

Inequality of bony landmarks.

Atrophy, shows as lack of fullness.

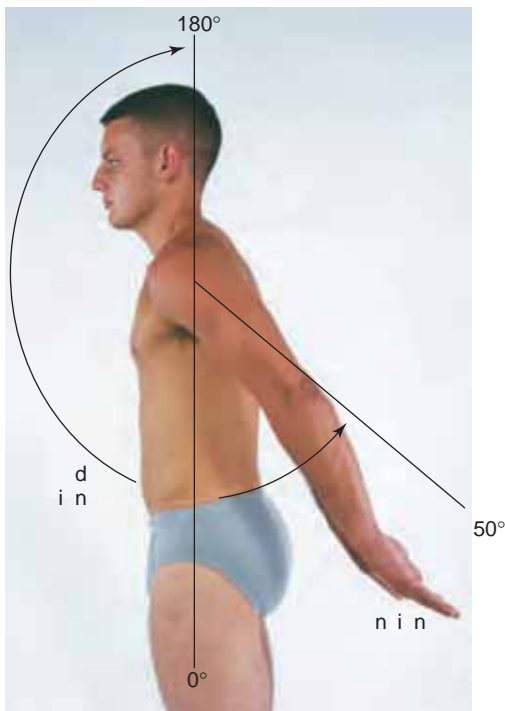
Dislocated shoulder loses the normal rounded shape and looks flattened laterally.

Procedures and normal findings

If the person reports any shoulder pain, ask that they point to the spot with the hand of the unaffected side.

While standing in front of the person, **palpate** both shoulders, noting any muscular spasm or atrophy, swelling, heat or tenderness. Start at the clavicle and methodically explore the acromioclavicular joint, scapula, greater tubercle of the humerus, area of the subacromial bursa, the biceps groove and the anterior aspect of the glenohumeral joint. Palpate the pyramid-shaped axilla; no adenopathy or masses should be present.

Test ROM by asking the person to perform four motions (Fig 15.20). Cup one hand over the shoulder during ROM to note any crepitation; normally none is present.



A
Figure 15.20



B

Abnormal findings and clinical alerts

Swelling from excess fluid is best seen anteriorly. Considerable fluid must be present to cause a visible distension because the capsule normally is so loose (see Table 15.2).

Swelling of subacromial bursa is localised under deltoid muscle and may be accentuated when the person tries to abduct the arm.

Be aware that shoulder pain may be from local causes or it may be referred pain from a hiatus hernia or a cardiac or pleural condition, which could be potentially serious. Pain from a local cause is reproducible during the examination by palpation or motion.

Swelling.

Hard muscles with muscle spasm.

Tenderness or pain.

Procedures and normal findings

Abnormal findings and clinical alerts

The adult over 65 years

Postural changes include a decrease in height, more apparent in the eighth and ninth decades. 'Lengthening of the arm-trunk axis' describes this shortening of the trunk with comparatively long extremities. Kyphosis is common, with a backwards head tilt to compensate. This creates the outline of a figure 3 when you view this older adult from the left side. Slight flexion of hips and knees is also common.

Contour changes include a decrease of fat in the body periphery and fat deposition over the abdomen and hips. The bony prominences become more marked.

For most adults over 65, ROM testing proceeds as described earlier. ROM and muscle strength are much the same as with the younger adult, provided no musculoskeletal illnesses or arthritic changes are present.

Functional assessment. For those with advanced ageing changes, arthritic changes or musculoskeletal disability, perform a **functional assessment for ADLs**. This applies the ROM and muscle strength assessments to the accomplishment of specific activities. You need to determine adequate and safe performance of functions essential for independent home life.

Instructions to person

1 Walk (with shoes on).

2 Climb up stairs.

3 Walk down stairs.

4 Pick up object from floor.

5 Rise up from sitting in chair.

6 Rise up from lying in bed.

Common adaptation for ageing changes

Shuffling pattern; swaying; arms out to help balance; broader base of support; person may watch feet.

Person holds hand rail; may haul body up with it; may lead with favoured (stronger) leg.

Holds hand rail, sometimes with both hands.

If the person is weak, they may descend sideways, lowering the weaker leg first. If the person is unsteady, they may watch feet.

Person often bends at waist instead of bending knees; holds furniture to support while bending and straightening.

Person uses arms to push off chair arms, upper trunk leans forwards before body straightens, feet planted wide in broad base of support.

May roll to one side, push with arms to lift up torso, grab bedside table to increase leverage.

Summary Checklist Musculoskeletal exam

For each joint to be examined:

1 Inspection

General inspection of ease of movement and flexibility

2 Gait (inspect, palpate, move)

3 Arms (inspect, palpate, move)

4 Legs (inspect, palpate, move)

5 Spine (inspect, palpate, move)

Promoting a healthy lifestyle Osteoporosis—‘the silent disease’

Bone is a dynamic tissue which responds to mechanical stresses through a complex process of remodelling. The remodelling process involves the resorption of micro damaged bone by osteoclast cells followed by a phase of bone formation by osteoblast cells. In healthy adults this process is coupled to ensure bone density remains stable. This process commences in childhood with peak bone mass reached by the end of the second decade of life. Studies suggest that more than 95% of the adult skeleton is formed by the end of adolescence (Rizzoli et al, 2010). There is also a direct link between total body fat in children and reduced bone health, emphasising the value of a healthy lifestyle from childhood through to adulthood (Hrafnkels-son, 2010).

When this bone remodelling process becomes uncoupled, normal bone density is altered leading to a change in the normal architecture of bone seen in diseases such as osteoporosis (Seeman et al, 2006). Osteoporosis is defined as a disease characterised by low bone mass and micro-architectural deterioration of bone tissue, leading to enhanced bone fragility and a consequent increase in fracture risk (WHO, 1994). The loss of bone occurs ‘silently’ and progressively. Often there are no symptoms until the first fracture occurs. Fractures associated with osteoporosis are termed low trauma or fragility fractures and occur most frequently in the neck of femur, vertebrae and distal radius.

The impact of osteoporosis and the resultant low trauma fractures are devastating: 1 in 2 women and 1 in 3 men over 60 years in Australia will suffer an osteoporotic fracture (Osteoporosis Australia, 2010b).

In Australia every day, more than 40 Australians break their hip. Most are aged 65 years or over, and more than half are aged 85 or over. Virtually all of these people will be admitted to hospital, and most will have some kind of surgery. Two people will die in the hospital, and at least four will need to go into a residential aged care facility, either while they recover or permanently. A year later, less than half of those original 40 people will be able to walk as well as they did before the fracture, and another six or seven will have died (AIHW, 2010b: 2).

Risk factors for osteoporosis and fractures include both intrinsic and lifestyle factors.

- Genetics
- Maternal family history of osteoporotic fracture
- Increasing age
- Previous low trauma fracture particularly of the hip, spine or wrist
- Early menopause, late menarche (women)
- Absence or suppression of menstrual periods (amenorrhoea) >1 year
- Anorexia nervosa
- Comorbidity and medical treatments

- Corticosteroid therapy
 - Malabsorption syndromes, including coeliac disease and inflammatory bowel disease
 - Chronic renal and liver diseases
 - Rheumatoid arthritis
 - Anticonvulsant therapy
 - Lifestyle factors
 - Inadequate dietary calcium intake
 - Vitamin D deficiency and/or lack of sunlight
 - Physical inactivity/sedentary lifestyle over many years
 - Smoking
 - Regular, excessive alcohol use
 - Increased risk of falls
 - Poor muscle strength and balance
 - Poor eyesight
 - Obesity/sarcopenia
 - Malnutrition
 - Polypharmacy especially sedatives/psychotropics
 - Depression
 - Cognitive impairment
- (Osteoporosis Australia, 2006)

In men the most identifiable risk factors also include hypogonadism, excess alcohol, hyperthyroidism and primary hyperparathyroidism (Osteoporosis Australia, 2010a; Thomas-John et al, 2009).

Within Australia it is estimated that more than half of all vertebral fractures do not receive any interventions, although nearly all are associated with disability and pain. It is also estimated that up to 80% of people with osteoporotic fractures remain undiagnosed and untreated. In addition, those people who sustain a low trauma fracture are at substantially greater (2–4-fold) risk of sustaining another fracture of a different type. This is called ‘the cascade effect’, as the risk of additional fractures increases exponentially with each new fracture (Langsetmo et al, 2009).

Nurses have therefore a pivotal role providing advice on osteoporosis risk modification following completion of an osteoporosis risk assessment. The focus of this advice relates to the positive benefits of a diet high in calcium (1000–1500 mg/day) and vitamin D, adequate levels of physical activity and sunlight exposure, smoking cessation and limited alcohol.

Within their daily practice it is crucial for nurses to support patients on the highly successful pharmaceutical treatments for osteoporosis. A recent study by Weycker (2006) concluded that approximately 50–75% of women who start any type of anti-osteoporosis drug therapy (bisphosphonates, calcitonin, selective oestrogen receptor modulators) are no longer using it 12 months later. Osteoporosis is a chronic and ‘silent’ condition requiring long-term therapy. Patients may have difficulty understanding the value of dual energy x-ray absorptiometry (DEXA) scans or biochemical bone markers and may not perceive any clinical benefit from these medications.

Osteoporosis is a preventable disease in many cases. The key message for the nurse to share with their patients is that bone density and quality can significantly improve with lifestyle changes and long-term medications; for example, bisphosphonates can reduce fracture risks by up to 46%.

Osteoporosis Australia has centres in each state and territory offering a wide range of resources for both patients and health professionals.

www.arthritisaustralia.com.au Arthritis Australia
www.osteoporosis.org.au Osteoporosis Australia

<http://www.bones.org.nz/>
www.arthritisnsw.org.au
www.arthritis.org.au
www.arthritissa.org.au
www.arthritistasmania.com.au
www.arthritisvic.org.au
www.arthritiswa.org.au
www.aont.org.au
www.health.act.gov.au/c/health

Osteoporosis New Zealand
 Arthritis New South Wales
 Arthritis Queensland
 Arthritis South Australia
 Arthritis Tasmania
 Arthritis Victoria
 Arthritis Western Australia
 Arthritis Northern Territory
 ACT Government Health
 Information: ACT Health

DOCUMENTATION AND CRITICAL THINKING

FOCUSED ASSESSMENT: CLINICAL CASE STUDY

MT is a 45-year-old female office worker with a diagnosis of rheumatoid arthritis 3 years ago, who seeks care now for 'swelling and burning pain in my hands' for 1 day. She has not been assessed by a rheumatologist since diagnosis and is subsequently not on an effective disease-modifying treatment program.

Subjective

MT was diagnosed as having rheumatoid arthritis at age 41 years by a rheumatologist. Since that time, her 'flare-ups' seem to come every 6 to 8 months. Acute episodes involve hand joints and are treated with aspirin, which gives relief. Typically experiences morning stiffness, lasting ½ to 1 hour. Joints feel warm, swollen and tender. Has had weight loss of 4 kg over last 4 years and feels fatigued much of the time. States should rest more, but 'I can't take the time'. Daily exercises have been prescribed but doesn't do them regularly. Takes aspirin for acute flare-ups, feels better in a few days, decreases dose by herself.

Objective

Body joints within normal limits with exception of joints of wrist and hands. Radiocarpal, metacarpophalangeal and proximal interphalangeal joints are red, swollen and tender to palpation. Spindle-shaped swelling of proximal interphalangeal joints of third digit right hand and second digit left hand; ulnar deviation of metacarpophalangeal joints.

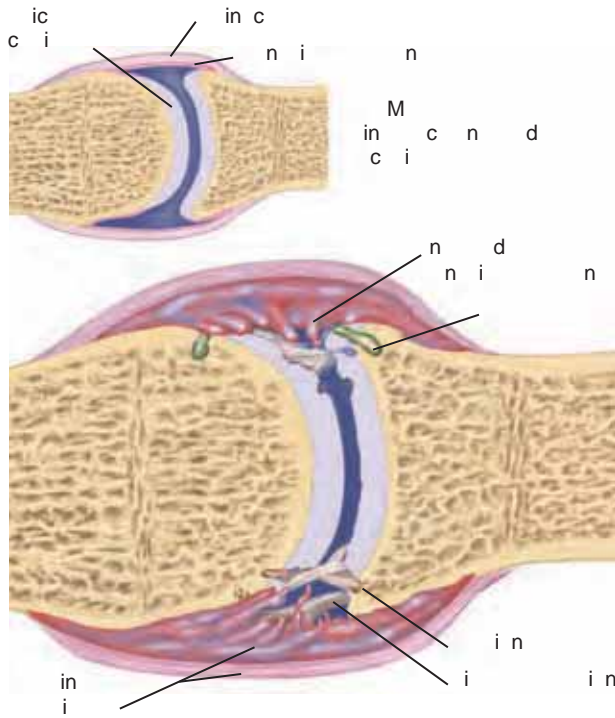
Patient problems/nursing diagnoses

Acute pain R/T inflammation
 Impaired physical mobility R/T inflammation
 Deficient knowledge, denial about her disease, lack of understanding of perceived benefits of treatment

ABNORMAL FINDINGS FOR ADVANCED PRACTICE

TABLE 15.1 Abnormalities affecting multiple joints

INFLAMMATORY CONDITIONS



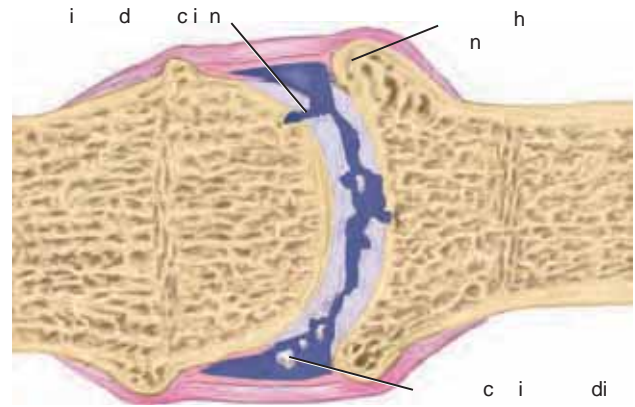
Rheumatoid arthritis (RA)

This is a chronic, systemic inflammatory disease of joints and surrounding connective tissue. Inflammation of synovial membrane leads to thickening; then to fibrosis, which limits motion, and finally to bony ankylosis. The disorder is symmetrical and bilateral and is characterised by heat, redness, swelling and painful motion of the affected joints. RA is associated with fatigue, weakness, anorexia, weight loss, low-grade fever and lymphadenopathy. Associated signs are described in the following tables, especially Table 15.4.

Ankylosing spondylitis (not illustrated)

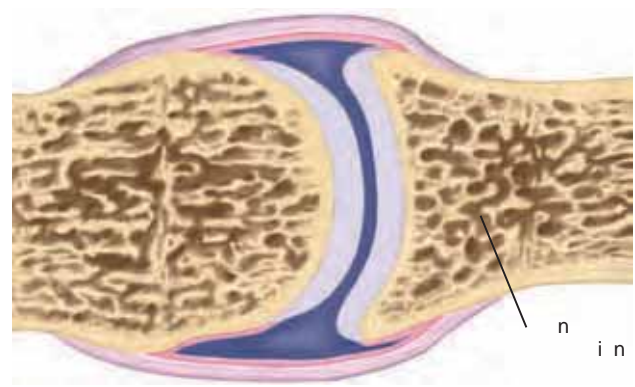
Chronic progressive inflammation of spine, sacroiliac and larger joints of the extremities, leading to bony ankylosis and deformity. A form of RA, this affects primarily men by a 10:1 ratio, in late adolescence or early adulthood. Spasm of paraspinal muscles pulls spine into forward flexion, obliterating cervical and lumbar curves. Thoracic curve exaggerated into single kyphotic rounding. Also includes flexion deformities of hips and knees.

DEGENERATIVE CONDITIONS



Osteoarthritis (degenerative joint disease)

Noninflammatory, localised, progressive disorder involving deterioration of articular cartilages and subchondral bone and formation of new bone (osteophytes) at joint surfaces. Ageing increases incidence; nearly all adults over 60 years old have some radiographic signs of osteoarthritis. Asymmetrical joint involvement commonly affects hands, knees, hips and lumbar and cervical segments of the spine. Affected joints have stiffness, swelling with hard, bony protuberances, pain with motion and limitation of motion (see Table 15.4).



Osteoporosis

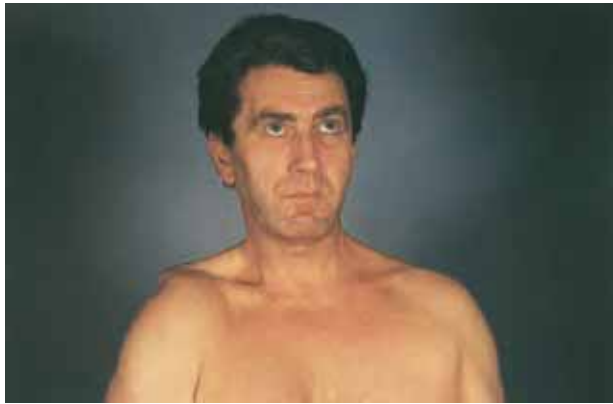
Decrease in skeletal bone mass occurring when rate of bone resorption is greater than that of bone formation. The weakened bone state increases risk for stress fractures, especially at wrist, hip and vertebrae. Occurs primarily in postmenopausal women. Osteoporosis risk also is associated with smaller height and weight, younger age at menopause, lack of physical activity and lack of oestrogen replacement therapy.

TABLE 15.2 Abnormalities of the shoulder



Atrophy

Loss of muscle mass is exhibited as a lack of fullness surrounding the deltoid muscle. In this case, atrophy is due to axillary nerve palsy. Atrophy also occurs from disuse, muscle tissue damage or motor nerve damage.



Dislocated shoulder

Anterior dislocation (95%) is exhibited when hunching the shoulder forward and the tip of the clavicle dislocates. It occurs with trauma involving abduction, extension and rotation (e.g. falling on an outstretched arm or diving into a pool).



Joint effusion

Swelling from excess fluid in the joint capsule, here from rheumatoid arthritis. Best observed anteriorly. Fluctuant to palpation. Considerable fluid must be present to cause a visible distension because the capsule is normally so loose.



Tear of rotator cuff

Characteristic 'hunched' position and limited abduction of arm. Occurs from traumatic adduction while arm is held in abduction, or from fall on shoulder, throwing or heavy lifting. Positive drop arm test: If the arm is passively abducted at the shoulder, the person is unable to sustain the position and the arm falls to the side.



Frozen shoulder—adhesive capsulitis

Fibrous tissues form in the joint capsule, causing stiffness, progressive limitation of motion and pain. Motion limited in abduction and external rotation; unable to reach overhead. It may lead to atrophy of shoulder girdle muscles. Gradual onset; unknown cause. It is associated with prolonged bed rest or shoulder immobility. May resolve spontaneously.

Subacromial bursitis (not illustrated)

Inflammation and swelling of subacromial bursa over the shoulder cause limited ROM and pain with motion. Localised swelling under deltoid muscle may increase by partial passive abduction of the arm. Caused by direct trauma, strain during sports, local or systemic inflammatory process or repetitive motion with injury.

TABLE 15.3 Abnormalities of the elbow



Olecranon bursitis

Large soft knob, or 'goose egg', and redness from inflammation of olecranon bursa. Localised and easy to see because bursa lies just under skin.



Gouty arthritis

Joint effusion or synovial thickening, seen first as bulge or fullness in grooves on either side of olecranon process. Redness and heat can extend beyond area of synovial membrane. Soft, boggy or fluctuant fullness to palpation. Limited extension of elbow.



Subcutaneous nodules

Raised, firm, nontender nodules that occur with rheumatoid arthritis. Common sites are in the olecranon bursa and along extensor surface of arm. The skin slides freely over the nodules.



Epicondylitis—tennis elbow

Chronic disabling pain at lateral epicondyle of humerus; radiates down extensor surface of forearm. Pain can be located with one finger. Resisting extension of the hand will increase the pain. Occurs with activities combining excessive pronation and supination of forearm with an extended wrist (e.g. racquet sports or using a screwdriver).

Medial epicondylitis is rarer and is due to activity of forced palmar flexion of wrist against resistance.

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