Health Priorities In Australia
FQ1 How are priority issues for Australia’s health identified?

Measuring health status

Role of epidemiology
→ Study of the patterns and causes of death and disease in a given population.

What does it tell us?
→ It tells basic info on the health of Australians
→ Provides trends in disease incidence and prevalence with information about ethnic
groups, socioeconomic groups, and gender groups

Who?
→ Researchers
→ Health department officials
→ Govt
→ Gps

→ Epidemiology does not measure everything about health status, it doesn’t take into
account the determinants of health

Measures of epidemiology

Life expectancy
→ The average number of years a person or a given age and gender is expected to live
→ Not all population groups within Australia have the same standard of health
→ Males have a lower life expectancy than females
→ ATSI have approximately 20 years lower in life expectancy

Mortality Rate
→ The death rate (usually per 100 000) over a specific period of time
→ Significant decline consistent in both males and females

Infant mortality rate
→ Number of deaths under the age of 1 per 1000 live births
→ Decrease in infant mortality due to improvements in hygiene, sanitation, water and milk
supplies, increase in breastfeeding and better access to education

Current trends in life expectancy
→ Life expectancy = currently improving
→ Male 77.4, Female 82.6
→ Decrease in mortality due to improvement in living conditions, better water supply,
sewerage systems and food quality and health education
→ Advances in medical technology eg. immunisation + antibiotics
→ Fewer deaths from motor accidents of young people and lower infant mortality
→ Fewer deaths from CVD
Current trends in morbidity and mortality

CVD
- Includes: coronary heart disease, cerebrovascular disease (stroke), peripheral vascular disease
- Downward trends since 60s
- Leading cause of death (42%)
- Decrease attributed to change of lifestyle and improvement in management of disease

Cancer
- 2nd leading cause of death (25%)
- Increase in incidence - due to earlier detection
- Most common male cancer - Lung (Major factor= tobacco smoking)
- Most common female cancer - Breast
- Males have a higher incidence than females beyond the age of 55, females have a higher incidence than males aged 30-54

Respiratory diseases
- Third leading cause of death
- Asthma, influenza, and bronchitis
- Asthma is highly prevalent, more so in young people

Injuries
- 6% of all deaths
- Includes: MVAs. suicide, poisoning, drowning
- Leading cause of death for young people
- ¼ deaths from injury are males aged 20-34
- Male suicides increasing
- Children under 15- deaths are mostly due to falls and drowning
- Decreasing mortality rate

Females
- 6 year greater life expectancy
- Use health services more than males
- Gender specific conditions ie. breast cancer+cervical cancer
- More vulnerable to domestic violence

Males
- More likely to be employed in risk taking occupations such as operating heavy machinery
- More males smoke
- Less likely to seek medical attention
- Gender specific conditions ie. testicular cancer+prostate cancer
Identifying Health Priority Issues

**Social Justice Principles**
- Decreasing or eliminating inequity, inclusiveness of diversity, environments that are supportive of all people
- Equity, access, participation, rights

**Priority population groups**
- ATSI, rural, Low SES

**Prevalence of the condition**
- Number of cases at a given time
- The higher the prevalence the greater the issue

**Costs to the individual + the community**
- **Individual - Economic, social, physical, emotional**
  - **Direct costs to the individual:**
    - Cost of treatment
    - Cost of replacement labour
    - Loss of working hours
  - **Indirect costs to the individual:**
    - Relationship breakdown
    - Emotional trauma
- **Health costs to the individual:**
  - Social isolation
  - Long term hospitalisation
  - Pressure on family + relationships
- **Direct costs to the community:**
  - Hospitalisation, health insurance use
  - Pharmaceutical use
- **Indirect costs to the community:**
  - Loss of work productivity
  - Absenteeism
  - Cost of replacing workers

**Potential for change**
- Both the individual and communities have the potential to change given the right help
What are the priority issues for improving Australia’s health

Groups experiencing health inequities

**ATSI**
- Lower life expectancy, 17 years less
- 5-8 times Higher mortality
- 3 times higher infant mortality
- Higher prevalence CVD, cancer, injuries
- Higher obesity, unemployment, low SES, ½ smoke(national level ¼)

**Low SES**
- Higher infant mortality
- Poor living conditions
- Unemployment
- High levels of substance abuse
- More likely to suffer disability + chronic illness
- Less likely to use preventative health services

High levels of preventable chronic disease

**CVD**

**Nature of the problem**
- Coronary heart disease - Poor supply of blood to the muscular walls of the heart
- Stroke - Interruption of blood supply to the brain
- Arteriosclerosis - Build up of fatty material on the interiors of the arteries
- Atherosclerosis - Hardening of the arteries

**Extent of the problem**
- Leading cause of death (42%)
- Mortality declining
- Incidence increases with age
- Coronary heart disease is responsible for 20% of CVD deaths
- Declining prevalence due to improved medical care

**Risk Factors**
- Modifiable:
  - Smoking
  - Physical inactivity
  - High blood pressure
  - High Cholesterol
  - Uncontrolled stress
  - Obesity
  - High fat diet
  - Alcohol abuse
  - Contraceptive pill
  - Diabetes
 ➔ Non-modifiable:
   ◆ Age
   ◆ Gender - Men more likely
   ◆ Family history

Protective factors:
 ➔ Modification of diet
 ➔ Managing stress
 ➔ Increasing physical activity

Determinants:
 ➔ Low SES
 ➔ Gender
 ➔ Geographic isolation
 ➔ ATSI descent

Groups at risk:
 ➔ ATSI
 ➔ Low SES
 ➔ Rural and remote areas

Diabetes

Nature of problem
 ➔ Type I - Body produces little or no insulin
 ➔ Type II - Body doesn't produce enough insulin to reduce energy from sugar
 ➔ Hypoglycemia - not enough sugar, hyperglycemia - too much sugar

Extent of the problem
 ➔ Major cause of morbidity and early mortality
 ➔ 1 in 4 Australians have it
 ➔ Incidence increasing
 ➔ Males have greater incidence than females
 ➔ Can experience major health problems such as blindness, damage to kidneys, enlarged heart, and higher risk of coronary heart disease

Risk factors
 ➔ Type I - Hereditary
 ➔ Type II - Excessive alcohol, obesity, high blood pressure, high saturated fat diet and carbohydrates, age, tobacco smoking

Determinants
 ➔ Low SES
 ➔ Aboriginality
 ➔ Age 45+

Groups at risk
 ➔ ATSI
 ➔ Low SES
 ➔ People w/ family history
Growing and ageing population

Healthy ageing

➔ Include various behaviours + choices that affect health, e.g. regular physical activity, good diet, regular family contact and maintaining social activities
➔ Goal = maintain health into old age
➔ How the government supports healthy ageing:
  ◆ Prevent disease
  ◆ Reduce illness
  ◆ Maintain economic contribution
  ◆ Maintain a social life

Increased population living w/chronic disease + disability

➔ Chronic disease + disability more prevalent w/ age
➔ Has a large burden on population
➔ Increased healthcare expenditure and need for health facilities

Demand for health services and workforce shortages

Health system and services:

➔ Ageing population will increase public spending on health and place more strain on the healthcare system
➔ Increase of those living past 85
➔ 65+ years have larger lifestyle diseases such as diabetes
➔ Elderly visit health professionals more frequently than young people
➔ 57% have used a specialist in the last year
➔ People living in aged care facilities show symptoms of depression

Health service and workforce

➔ Increase in aged care facilities means there’s a need for more training in aged care and chronic conditions surrounding
➔ One was to focus on this is efficient coordination of care -> this would decrease the demand

Availability of carers and volunteers

Carers of the elderly

➔ Growing and ageing population means there’s an increased need in carers
➔ The need for a varied approach to cater for different demands
➔ Includes daily activities such as cooking and cleaning
➔ Most unpaid carers are family
➔ A growing number of elderly are carers for the grandchildren( 12 under)
**FQ3 What role do health care facilities and services play in achieving better health for Australians?**

Health care in Australia

**Range and types of health facilities and services**

- Institutional; Hospitals, nursing homes
- Non-institutional; GPs, dentists, research groups, pharmaceutical services
- Hospitals; provide emergency care, elective surgery, and rehabilitation services
- Hospitals can be public or private; medicare covers the costs of public hospitals which makes them accessible to those of a low SES
- Nursing homes mostly provide care for the elderly, including those with chronic disease and disabilities
- Aged care is a growing industry and is expected to keep growing as Australia is a growing and ageing population
- The gov provides most of the funds for the nursing homes, with private nursing homes having some cost to the individual
- Dentists are generally not covered by medicare and leave patients out of pocket
- Some rebates can be claimed through the Chronic Disease Benefit Scheme and other Allied schemes
- Pharmaceutical services are funded through the pharmaceutical benefits scheme, PBS allows customers to only pay a fraction of the price of medication, it also provides extra funding for people with special needs; pensioners, concession card holders and veterans

**Responsibility for health facilities and services**

- The people who are overall responsible for health facilities and services are the State and Commonwealth Australian Health Ministers- referred to as Standing Council on Health
- Running of specific systems falls to the relevant health ministers and departments in conjunction
- The focus is having better health services and a more sustainable health for Australia, and closing the Gap between ATSI and other Australians
Areas of responsibility include:

- Hospitals
- Community health
- Health promotion
- Aged care

State and territory gov regulates the health system; they license private hospitals, regulate supply of alcohol and tobacco, the safety of pharmaceuticals

<table>
<thead>
<tr>
<th>Expenditure</th>
<th>Hospitals (public and private)</th>
<th>Primary health care (GPs, physio, dental, optometry, medications)</th>
<th>Other recurrent medical services (other than those provided by GPs, medical research)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsibility</td>
<td>Public and private health sector (All levels of government)</td>
<td>State and territory gov</td>
<td>Private providers</td>
</tr>
<tr>
<td>Funding</td>
<td>Commonwealth gov</td>
<td>State and territory gov</td>
<td>Private funding</td>
</tr>
</tbody>
</table>

Summary of responsibilities:

- Commonwealth
  - Policy/legislation, funding to state/territory, hospitals, fund Medicare and PBS, health promotion strategies

- State/territory
  - Health services including hospitals and mental health, women’s, Aboriginal, and dental. Help carry out health promotion

- Local
  - Action policies including: WHS, parks and community spaces. Community health services and clinics, early childhood centres, local health promotion, waste disposal, and services such as meals on wheels.
Equity of access to healthcare facilities

- Most Australians live in metropolitan areas which means they have readily access to health facilities and services
- Those living in rural areas have less access to these facilities
- They have limited access to hospitals and specialist facilities
- To address this the Govt has introduced, Royal Flying Doctor Service, e-health records, and access to specialist via video conferencing
- People with lower education have less access to health facilities
- Biggest action by the govt for better access to health services and facilities was introducing medicare and PBS
- Medicare doesn’t cover everything; doesn’t include physio, psychotherapist, or OTs

Health care expenditure versus expenditure on early intervention and prevention

- For an effective health care model, Australia must seek early intervention and prevention as well as a cure
- Cost of health care is a large burden on Govt expenses
- Primary health care includes- GPs, nurses, allied health and dental services
- Prevention refers to the activities and behaviours which reduce the likelihood of a disease or disorder that
- Major prevention activities include;
  - Good personal hygiene
  - Good sanitation
  - Good food and water supply
- There is a strong current focus on the increase of chronic diseases, to address this Australia seeks to improve lifestyle choices which affect our health
- Focus aims;
  - Decrease smoking
  - Increase physical activity
  - Decrease the level of consumption of drugs and alcohol
  - Improve diet by increasing fresh fruit and veg intake
- This focus shows that Australia recognises the importance of the determinants of health by creating an environment which encourages good health, and addresses aspects of sociocultural and socioeconomic aspects of health, e.g accessibility to health services and the costs of these services
→ Australia has many health promotion campaigns:
  ◆ **Slip, slop, slap, seek, slide** - Shows how to reduce the risk of not only sunburn but also skin cancer though a number of preventative actions.
  ◆ **Girls make your move** - This campaign is aimed at teenage girls because many aren’t meeting the daily recommended activity, also at this age many of them begin to quit their extra-curricular activities such as sport.
  ◆ **Make healthy normal** - A campaign where the name speaks for itself as unhealthy seems to have become normal and the aim is to make healthy normal
  ◆ **Kids Matter** - A children’s mental health initiative
  ◆ **Others include** - plain cigarette packaging, seatbelts in cars, mass immunisation and cancer screening programs

→ Prevention and early intervention strategies cost Australia $2.2billion a year which is 1.4% of the total expenditure
→ Prevention and early intervention strategies comes down to costs and benefits

**Impact of emerging new treatments and technologies on health care**
→ These can include benefits to health outcomes but also an increase in cost and also raises questions in the equity of access
→ Some new treatments and technologies include:
  ◆ Key hole surgery
  ◆ Improved prosthetics and replacement limbs such as knees and hips
  ◆ Ultrasound and MRI
→ New technology helps with the early detection of various diseases and illnesses
→ This new technology can come at a high price, this isn’t covered by medicare and may only be accessible to those with a higher SES

**Health insurance- Medicare and private**
→ Medicare has helped improve Australia’s health and reduced the inequities throughout the country
→ It covers a large portion of the costs for primary health care
→ This is funded through the tax system and medicare levy
→ The medicare levy is currently 2% of a person’s taxable income, for those earning over $90 000 as a single or $180 000 as a family are charged an additional 1-1.5% on top of the 2% for Medicare levy, this is called the Medicare Levy surcharge
→ Patients using medicare have the choice of their GP, or specialist, however if they are using hospital care they do not have a choice in their healthcare provider(except for choice in hospital)
→ Medicare only covers allied health providers, these are under the Allied Health initiative; these allow for rebate for some chronically ill patients
→ Private healthcare includes the benefit of not having to pay the Medicare Levy Surchage
This provides the incentive for those earning more money to take out private health insurance

Lifetime cover loading is an incentive to take out health insurance

The loading is 2% for each year over the age of 31 where a person has not taken out health insurance, this means that someone who is 40 will be paying 20 percent more for private health insurance than if they’d taken it out before they were 31

Initiatives like these decrease government expenditure and increase the individual contribution to health care

It benefits those of higher SES but also provides more funding for those lower SES

Private health insurance is designed to benefit those with a higher SES

It is expensive and those who can afford it get greater health care than those who cannot, this then makes it a social justice issue

Complementary and alternative health services

Reasons for growth of complementary and alternative health products and services

Complementary health products are used in conjunction with western medicine, while alternative health products are not

Complementary and alternative health products and services include:
- Natural medicines (e.g. herbs, nutrition, chinese medicine)
- Supplementation (e.g vitamins, protein, etc)
- Physiological treatment (e.g physiotherapy, acupuncture)

The growth is due to:
- People becoming more conscious of the need for more holistic health approach
- Growing multiculturalism in Australia
- Health insurers subsidising it
- Increased number of trained personnel
- Dangers of pharmaceutical drugs encourages consumers to try alternative health approaches

Range of products and services

Acupuncture - Involves the insertion of needles into acupuncture points by trained practitioners, the needles used are approximately the thickness of a guitar string and made of stainless steel

Herbal medicine - Form of medicine which uses plants and plant extracts

Chiropractic treatment - An underlying principle that health problems can be prevented and treated using spinal adjustments in order to correct spinal dysfunction

Aromatherapy - Involves use of volatile liquid plant materials (essential oils) and other aromatic compounds to affect someone’s mood or health

Naturopathy - Attempting to achieve better health or improve health through natural remedies
How to make informed consumer choices

How do you know who to believe?

➔ There are range of things which a person should look for, these include:
  ◆ Qualifications
  ◆ Registration
  ◆ Regulation
  ◆ Research

➔ Govt websites can be helpful, most information is limited and largely influenced by Western medicine

➔ Seek info from academic professionals, these are people such as professors, doctors(PhD)

➔ When seeking information it is important to make sure the people with information have experience and qualifications relevant to the specific field

➔ Ask the person questions such as: what qualifications do you have? Are you registered? What evidence is there for this treatment?

What do you need to help you make informed choices?

➔ You should gather reasonable amount of info from reliable sources

➔ This information should include:
  ◆ The philosophy behind the treatment
  ◆ Process of the treatment
  ◆ Possible side effects
  ◆ Qualifications necessary to provide the treatment
  ◆ Academic evidence of the effectiveness of the treatment
**FQ4 What actions are needed to address Australia’s health priorities?**

Health promotion based on the 5 action areas of the Ottawa charter

**Levels of responsibility for health promotion**

- Govt, communities, and individuals all play a role in the responsibility for health promotion

<table>
<thead>
<tr>
<th>Build healthy public policy</th>
<th>Governments</th>
<th>Communities</th>
<th>Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creation and maintenance of policies</td>
<td>Contribute towards development of health policies, involvement in carrying out policies</td>
<td>Act in accord with policies</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Creating supportive environments</th>
<th>Governments</th>
<th>Communities</th>
<th>Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning, implementation, management of infrastructure e.g Location of hospitals, parks, community centres</td>
<td>Help maintain healthy environments and promote healthy behaviours</td>
<td>Make better health choices and help maintain the environment</td>
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</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Strengthen community action</th>
<th>Governments</th>
<th>Communities</th>
<th>Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engage with community groups in creation of policies</td>
<td>Contribute to and take ownership of policies</td>
<td>Promote community activities that promote health, be involved in community actions</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Develop personal skills</th>
<th>Governments</th>
<th>Communities</th>
<th>Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop policies and provide funding towards developing personal skills. E.g compulsory PDHPE k-10, kids matter, girls make your move, etc</td>
<td>Run education programs to develop personal skills in relation to health</td>
<td>Seek to develop own skills in health</td>
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<table>
<thead>
<tr>
<th>Reorienting health services</th>
<th>Governments</th>
<th>Communities</th>
<th>Individuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fund, research and create policies around promotion</td>
<td>Conduct research and be involved in promotion of health</td>
<td>Seek to make healthy life choices, help others do the</td>
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</tr>
</tbody>
</table>
Look at all determinants of health and not just curative services.

<table>
<thead>
<tr>
<th>The benefits of partnership in health promotion</th>
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<tbody>
<tr>
<td>➔ One of the benefits of partnerships in health promotion is that it ensures it’s effective in improving health outcomes</td>
</tr>
<tr>
<td>➔ Partnerships are between many groups- including between both Govt and non-Govt agencies, along with communities and the individual</td>
</tr>
<tr>
<td>➔ WHO states:</td>
</tr>
<tr>
<td>◆ The prerequisites and prospects for health cannot be ensured by the health sector alone. More importantly, health promotion demands coordinated action by all concerned: by governments, by health and other social and economic sectors, by nongovernmental and voluntary organization, by local authorities, by industry and by the media. People in all walks of life are involved as individuals, families and communities. Professional and social groups and health personnel have a major responsibility to mediate between differing interests in society for the pursuit of health</td>
</tr>
<tr>
<td>➔ Individuals and communities should be involved as this ensures their needs are met</td>
</tr>
<tr>
<td>➔ They should also be involved via surveys, community meetings, consultations and data analysis.</td>
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<tr>
<td>➔ Sharing info is also important</td>
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<tr>
<td>➔ Benefits of partnerships in health promotion include:</td>
</tr>
<tr>
<td>◆ Addresses needs of individuals and communities</td>
</tr>
<tr>
<td>◆ Better results in health promotion goals</td>
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<tr>
<td>◆ Empowers individuals</td>
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How health promotion based on the Ottawa Charter promotes social justice

<table>
<thead>
<tr>
<th></th>
<th>Equity</th>
<th>Diversity</th>
<th>Supportive environments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building healthy</td>
<td>Public policy is designed with the aim of producing equity in health</td>
<td>Public policy seeks to provide for all population groups</td>
<td>Policy should aim to produce an environment that</td>
</tr>
<tr>
<td>public policy</td>
<td>status</td>
<td></td>
<td>supports healthy choices</td>
</tr>
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<td></td>
<td>E.g. Medicare</td>
<td></td>
<td></td>
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<tr>
<td>Creating supportive</td>
<td>A non-supportive environment doesn't support equity</td>
<td>For the environment to be supportive it must cater to all in a diverse</td>
<td>Creating environments that encourage healthy</td>
</tr>
<tr>
<td>environments</td>
<td></td>
<td>environment</td>
<td>choices is vital in health promotion</td>
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<td></td>
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<tr>
<td>Strengthening</td>
<td>Equity with and between communities is very important</td>
<td>Each community has its own diversity and needs to be consulted in health</td>
<td>Communities that become empowered need</td>
</tr>
<tr>
<td>community action</td>
<td></td>
<td>promotion</td>
<td>environments which support them</td>
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<td></td>
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</tr>
<tr>
<td>Developing personal</td>
<td>All people should have access to education and development of skills</td>
<td>Programs should be able to cater for the diverse population</td>
<td>People who share their knowledge and educate</td>
</tr>
<tr>
<td>skills</td>
<td></td>
<td></td>
<td>other are helping create a supportive environment</td>
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</tr>
<tr>
<td>Reorienting health</td>
<td>Health services must address inequities in health</td>
<td>Health services must meet the diverse needs of a community</td>
<td>Health services must help create a supportive</td>
</tr>
<tr>
<td>services</td>
<td></td>
<td></td>
<td>environment</td>
</tr>
</tbody>
</table>
The Ottawa Charter in action

→ Developed in 1986
→ Recognises the many determinants of health
→ The five action areas are:

◆ Building healthy public policy:
  ● Policy department aims to promote health
  ● Includes - legislation, taxation, organisational change.
  ● Health income and social policies are used to foster equity
  ● Policies need to identify obstacles to health and seek to remove them

◆ Creating supportive environments:
  ● Addresses the link between people’s health and the environment
  ● Reciprocal maintenance of the environment is also important
  ● Work and leisure should promote health
  ● Health promotion should create safe working environments which are enjoyable

◆ Strengthen community action:
  ● Community action is strengthened through communities being involved in setting priorities, making decisions and planning strategies and implementing them

◆ Developing personal skills:
  ● Increases options and control for individuals over their own health
  ● Equips them with lifelong learning and develop skills for coping with health and illness

◆ Reorienting health services:
  ● Health promotion is in the responsibility of governments, institutions, professionals, community groups and individuals
  ● About the shift towards a system which promotes health rather than curative services
  ● Health services need to support the needs of the individuals and communities to promote health
Health promotion initiatives related to Australia’s health priorities

Close the Gap

**Build Healthy Public Policy**
- COAG starting the campaign
- Australia established an Indigenous representative body and provided funding to upskill the workforce to meet the challenges of remote Indigenous population
- Measureable targets for equity were also set

**Creating supportive environments**
- Close the gap seeks to train health professionals (particularly ATSI) to deliver primary health care to other ATSI people
- Ensure that indigenous people have healthy food, housing, and waste removal to improve housing quality
- Federal police have also recruited ATSI people and developed training programs for policing in ATSI areas

**Strengthening community action**
- Involving ATSI people and community groups/elders in the planning at local and regional and local levels
- Delivers culturally appropriate primary health services by Aboriginal Community Controlled Health Services.

**Developing personal skills**
- Close the gap aims to increase ATSI education levels and provide primary health care services through Aboriginal Community Controlled Health Services
- Provide learning support and ensure health care is provided to ATSI mothers, babies and children

**Reorient health services**
- Close the gap seeks to utilise primary health care to prevent and promote health in balance with curative services
- Provides education through health services
- Seeks to ensure ATSI communities have housing, water supplies and system that support health equity
The latest report states that the Close The Gap initiative is only partially on track to meet its targeted goals.

- Gap in death rates has fallen 15%
- The goals to close the gap is not likely to be met by the goal of 2031

Road Safety

- Aims to half the number of road fatalities by 2020
- Describe speeding to be the major factor in crashes
- Also aims to reduce the expenditure on crashes

Building healthy public policy

- Legislation was created in order to allow fixed speed cameras in NSW
- 50km/h speed limit was set as even the smallest reductions in speed can save lives
- Road safety courses being developed to develop safer driving habits
- Further testing has been added to the test requirements for safer driving (hazard perception and driver qualification test)
- Penalties increased for drink driving, speeding, and road rage

Creating supportive environments

- ‘Speeding- no one thinks big of you’ Campaign
- Increased awareness of police operations through the ‘P plate speeding’ campaign
- Installation of speed cameras and warnings for the signs
- Higher safety standards on roads, cycleways constructed to make it safer for cyclists on the road
- Crossings, ramps for wheelchairs, prams and trolleys have been upgraded for pedestrian safety

Strengthen community action

- Sponsoring the RTA SpeedBlitz Blues to raise awareness of the consequences of speeding
- Works with community by providing ‘driver-reviver’ stops to combat fatigue related accidents

Develop personal skills

- The ‘Speeding Campaign’ was used to show the difference that 5 km/h makes to an accident
→ Seeks to remove myths about driving through familiar roads through the ‘Country Driving Campaign’

→ The ‘Notes Campaign’ targets 17-25 year olds with increase in awareness of speeding and mortality

→ The introduction of the Graduated Licensing Scheme improves the knowledge and driving ability of young drivers and school education programs on road safety aims to protect children and instill long-term safe behaviours

Reorient health services

→ The ‘Slow down roadshow’ travels around the state educating the community about the consequences of speeding

→ Many of the other strategies and campaigns mentioned that increase road safety awareness promote a preventative approach to road safety issues, and are examples of reorienting health services towards health promotion
Factors Affecting Performance
FQ1: How does training affect performance?

Energy systems

Alactacid system (ATP/PC)

<table>
<thead>
<tr>
<th>Source of Fuel</th>
<th>- ATP which is immediately available within the cell</th>
</tr>
</thead>
</table>
| Efficiency of ATP production | - Very fast ATP production  
- Limited store of fuel  
- PC runs out fast and is not available again until after recovery |
| Duration | - 8 to 12 seconds |
| Cause of Fatigue | - Depletion of fuel (ATP + PC) |
| By-products | - Heat |
| Process + rate of recovery | - Creatine in cell connects to free phosphates and stores them as PC, ready to be used again  
- 2 minutes for complete recovery, 30 seconds for half |
| Examples | - 100m sprint  
- Javelin  
- High jump |

Lactic acid system

<table>
<thead>
<tr>
<th>Source of Fuel</th>
<th>- Carbohydrates</th>
</tr>
</thead>
</table>
| Efficiency of ATP production | - Produces ATP at a fast rate  
- Can produce a lot of ATP |
| Duration | - 30 secs to 3 mins (depending on intensity) |
| Cause of Fatigue | - Build up of pyruvic acid in the muscle  
- Pyruvic acid = pyruvate and a hydrogen ion (H⁺)  
- Without oxygen the body converts the hydrogen ion to lactate |
<table>
<thead>
<tr>
<th>By-products</th>
<th>Pyruvic acid which is then converted to lactate</th>
</tr>
</thead>
</table>
| **Process + rate of recovery**  | Recovery occurs once fatigue is reached and there is no oxygen  
|                                  | In the presence of oxygen, pyruvic acid is converted to acetyl coenzyme A, which is then broken down through the Krebs cycle to produce more ATP  
|                                  | Recovery takes between 30 and 60 mins |
| **Examples**                    | 50m/100m Swim  
|                                  | 200m run |

### Aerobic energy system

| Source of Fuel        | Carbohydrates  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fat</td>
</tr>
<tr>
<td></td>
<td>Protein</td>
</tr>
</tbody>
</table>
| **Efficiency of ATP production** | Very efficient in producing ATP  
|                       | Production is very slow |
| **Duration**          | Over an hour, as long as fuel is present |
| **Cause of Fatigue**  | Depletion of fuel  
|                       | Hitting a wall |
| **By-products**       | Water         |
|                       | Carbon dioxide |
| **Process + rate of recovery** | Restoring fuel to pre exercise levels  
|                       | Takes 12 to 48 hours |
| **Examples**          | 1000m swim   
|                       | Marathon     |
|                       | Triathlon    |
Types of training and training methods

**Aerobic Training**
- Targets the aerobic system
- Improves delivery of oxygen and enhance its use
- Should be done at least 3 times a week
- Normally goes for 30 mins and at an intensity of 70%-80% Max heart rate
- It’s suited for all sports as it provides the base work for an athlete’s fitness
- Sports best suited for:
  - Marathons
  - Triathlons
  - Aussie Rules Football
- This type of training improves the body’s delivery of oxygen
- Improves the efficiency of waste removal from all energy systems

**Continuous or uniform**
- Training is completed at the same intensity for a specified amount of time, such as 30 min
- Examples:
  - Running on a track at the same speed or on a bike for the same intensity throughout the given time
- Continuous training is best suited for sports where the activity doesn’t change much throughout competition and tends to be repetitive:
  - Rowing
  - Marathon running
  - Distance swimming

**Fartlek**
- Meaning speed play in swedish
- Training is completed at varying intensities
- Example: a walk at 4km/h then to a run at 20km/h and slows down to 10km/h
- Each of the intensities can go for different durations or the same
- Fartlek is best suited for sports where there are many changes in intensity throughout:
  - Soccer
  - Outdoor cycling
  - Rugby league

**Aerobic/Long interval**
- A single activity is performed with specified changes in intensity at specific times or lengths within the session
- Example: 1500m at 80% then 400m at 40%, the set would then be repeated
→ Best suited for sports with extended periods of work, followed by a rest which require further exertion:
  • Basketball
  • Netball

**Circuit**
→ Various activities where one is completed for a set time before moving on to the next activity
→ Intensity can vary or stay the same
→ Best suits sports where the activities vary:
  • Triathlons
  • Ironman
  • Summer and winter quadrathlons

**Anaerobic training**
→ Specifically develops the 2 anaerobic systems and often develops power, strength and speed
→ Affects performance by increasing the body’s rate of dealing with pyruvic acid and removes lactate from the muscle - increases lactate inflection point
→ Allows higher intensity activities to be performed for longer

**Short interval/anaerobic**
→ single activity with specified changes in intensity at specific times or lengths within the session, similar to long interval training, however the intervals are shorter, hence the name
→ Example: 100m sprints followed by 100m jogs
→ Shorter interval training will work the lactic acid system while longer intervals will begin to work the alactacid system
→ Best suited for sports where frequent, high-intensity bursts are required with some rest in between:
  • Rugby league
  • Basketball
  • Netball

**Flexibility Training**
→ Aims to increase a joint’s ROM (range of motion)
→ Active ROM = Produced by the athlete, example; straight leg lift
→ Passive ROM = Produced by an external force, example; sit and reach
→ Affects performance by allowing athlete to execute skill with correct technique and preventing injury
→ Greater flexibility = less chance of injury
The immediate stretching during warm-up doesn’t prevent injury, however it is the more sustained training which can be done during warm-up which help prevent injury.

Static
- Muscle is stretched to a length which is uncomfortable but not painful and held for a given time
- Optimal time held is 30 to 60 secs
- Most suited for sports where the muscle is stretched for prolonged periods of time
- Examples:
  - Gymnastics
  - Acrobats
  - Diving

Ballistic
- Involves a bounce or swing
- Should only be performed by elite athletes
- Potential to cause injury
- Most suited for sports where there is a lot of bouncing of swinging movement:
- Examples:
  - Dance
  - Gymnastics
  - AFL

PNF
- Involves a static stretch followed by a contraction of the stretched muscle until the stretch is no longer felt, then a further lengthening of the muscle
- Best suited for sports where the joint is forcefully taken past its ROM
- Examples:
  - Rugby
  - Ice-hockey
  - American football

Dynamic
- When an athlete takes joint through its ROM to provide temporal stretch of the joint
- This type of movement stimulates mostly closely the movements in a majority of sports
- Suited for most sports as it replicates the movements used in performance
- Examples:
  - Dance
  - Rugby League
Strength training

- Training that aims to improve an athlete's strength
- This type of training causes large stress to the muscle which results in small tears in the muscle
- The body's response to this is to increase the size of the muscle
- Often involves:
  - Sets- How many times the exercise is repeated
  - Repetitions- How many times the set resistance is lifted
  - A set resistance- Eg. 20kg weight
  - A rest period between sets

Weight training

- Involves a certain weight to train against gravity to engage specific muscle groups
- Can use **fixed** and **free weights**
- **Free weights** often involve dumbbells, barbells and even the weight plate
- This type of training not only trains the major muscle groups but also smaller muscles
- **Fixed weights** involve the use of a machine which often has a pulley system
- An advantage of **fixed weights** is that the athlete has a chance to learn correct technique and experience equal resistance throughout the exercise
- Most suited to sports where large amounts of strength is required:
  - Rugby
  - Shot put
  - Wrestling

Elastic training

- Involves various forms of elastic and resistance to increase strength
- Intensity is limited
- Resistance increases as the elastic is stretched
- Highly portable - great for at home and personal trainers
- Often used in rehabilitation or for weaker muscles
- Best suited for sport which require the use of smaller muscles:
  - Arm wrestling
  - Darts
  - Archery

Hydraulic

- Involves use of machines which use water or air compression to provide resistance throughout the movement
The resistance increase with the speed of the movement
Best suited for sports that require fast movement through a resistance:
- Rugby league
- Swimming
- Boxing

Principles of training

**Progressive overload**
- When the workload for a training session increases gradually
- The increase of workload is usually done to maintain the same intensity as adaptations are made
- This can be used for *aerobic training*, the increase can be in the speed or duration during training
- It can also be used for *resistance training*, the increase can be in reps, sets, and resistance
- The best way to use progressive overload training is to increase the weight, this improves strength and develops recovery times and muscular endurance

**Specificity**
- Adaptations are made to the specific training
- It applies to:
  - Speed of training
  - Muscle group training
  - Movements of training
  - Energy systems used
- When applied to *aerobic* sports such as marathon running, training should involve running so the adaptations made will benefit performance
- For example; Continuous running at the speed needed during a marathon race
- When applied to *Resistance* training, trainer should try to use specific movements which are the same or similar to the sport and at a similar speed
- For example; A swimmer could use a lat pulldown to replicate the pulldown of swimming

**Reversibility**
- The fact that when training stops the adaptations made are lost
- This is generally at a similar speed to what gain is made
- The more adaptations are made, the more there is to lose
- Reversibility can be avoided by maintaining some level of training during off-season or when with injury
Aerobic training- reversibility can be seen 4 to 6 weeks after training stops, this can be avoided by maintaining through 2 sessions a week

Resistance training- Reversibility can be seen within 2 weeks, however this can be avoided with a weekly session of regular intensity as before

Variety

- Ensuring training sessions have a variety of training types, methods and exercises
- Important to prevent boredom and ensures overall development of fitness
- Aerobic - Involves changes to training method i.e fartlek, continuous, aerobic interval, also include how the exercise is completed for example 10km or bike or as a run or on treadmill or stairmaster
- Resistance - Would involve a mixture of free weights, fixed weights, hydraulic and elastic

Training thresholds

- Refer to the level of intensity which the body needs to be stressed to in order to react by causing an adaptation or improvement in performance
- Can be measured by intensity and be either MHR(maximum heart rate) or VO2 max
- Generally there are 2 thresholds; aerobic and anaerobic
- Anaerobic threshold is the intensity needed to improve VO2 max, this is normally between 65% and 70% MHR
- Similarly, aerobic threshold is the intensity needed to improve an athlete's aerobic performance, normally by increasing the removal of lactate, usually 80% and 85% MHR
- Aerobic training zone = intensities between the 2 thresholds, these are the intensities the athletes should train at in order to improve aerobic performance
- Resistance training usually involves the repetition max
- The threshold varies depending on the goal
- Studies show that maximal power and strength is gained through 1-6RM
- Between 8-12RM is best for muscle hypertrophy results
- 12-15RM is best for muscular endurance

Warm-up and Cool-down

- Warm-up - a process whereby the athlete goes through a series of exercises to prepare their body for comp or training
- Warm-up goes from lower intensity to higher intensity and from general to sport specific
- Increases heart rate, cardiac output, blood flow to muscles
- Causes liver to release glucose, opens muscle walls to absorb glucose better
→ Decreases risk of injury
→ **Cool-down** - essentially the opposite of warm-up
→ Goes from medium intensity movements to lower intensity movements
→ Goal: Allow the body to remove leftover lactate, pyruvic acid, water and carbon dioxide
→ Stretching during warm-up should be sport specific
→ Before **aerobic** training - the athlete should go for 10 min and aim for 70% MHR
→ Before **resistance** exercise - should go for 10 min and aim to increase blood flow to the group of muscles being used and prepare them for heavy lifting

**Physiological adaptations**

**Resting heart rate**
→ Number of times the heart beats at rest
→ Rest means the heart rate as soon as you wake up
→ RHR declines as a result of training, many athletes have RHRs as low as 40bpm
→ The physiological adaptation of a decreased heart rate decline happens as a number of other physiological adaptations allow it to do so
→ For example, stroke volume, the amount of blood pumped out per contraction increases
→ An increase in haemoglobin levels is also increased which results in more oxygen being transported through the body
→ Increase in stroke volume and haemoglobin levels means more oxygen travels through the body which means the heart doesn’t have to contract as frequently

**Stroke volume and cardiac output**
→ Responsible for blood flow around the body
→ Training results in an increase of stroke volume and cardiac output results in an increase in blood flow
→ This increases aerobic work zone and delays fatigue
→ Stroke volume = amount of blood pumped out per contraction of the heart through the left ventricle
→ Increase in stroke volume means the body pumps out the same amount of blood but with fewer contractions
→ Cardiac output is the amount of blood pumped out of the left ventricle per minute
→ Cardiac output is calculated by multiplying the stroke volume by the heart rate
→ Increase of stroke volume and cardiac output means the athlete can remove lactate and carbon dioxide faster and transport blood and the nutrients within it faster
Oxygen Uptake and Lung Capacity

- Work together to deliver oxygen to the blood
- Oxygen uptake refers to the body’s ability to absorb oxygen through the lungs and into the blood which is then transferred to the muscle and this is used for energy production
- Increase in oxygen uptake is due to an increase in haemoglobin and myoglobin
- Myoglobin is responsible for transporting oxygen out of the blood and in the cell, and taking it where it is needed for ATP production
- Haemoglobin is responsible for absorbing oxygen from the lungs and transporting it through the blood
- More haemoglobin = more oxygen per ml of blood

Haemoglobin level

- The molecule that binds with oxygen and transports it throughout the body in blood
- It’s responsible for giving blood its red appearance
- Aerobic training stimulates an increase in haemoglobin production
- Haemoglobin increase improves the body’s transportation of oxygen where it is needed for energy production
- This energy production is done through the aerobic system, producing ATP for movement
- An increased use of the aerobic system means there is a delay on the need to rely on anaerobic systems and helps avoid fatigue and acid build up in the muscles
- Improves performance by allowing faster recovery from acid build-up in the body

Muscular Hypertrophy

- The increase in muscle size due to an increase in myofibrils(tissue component of a cell responsible for contraction in the muscle)
- Muscular hypertrophy results in an increase in muscular strength and endurance
- This improves performance by allowing the athlete to exert greater force and repeat movements more often
- Very beneficial for sports which require strength, power and/or muscular endurance:
  - Shot put
  - Sprinting
  - Rugby
  - AFL
  - Martial Arts
Effects on fast twitch and slow twitch muscles

- Training has an array of effects on slow and fast twitch muscles
- These effects are specific to the type of training
- Some adaptations are similar:
  - Increased capillary density - increases delivery of blood to muscle cells
  - Increase in mitochondria to muscle cell - increases ATP production from the aerobic energy system

**Fast twitch muscles**

- Used for strength, power and movements of a high intensity and short duration
- Linked with the two anaerobic systems - ATP/PC and Alactacid system
- Adaptations include increased anaerobic enzymes for glycolysis, increased PC stores, hypertrophy and increased removal of lactate, which helps reduce the acidic levels in the muscle

**Slow twitch muscles**

- Used for endurance movements and exercise
- The adaptations within these muscles assist in the use of the aerobic energy system and include increased: mitochondria, capillary density, aerobic enzymes needed for ATP production in the aerobic energy system, glycogen and fat stores, and myoglobin
- these adaptations help in the delivery of ATP through the aerobic energy system
FQ2 How can psychology affect performance?

Motivation

→ The driving force behind an athlete
→ A motivated athlete is more likely to succeed

Negative and positive

→ Motivation can be positive and negative - this is often specific to the athlete and what they define to be positive and negative
→ Positive - a reward for good performance
→ Athletes who use motivation are more likely to take more risks, be creative and perform under pressure
→ Negative - Punishment for poor performance
→ Positive motivation works better than negative especially when used during training

Intrinsic and extrinsic

→ Intrinsic - motivation comes from the athlete, best for producing long term results
→ Extrinsic - comes from an external source including coach, money, family, fans, friends
→ Intrinsic is best for producing long term results as the athlete is their own motivator

Anxiety and arousal

State and trait anxiety

→ Psychological responses akin to nervousness
→ Anxiety stimulate flight or fight response
→ Trait anxiety is the anxiety which is characteristic of a person, it’s part who that person is
→ State anxiety is the anxiety which is brought on by a particular situation, it may rise when the athlete is placed under pressure

Sources of stress

→ Varies for each person and can affect performance
→ Past experience can make a situation more stressful:
  ◆ EG. An athlete who was injured will be more stressed the next time they perform
→ Support provided can also affect stress levels:
  ◆ EG. An athlete form a single parent family may be more stressed than that of a family with 2 parents
Expectations can also affect the stress of an athlete:
- EG. Athletes who have performed well will put more stress on themselves to perform the same or better the next time
- Stress is more likely when the athlete is under pressure:
  - Pressure can come from themselves, coach, teammates, fans, friends, family
- Those with a confident, more positive attitude on life tend to deal with stress better than those who don’t

**Optimal Arousal**
- Required for athletes to perform at their best
- Different to anxiety as it is a physiological response similar to getting excited before an event
- Getting ready for action, increases heart rate, blood flow and is heightened by neural activity
- Can be positive or negative depending on type and level of performance
- High intensity contact sports have a higher optimal arousal than a low intensity non-contact sport, meaning a rugby league player needs a higher optimal arousal than an archer
- The more difficult the skill the lower the arousal needed, lower the difficulty of the skill the higher the arousal
- Under arousal is characterised by lethargy and lack of motivation
- Over arousal is characterised the inability to concentrate

**Psychological strategies to enhance performance**

**Concentration and attention skills (focusing)**
- Refers to an athlete's focus on doing rather than how to do
- Improved by blocking out distractions and using positive self talk
- The better the focus, the better the outcome should be
- Level of concentration needed is specific to the sport
- More difficult skills needs a much higher focus than lower difficulty skills
- Longer duration sports require more sustained focus than shorter duration sports
- Attention skills needs to be able to vary during competition

**Mental rehearsal**
- Refers to when the athlete pictures or visualises the skill in the mind
- It involves the athlete performing the skill perfectly while ensuring they imagine the complete scenario
- Often done just before performance
- Often sick or injured athletes use visualisation
- Mental rehearsal can help maintain current levels of skill execution, though it will not increase the level
→ Improves performance by: optimising arousal, and improving concentration.
→ Must be realistic, only have successful performances, and be rehearsed from the athlete’ perspective while completing the skill or performance.

**Relaxation techniques**

→ Often used to reduce anxiety and arousal
→ Centred breathing:
  ◆ Focusses on lengthening breathing and reducing respiratory and heart rate
  ◆ Often used in yoga
  ◆ Releases anxiety and reduces arousal levels
→ Progressive muscular relaxation:
  ◆ When the athlete moves from one end of the body to the other contracting then relaxing their muscles
  ◆ Normally begins at the toes and slowly progresses to the head
→ Listening to music:
  ◆ Can relax and calm an athlete
  ◆ Can also psych them up
  ◆ Can increase or decrease arousal levels depending on the music being listened to
→ Mental relaxation:
  ◆ Reducing respiratory rate
  ◆ Emptying mind and thoughts in order to improve focus

**Goal setting**

→ Improves motivation and measure progress
→ Can be long or short term
→ Setting long-term goals gives major purpose to training
→ Short-term goals provide benchmarks and progress towards long term goals
→ Performance goals relate directly to performance:
  ◆ EG. A swimmer aims to break the PB
→ Other goals include behaviour, this can impact on motivation, training output, and performance
→ Goal setting needs the goals to be specific, measurable, attainable, relevant, and time specific

**Case studies from different sports**

Case 1 - Michael Jordan

→ His key to success is visualising actions
→ Example: he performs a free throw with his eyes close by visualising
Case 2 - Johnny Wilkinson

➔ He attributes his success to creating pressure during training, and becoming accustomed to the pressure
➔ He tries not to overthink things in the moment and getting the little things right

Case 2 - Michael Phelps

➔ Phelps uses the pressure and criticism or trash talk as ammunition to motivate him to perform
➔ Phelps uses visualisation well, planning for various scenarios so that he knows how to respond to them
➔ This increases his confidence and improves his chances of performing at his best
**FQ3 How can nutrition and recovery strategies affect performance?**

**Nutritional considerations**

**Pre-performance**
- Should be well hydrated
- They should drink 2-3L the day before comp, 500ml morning of the comp, and 250ml half an hour before
- Should not try anything new
- They should eat a familiar form of carbs, approx 100g 3-4 hours before comp
- They can have a small snack such as a muesli bar 1-2 hours before
- **Carbohydrate loading** - a process used by athletes to ensure their glycogen stores are at maximum
  - They achieve this by eating large amounts of complex carbohydrates in the week before the competition
  - Carb loading benefits performance that would normally deplete glycogen stores and delays the onset of fatigue caused by a greater reliance on fat to produce ATP in the aerobic energy system
- Allows for higher intensity aerobic exercise to be maintained for longer
- Only benefits sports that last longer than 60 mins
- Soccer, rugby, afl

**During performance**
- Maintain hydration and for extend periods of exercise, replenish blood glucose levels
- Hydration aids performance, dehydration hinders it by decreasing the body’s ability to focus and function
- It is recommended to drink 1L per hour of activity, a marathon runner may drink every 5 mins while a rugby player may drink every 10
- Can also consume sugars by drinking PowerAde, Lucozade or GatorAde
- These drinks add glucose to which is then transported to the muscle for energy system use
- Sugar consumption during performance also allows for higher intensities to be maintained for longer
- Salts help the body contain fluid and replace the salt lost through sweat
- This requires the body to filter out through the kidneys and not the bladder
**Post performance**

- Goal is to replace the nutrients which the body lost in performance for repair and recovery
- The nutrients needed are:
  - Water
  - Carbohydrates
  - Protein
- Sweat rates vary between athletes, athletes should know their sweat rate in order to replace their fluids
- Weight post-performance - their weight pre-performance - the amount of fluids they consume
- They should consume all fluids lost within the first hour post comp
- Carbohydrates need to be consumed in order to restore glycogen levels
- A meal of complex carbs should be consumed 1-2 hours post performance
- Protein should also be consumed 1-2 hours after, particularly for power sports where tissue is frequently lost
- Sleep is also the BEST strategy for recovery

**Supplementation**

**Vitamins and Minerals**

- All vitamins and minerals are needed for properly bodily function, few are needed for performance
- Most important are B, D, C, E and beta-carotene:
  - B - Optimise energy production, building and repair of muscle tissue, red blood count
  - D - Adequate calcium consumption
  - C, E, beta-carotene(antioxidants) - help protect cell membranes from oxidative damage
- Minerals vital for performance:
  - Iron - Most important as it give haemoglobin and myoglobin its shape in order to transport oxygen around the body
  - Calcium - Bone repair, growth, and development
  - Zinc - growth and repair of muscle tissue
  - Magnesium - required for muscular contraction and plays a role in glycolysis
  - Sodium, chloride and potassium - neural transmission
**Protein**
- Refers to the chain of amino acids which form the building blocks for all cells
- Important for muscular growth and repair
- Can be used for energy
- Recommended that people consume 0.8g protein per Kg of body weight
- When resistance training is being undertaken it is recommended to take 1.2-1.8g per Kg
- Supplementation is not required for most western athletes
- Vegans and vegetarians can consume their protein through beans, nuts and legumes
- Supplementation can be taken to better improve the protein consumption
- Protein consumed within an hour of training can help recovery and increase hypertrophy

**Caffeine**
- Caffeine’s main benefit is blocking adenosine in the brain
- Improves the athlete’s perception of fatigue, allowing for greater performance as the athlete can go harder, for longer
- The benefits are almost immediate
- It can be consumed before a short event or during a longer event
- It is a stimulant which means it also speeds up the nervous system
- This can be useful in quick-decision making sports
- Caffeine is a diuretic which means it removes water from the body and in an endurance event this can become fatal
- If an athlete uses caffeine they should consume greater amounts of fluid

**Creatine**
- Creatine is an organic acid and is not an essential nutrient for humans
- Could increase PC stores and enable the alactacid system to be used longer and recover faster
- Theoretically, this would maximise the use of the energy system at maximal power
- The major benefit would come with a faster recovery system
- Increase in PC would allow for faster recovery between sets
- Studies have shown an increase in hypertrophy when taking creatine supplements
- Shown to increase body mass due to fluid retention in order to store extra creatine
- Quality varies from product to product, practitioner supplementation works better than over-the-counter
Creatine does provide some benefits, however it can be easily sourced through diet:

- Eating meat

It can cause short-term side-effects such as nausea, hypertension, and cramps.
FQ4) How does the acquisition of skill affect performance?

Stages of skill acquisition

Cognitive
- Athlete needs to think about their body position, which muscles are contracting and what the overall movement needs to look like
- Large frequent errors, jerky robotic movement
- May miss the ball when attempting to kick or kicking it backwards
- Coaches need to give plenty of feedback and demonstrations, may use videos and other visual aids
- Often break down skills into sub skills in order to learn the overall movement
- Frequent, short exposure is best for the growth of this skill
- 20-40 min 2-5 times a week
- Distributed part practice is best for this stage

Associative
- Progressed to thinking about how they do the skill
- No longer about body position but where they are hitting the ball
- Begin to think about the end result
- Can begin to provide some of their own feedback
- Still benefit from immediate feedback from the coach
- Can adjust technique and increase complexity of the movement
- Needs practice that is whole or normally massed as they will get bored with distributed practice
- Often lasts a long time and some athletes never leave this stage

Autonomous
- The athlete no longer thinks about the skill
- Movement comes naturally
- Athlete can focus on other aspects of comp
- Knows what the movement feels like and can provide their own feedback, feedback from coach may still benefit
- Can perform the skill under various circumstances
- The mastery stage, characteristics of skilled performers; kinaesthetic sense, good anticipation, consistency of performance, sound technique
- Can correct movements midway through performance
- Not reached by all athletes
- Elite athletes have usually reached this stage
Characteristics of the learner

**Personality**

- How someone thinks, behaves and feels
- Behaviour greatly influences skill acquisition
- Someone with good work ethic and punctuality will develop a skill faster than someone who doesn’t have these traits
- Skill acquisition require hard work and dedication
- If someone has undesirable traits such as negative thinking this will diminish the ability to develop skills
- Positive talk and self-confidence will help skill acquisition
- How an athlete feels will also affect their skill acquisition
- Energetic and focused people are more likely to succeed than those whose are sluggish and tired
- Desirable traits include:
  - Determination
  - Positive attitude
  - Dedication
  - Cooperation
  - Patience
  - Willingness to try something new
- The desirable personality traits help athletes not to get frustrated when making errors and receiving feedback

**Heredity**

- Includes factors which are part of the genetic inheritance of an athlete
- Athletes can perform well in a sport while they may not necessarily be best suited for it

**Gender**

- Affects levels of hormones, in particular testosterone which affects the growth of muscle
- Males tend to be stronger, muscular and more powerful than females
- Gender tends not to make effect on competition as they are gender specific
- It does affect performance however, as males tend to perform better in sports requiring speed power and strength

**Race**

- Particular races can have specific genes which make them more suited to specific sports
- Often, dark ethnic groups tend to have more fast twitch muscle fibres and are taller and lighter than other races (not always the case)
Example, domination of dark people in track races
Suited to sports such as distance running, basketball, 100m finals
Caucasian ethnic groups tend to be more suited for sports such as swimming and hockey
Can also be a product of social upbringing

**Muscle type**

- Heredity and cannot be changed
- The relative balance or percentage of muscle fibres will make an athlete more suited to specific sports
- High levels of type II, fast twitch are more suited to:
  - 100m Sprint
  - Rugby league
  - Shot-put
- High levels of type I, slow twitch muscles are more suited to:
  - Marathon running
  - Triathlons
  - Cross country skiing
- Equal levels of both are most suited to:
  - Soccer
  - Australian rules football

**Somatotype**

- Endomorphs - carry more weight, tend to hold weight lower, have advantages in sports such as Rugby Union, American Football
- Mesomorphs - Very muscular, low body fat, best suited to Australian Rules Football, bodybuilding, rowing
- Ectomorphs - Skinny, best suited for sports such as distance running, high jump, horse racing
- Tall athletes tend to perform better in sports such as basketball, netball, or volleyball
- Shorter athletes tend to perform better in sports such as horse racing, gymnastics, and bike riding

**Confidence**

- Belief in one’s own ability and positively affects skill acquisition
- Confidence grows with success
- Important for coaches to provide opportunities for success early in order for the athlete to grow confidence in their ability to perform well
- Previous experience will also affect an athlete’s confidence
- Having similar skills will help the athlete feel more confident in learning the newer skill
→ Coach should progress from easier skills to harder skills
→ If skills are not learnt and frequent failures occur the athlete’s confidence will decrease
→ Over confidence results in poor skill acquisition, they may move on to a harder skill when they are not ready to do so

Prior-experience
→ The transfer of skills from one context to another allowing the athlete to learn new similar skill than those with no prior experience
→ Can be lateral or vertical
→ Lateral - Easy, the transfer of a similar skill from one context to another, eg tackle in rugby union to tackle in rugby league
→ Vertical - Transfer of a lower order skill to a higher order skill, eg one handed cartwheel to a barani in gymnastics
→ Jarryd Hayne is an example of prior experience, he used his previous experience in Rugby league to be able to transfer to American football

Ability
→ Ease of performing movements and performances
→ Fluid movements and accuracy of skill
→ Used to describe people who are skilled in different areas
→ Most common used term ‘natural talent’
→ An athlete with a greater ability will learn and process new skills faster than someone of a lower ability
→ Often a combination of characteristics in an athlete
→ Includes, perception or ability to read a game, reaction time, intelligence

The Learning Environment

Nature of the skill
→ Skill can be open/closed, gross/fine, discrete/serial/continuous, self/externally paced
→ Open skill - Performed in a constantly changing environment, rugby league
→ Closed skill - same conditions every time, swimming
→ Gross skill - Uses large muscle groups, running
→ Fine skill - Uses smaller, isolated muscles, archery
→ Discrete skill - Clear beginning and end, flip in gymnastics
→ Serial skill - Separate number of smaller skills combined to create a larger, more complex skill, dribbling in basketball
→ Continuous skill - Repeats a specific movement, running
→ Self-paced - Timing and speed determined by the performer, tennis serve
→ **Externally paced** - Timing and speed determined by external factors such as music and opposing players, rhythmic gymnastics

**Performance elements**

**Decision making**

→ Refers to the various decisions made by an athlete
→ Eg. Where to hit the ball, when to pass, who to pass to
→ Can be improved by demonstrations, good-decision making, practicing game like scenarios, exploring various scenarios
→ More opportunities to make decisions = getting better at making decisions

**Strategic and tactical movement (strategy)**

→ The overall method used to achieve the goal
→ Comes through technical efficiency, understanding the game, good execution
→ Players with good technical skills are more likely to perform the movement with success
→ The strategy/tactic must be practiced in order to be successful when performed under pressure
→ Players who understand how the game works will be able to adjust the strategy in order to succeed

**Practice methods**

→ Can be massed/distributed, whole/part
→ **Massed** - Continuous practice session, with smaller rest periods, works well for more skilled athletes, suits skills that are frequently used in performance, eg. passing in rugby league
→ **Distributed** - Short periods of practice with longer breaks between skilled rehearsal, often used for less skilled athletes, helpful in teaching boring skills such as passing in basketball
→ **Whole** - Skill is practiced in its entirety, often used for discrete and continuous skills, suited for sports such as swimming
→ **Part** - Skill is broken down into smaller parts which are practiced in isolation before being performed all together, often used for teaching serial skills, eg. Basketball layup

**Feedback**

→ Important for the skill acquisition of the athlete
→ Can be internal/external, concurrent/delayed
→ **Internal** - Comes from the performer, how the movement felt, relies of proprioception, eg. football player not feeling like they connected with the ball correctly
→ **External** - Comes from outside the body, includes coach, sounds and videos.
→ **Concurrent** - Occurs during the execution of a skill, eg. coach stopping athlete mid swing to change position before a serve in tennis

→ **Delayed** - Feedback is given after the skill is executed, eg. video analysis of a swimmer watching their dive technique.

→ **Knowledge of results** - feedback that provides info of the outcome such as a dropping time in swimming.

→ **Knowledge of performance** - Feedback which provides info on the process of movement, normally provided externally, eg, coach giving advice on how to improve body position in order to dive more efficiently in swimming, changing leg positions or being able to push more powerfully off the block by crouching slightly lower.

### Assessment of Skill and Performance

#### Characteristics of skilled performers

**Kinaesthetic sense**

→ Refers to a skilled performers proprioception

→ Relies on various sensors of muscles and other organs which provide information on body position and movement without having to see it

→ Skilled performers can correct movement mid-performance

→ Develops as a direct result of practice, results in muscle-memory

→ Basketball player adjusting shot after being fouled

**Anticipation**

→ Ability to read the play, the opponent and respond accordingly

→ Good anticipation comes from being able to read an opponent’s body movement and being familiar with their preference of shot

→ Eg, tennis player anticipates a backhand down the line which gives them time to cover the shot

**Consistency**

→ Repeating good performances

→ The athlete is continually performing well

**Technique**

→ The technical aspects of execution

→ Skilled performers have good execution of the skill

→ This saves energy and provides more consistency in results, holds up better under pressure, provides less chance of injury

→ Vital in sports such as swimming, as correct technique help generate more power and saves energy for later on in the performance

→ Particularly important for long distance and endurance events
Objective and Subjective Performance Measures

- **Objective** - Performance is measured independent of the observer, meaning, that it does not rely solely on the observer
- Eg, they can use a stopwatch, measuring tape, or record of goals, an established criteria
- **Subjective** - Performance is measured dependent on the observer
- Based on the opinions, feelings, and general impressions of the observer
- Sports which are more subjective are gymnastics, dance, and diving

Validity and reliability of tests

- **Validity** - Refers to a test's ability to measure what it is supposed to measure
- Beep test is meant to measure an athlete’s cardiovascular endurance, it’s valid as it give an accurate prediction of an athlete’s VO2 max
- Validity is enhanced if the known good performers perform better than the known bad performers
- **Reliability** - Refers to the test’s consistency
- A shuttle run is reliable if the athlete is tested under the same conditions each time
- Tests that are more valid and reliable tend to be more objective

Personal vs. Prescribed judging criteria

Personal

- judged based on the presuppositions brought to the performance by the judge and are subjective
- Includes judges expectations, and preconceived ideas
- Often used by coaches and crowds
- More suited to appreciation rather than judgements of performance quality

Prescribed

- Established criteria used to judge a performance
- Often comes in the form of a checklist
- Helps objectify subjective measurements
- The more detailed the criteria and stringent judge, the better the objectivity and reliability of the criteria
Sports Medicine
FQ1. How are sports injuries classified and managed?

Ways to classify sports injuries

Direct and indirect

➔ Any type of injury to body tissue other than bone or teeth
➔ Include tears, sprains, strains
➔ Stimulate the inflammatory response which can cause further damage if not treated by ricer

Tears, sprains and contusions

➔ Strain - Occurs to a muscle, normally caused by internal forces, poo technique and overtraining:
  ◆ Grade 1 - is a small tear to the muscle.
  ◆ Grade 2 - is a much larger tear around 50% or more torn.
  ◆ Grade 3 - refers to a complete tear, so that surgery is needed to join the muscle back together.

➔ Sprain - occurs to a ligament, often caused by an external force, always caused by a joint being moved in a direction which it is not supposed to, grading is the same as strain

➔ Contusion - AKA bruise, when the capillaries are ruptured which causes internal bleeding, normally caused by an external force to the soft tissue

Skin abrasions, lacerations, blisters

➔ Skin abrasion - A scraping of wearing away of skin, aka graze, not usually deep. Common in all sports but particularly those which involve constant falling or tackling. Treatment:
  ◆ Clean the wound,
  ◆ Wash and disinfect it,
  ◆ Cover it in non-stick dressing.

➔ Laceration - A deep cut or tear in the skin which has resulted from contact with a sharp device. Often result after a head-clash or contact with other sport specific equipment. Treatment:
  ◆ Manage blood loss- this is top priority
  ◆ Apply pressure to the area
  ◆ Depending on severity medication, stitches or even surgery may be needed
Blisters - Caused by friction or heat which causes a buildup of serum under the skin. Athletes often get blisters from their shoes. Most often caused by friction from a tennis racquet or soccer boot. Treatment:
- Cover with padding, often a band-aid
- Remove object causing friction
- Do not pop it

Inflammatory response

Phase 1 Acute inflammation:
- Fast and painful
- Vasodilation of blood vessels and transfer of fluid to affect area
- Athlete loses function due to large swelling
- New blood vessels begin to develop in the affected area
- Lasts 48-72 hours
- RICER is very important in this stage

Phase 2 Repair inflammation:
- Body begins to fix injured site
- Leukocytes (white blood cells) clean up debris from the injury so new tissue can be formed
- Often produces scar tissue which needs to be minimised for proper healing (scar tissue is weaker than normal tissue)
- Last 3 days to 6 weeks

Phase 3 Remodelling inflammation:
- Continues to rebuild injured area
- More scar tissue produced, however, new functional body tissue is also produced
- More strengthened and developed tissue can be produced and depends if proper treatment is sought from professionals
- Balance of exercise and rest is needed
- Too much exercise will result in further injury, not enough will result in more scar tissue
- Can last many months

Management of soft tissue injuries

RICER - Rest, Ice, Compression, Elevation, Referral

Rest - Stop playing the sport or doing the exercise when there is injury, helps prevent further injury

Ice - Should be applied as soon as possible, can be in the form of ice, ice pack, cryotherapy. Should be applied over the first 48 hours, eg. 20 min on 20 min off. Helps reduce pain, decreases swelling and speeds up recovery
Compression - Helps reduce or control inflammatory response and stabilise joint. Involves application of a bandage or garment. Helps force fluid away. Helps reduce movement, limiti injury and provide support for the injured area

Elevation - Elevation of soft tissue injuries must be above the heart, eg. injured elbow must be rested on chest as the person lies down. Only works if injury is above the heart. Gravity assists move the blood and other fluid back towards the heart which reduces/control inflammatory response

Referral - Refer the athlete to a health or medical professional. Allows for proper diagnosis and treatment of the injury. Will help improve recovery.

Hard tissue injuries

Fractures

Can be closed/open/complicated and complete/comminuted/incomplete

Closed - Remains inside the body and does not pierce the skin

Open - Pierces the skin and bone can be seen

Complicated - Where the bone cause further damage to major nerves, organs or blood vessels. Can be life threatening and needs immediate attention

Complete - Breaks clean through the bone

Comminuted - Fractures result in more than 2 parts of the bone

Incomplete - Does not break the whole way through the bone

Signs and symptoms:

- Hearing/feeling a break
- Pain
- Redness
- Deformity
- Bone protruding from the skin

Management:

- DRSABCD
- Control bleeding
- Cover wounds
- Check for other injuries
- Casualty remain still
- Immobilise fracture
- Handle gently
- Seek medical attention

Dislocation

- Abnormal separation of a joint between 2 bones
- Causes much damage to surrounding soft tissue, sprains and strains
- Often cause by excessive force and can be direct or indirect
Joints that are frequently dislocated:

- Fingers
- Shoulders
- Hip

Signs and symptoms:

- Pain
- Swelling
- Bruising
- Deformity

Management:

- DRSABCD
  - Do not move the joint
  - Check for circulation past the joint
  - Support the area
  - Apply ice packs

Assessment of injuries

**TOTAPS**

- **Talk** - Talk to the athlete to find out as much as possible about the injury
- **Observe** - Observe the injured area, compare limbs on both sides of the body to determine normality or abnormality.
- **Touch** - Touch the casualty, look for where the pain begins along the limb, feel for abnormalities.
- **Active movement** - Ask the casualty to move the injured area, look for to see if the athlete has a full ROM and if the movement was pain free.
- **Passive movement** - When the first-aider moves the injured area for the athlete. Involves pulling or pushing the joint, testing for ligament and tendon stability within the joint.
- **Skills test** - If the athlete makes it to the skills test, the injury is not likely to be a serious one. Used to assess the injury if the injury can withstand the forces involved in the sport. Progresses from low impact to higher impact movements.
FQ2. How does sports medicine address the demands of specific athletes?

Children and young athletes

Medical conditions

Asthma

IMPLICATIONS:

→ Can be induced by exercise
→ More likely to be triggered in longer duration of activity than short bursts of activity
→ Asthma attack is more due to the intensity of an exercise
→ Should not stop a child or young athlete from participating in sport

MANAGEMENT:

→ All athletes with asthma should have an asthma management plan
→ Should be provided to those supervising
→ Should also have a ventolin puffer with them
→ Supervising adult should also know how to address an asthma attack
→ Can possibly be prevented through proper warm-up and cool-down

Diabetes

IMPLICATIONS:

→ Diabetes is related to the glucose levels in blood
→ It has implications as glucose is vital for ATP production
→ When a child or young athlete participates in sports, the muscle cells are opened to allow glucose transport without the need for insulin, results in a decrease of blood glucose which can be problematic for children
→ Glucose too low = hypoglycemic, glucose too high = hyperglycemic
→ Important to monitor glucose levels
→ Important not to have an inject before or after sport and eat meals to balance glucose levels

MANAGEMENT:

→ Often managed through insulin injections and sugary food
→ Children and young athletes with this condition should participate in regular activity as it helps prevent a hyperglycemic episode
→ Should have access to food and sugary drinks during participation
→ Those supervising should know how to manage hyperglycemic and hypoglycemic episodes
Epilepsy
IMPLICATIONS:
→ Should not stop athletes from participation in sport
→ Many medications reduce the likelihood of seizures occurring
→ Should not limit the choices in sports participation but triggers should be considered
→ Those with epilepsy should ensure that they have someone to supervise at all times, particularly with sports such as water sports, bike riding and horse riding

MANAGEMENT:
→ Medication
→ Should be supervised by an adult who knows how to properly manage seizures

Overuse injuries
→ Common in children and young athletes
→ Often as a result of placing the body under repetitive stress
→ Can be caused by:
  ◆ Poor recovery
  ◆ Poor technique
  ◆ Ill-fitted protective equipment
→ Common overuse injuries in children:
  ◆ Shin splints
  ◆ Stress fractures
  ◆ Tendonitis

Implications
→ Overuse injuries affect the way young athletes participate in sport
→ Children are encouraged to engage in a variety of sports at a young age to help prevent overuse injuries
→ Helps ensure holistic growth and balance is achieved
→ Ensure they have appropriate rest periods after training
→ Full recovery for both minor and major injuries
→ Coaches and trainers should be qualified to work with children and young athletes

Management
→ Management should be supervised by a qualified health professional
→ Often done in conjunction with a GP
→ Management is usually for the athlete to stop the movement that cause the injury and rest until it is completely healed
Thermoregulation
➔ Refers to the maintenance of stable core body temperature
➔ Vital for an athletes to avoid hypothermia, and hyperthermia
➔ A child’s body will overheat 3-5 times faster than an adult
➔ Thermoregulation is not as developed in children as adults
➔ Children and young athletes have underdeveloped sweat glands - they sweat less and are more affected by the climatic conditions

Considerations
➔ Children and young athletes should monitor their body temperature closely, particularly with sports which are played in heat or cold
➔ Considerations include:
   ◆ Appropriate clothing
   ◆ Time of day the sport is played
   ◆ Availability of shade
   ◆ Access to fluid
➔ Examples:
   ◆ For a game of soccer on a hot day
      ● Game to be played in quarters
      ● Can be played early in the morning to avoid heat of the day
      ● Children should have sunscreen
   ◆ Children are snowboarding:
      ● Wearing warm clothes
      ● Have an adequate warm-up

Management
➔ Hyperthermia (heat induced):
   ◆ Lie person in a cool place with circulating air
   ◆ Remove unnecessary clothing
   ◆ Sponge with cool water
   ◆ Give cool water
   ◆ Seek medical aid
➔ Heatstroke:
   ◆ DRSABCD
   ◆ Lie person in cool place w circulating air
   ◆ Remove unnecessary clothing
   ◆ Apply packs of cold ice
   ◆ Cover with wet sheet
   ◆ Call 000
   ◆ Give cool water
Hypothermia (cool induced):

- DRSABCD
- Lie in warm dry place
- Avoid wind, rain, sleet, cold, wet grounds
- Remove wet clothing
- Warm with blanket
- Call 000

**Appropriateness of resistance training**

- Is no more dangerous for children and young athletes than other forms of training
- Will not stunt the growth of young athletes
- When training is done correct and under supervision it will not break the growth plate of an athlete

**Implications**

- Is appropriate when supervision is provided and guidelines are followed
- Provides increases in muscular size, strength, power and speed
- Increase bone strength and prevents injury
- As set by the Australian Strength and Conditioning association:
  - Children should be mature enough to follow direction and appreciate the risks and benefits, usually age 6
  - Technique should be taught and mastered before increasing resistance
  - Should be done 2-3 times a week

**Management**

- Should be managed by a trained professional
- Trainers should follow appropriate guidelines
- If injury occurs proper treatment and follow up should be sought

**Adult and aged athletes**

**Heart conditions**

- A term used to refer to a number of conditions:
  - High blood pressure
  - CVD
  - Angina
  - Survivors of heart attacks
  - Heart valve disease (leaky valve)
- Generally on the decrease and still prevalent
- Heart conditions impact an athlete’s choice of sport
- Useful form of treatment for most underlying causes of heart conditions
- Can still adapt to exercise, improves heart and circulatory health
Beginning a sport with any heart condition should be given medical clearance first.

Sport participation options for adults and aged athletes

- Cannot participate in sports which are high intensity
- It is recommended that they do lower intensity sports, such as:
  - Golf
  - Walking
  - Aerobics
  - Aqua aerobic
  - Tennis
  - Dancing
  - Brisk walks
- Will be beneficial for the athlete and allow them to socialise and build relationships

Fractures and bone density

- Poor bone density can lead to osteoporosis
- Predisposition to poor bone health include:
  - Genetics
  - Female
  - Early menopause
  - Small size
  - Inadequate diet
- Greatly influenced by diet
- Adults and aged athletes should eat plenty of fruit and vegetables in order to receive adequate nutrition
- Key nutrients for bone health:
  - Vitamin D
  - Calcium
  - Sodium
  - Phosphorus
  - Protein

Sports participation for athletes with fractures and bone density issues

- Limited choices in sports
- Should avoid contact sports
- Possible options:
  - Cycling
  - Walking
  - Golf
  - Tennis
Swimming

- Particular sports will benefit bone density, such as walking and running as they are weight bearing exercises
- The stress placed on the bones should be enough to cause an adaptation not a break

**Flexibility and joint mobility**

- Refers to the joint’s ability to go through its ROM
- Flexibility = ROM across a range of joints, joint mobility = ROM at a specific joint
- Doesn’t change with age but does change with the amount of use
- When athletes age they tend to decrease use of their joints and therefore their flexibility and joint mobility decreases

**Sports participation options for athletes with poor flexibility and joint mobility**

- Poor flexibility and joint mobility is often a result of a decrease in physical activity
- Joints will adapt to increased use
- They can be increased through slowly increasing the ROM during regular exercise
- Particular sports which require good flexibility include:
  - Dance
  - Gymnastics
  - Martial arts
- Not limited in choice of sport, but should gradually build up the intensity

**Female athletes**

**Eating disorders**

- Detrimental to all athletes but female athletes in particular
- Often under pressure to fit social standards of physique and beauty
- This can result in eating disorders such as anorexia and bulimia
- Decreases nutrient intake and negatively affects performance
- Low energy intake and nutrition affects menstruation and skeletal health
- It affects the female’s ability to adapt to training and perform well
- Can cause iron deficiency
- Iron is one of the key nutrients for sports performance
- It is required to help haemoglobin take the right shape for oxygen transport
- Less iron = less oxygen
- Causes fatigue due to greater reliance on anaerobic systems
- Other important nutrients include, calcium, magnesium, potassium, and sodium
> Calcium and sodium are particularly important for bone density, which is also particularly important for female athletes as they usually have thinner bones than men
> If oestrogen levels drop so does bone density
> Women’s oestrogen level drops when they hit menopause
> Many athletes increase in muscle mass and decrease in fat which can be a sign of low oestrogen and higher testosterone
> Female athletes often do weight bearing exercises and resistance training
> If an athlete combines training with an eating disorder she may not have the nutrients to build stronger bones
> Affects energy and nutrition available to the athlete
> Has a great negative effect on performance

**Iron deficiency**
> Results from 2 things, menstruation and lack of iron in the diet
> Anemia is much more common in females
> Menstruation is influenced by energy and nutrition
> Iron is a readily available nutrient found in red meat and many veg
> Consuming enough iron will mean menstruation is not a problem
> Iron is needed to allow haemoglobin to bind with oxygen and transport it around the body
> Oxygen is relied on in the aerobic system and will speed up recovery in the lactic acid system
> Female athletes with low iron will have a poor oxygen delivery and therefore have a higher reliance on the anaerobic system
> Training will not be able to be sustained for long durations
> Athlete will feel lethargic

**Bone Density**
> Poor bone density is an indicator of osteoporosis
> Is a particular issue in female athletes when oestrogen levels drop
> Calcium and vitamin D are vital
> Calcium needed for bone development and vitamin D helps to absorb the calcium
> More likely in females who have eating disorders or have gone through menopause
> Decrease in density causes fragile bones
> High intensity sports place the athlete at more risk of fracture especially when density is low
Pregnancy

→ Female athletes can still participate in their sport while pregnant
→ Generally, a female can continue her sport that she already did before she was pregnant
→ They can also start a sport while they are pregnant, however they should be cautious and have proper guidance
→ Pregnancy increases relaxin, a hormone which allows for greater flexibility and affects all joints, generally not a problem as long as the joint isn’t stretched beyond the normal ROM
→ Centre of gravity shifts forward as they put on weight and for this reason it is not advised that pregnant women take on sports such as ice skating late in the pregnancy
→ Pregnancy increases blood volume and haemoglobin levels, therefore during pregnancy, delivery oxygen efficiency is increased
→ It is advisable that women do not take up any dangerous sports late in the pregnancy
→ Advised not to exercise in the heat of the day
→ Scuba diving not advised
→ Women benefit from sports participation while pregnant
→ Better weight control, mood, maintain fitness levels
→ Help prevent gestational diabetes

What role do preventative actions play in enhancing the wellbeing of an athlete?

Physical preparation

Pre-screening

→ Phase 1 Questionnaire:
  ◆ Completed by a professional or self administered
  ◆ Purpose is to identify those individuals with a known disease, signs or symptoms of disease and those at risk of an adverse event during physical activity
→ Phase 2 Questionnaire:
  ◆ Aims to identify those with risk factors or other conditions to assist with appropriate exercise prescription
  ◆ Administered by an exercise professional
→ Phase 3 Measurements:
  ◆ Aim is to obtain pre-exercise baseline measurements of other recognised cardiovascular and metabolic risk factors
Skill and technique

→ Skill:
  ◆ Stages of skill acquisition - cognitive, associative, autonomous
  ◆ At the beginning the athlete focuses on the skill at hand
  ◆ A more skilled athlete will be able to focus more on the environment and how to use that skill to perform well

→ Technique:
  ◆ One of the greatest indicators for sports injury
  ◆ Poor technique = higher injury rates
  ◆ Better technique = protects against injury
  ◆ Poor technique generates unnatural forces which can cause injury

Physical fitness

→ Health related components:
  ◆ cardiorespiratory endurance
  ◆ muscular strength
  ◆ muscular endurance
  ◆ flexibility
  ◆ body composition

→ Skill related components:
  ◆ power
  ◆ speed
  ◆ agility
  ◆ coordination
  ◆ balance
  ◆ reaction time

→ Each sport has components which are required for safe and good performance
→ Most sports will benefit from a firm base in cardiorespiratory endurance
→ Each sport has specific requirements which should be analysed individually

Warm-up, Stretching and cool-down

Warm-up

→ Should prepare the body for the physical activity required
→ Warm-up is important for safe participation
→ Should begin with general whole body movements
→ Should begin without equipment, equipment should be added towards the end
→ Often finish with a small mini-game to fully replicate the movements of the sport
Stretching

- Fundamental part of preparation for any sport
- Increases flexibility
- Helps prevent injury
- Works well if a set flexibility plan is in place, like a resistance training plan, results will only show with consistent hard work
- Stretching during warm-up should be specific to the sport

Cool-down

- Stretching should be a part of cool-down and warm-up
- Should slowly bring athlete back to pre-metabolic rate
- Begin with vigorous activity and decrease in intensity
- Helps ensure waste product is removed before exercise is stopped

Sports policy and the environment

Rules of Sports and Activities

- Designed specifically to the sport in order to promote safety and wellbeing
- Help promote fair play and prevent injury
- Enforced by referees and umpires
- Can include:
  - Size of field/court
  - Length of competition
  - Number of breaks
  - What equipment is used
  - What constitutes as fair play
- Many team sports are played in halves on a field of 50m x 100m (may vary) other sports such as netball are broken into quarters, and played on smaller fields
- Rules on illegal contact help protect the athlete’s wellbeing

Critically analyse sports policies, rules and equipment to determine the degree which they promote safe participation

Modified rules for children

- Children and young athletes require modified rules to cater for specific needs
- Particular concern is their underdeveloped sweat glands and poor ability to thermoregulate
- Frequent modifications include:
  - The type of ball used in tennis, smaller children use red and yellow ball which is softer, and bounces lower for those with lower skill level
  - Size of courts and racquet is also adjusted
  - Lower nets for small children in tennis
Matching opponents

→ Matched by; age, sex, skill level, size

Age:
→ Most sports begin matching through age
→ Most beginning at under 6s and progressing to under 17s
→ Done to group together both psychologically and physically
→ Often similar in size and skill
→ Limited in ability to reduce injuries and appropriately match opponents as children develop at different rates and adults may begin later in life

Size:
→ Many combat sports match by size; boxing, mixed martial arts, wrestling
→ Reduces risk of injury as athletes are not forced to play against a player who is much bigger than them
→ Limited though as it does not take into account the skill level of opponents

Skill level:
→ Almost every sports matches based upon skill level
→ Often done by grading teams, eg. First grade, reserve grade, etc
→ Martial arts use belts as a grading of skills system

Sex:
→ Promotes safety and well being as males have a higher level of testosterone which means they tend to be stronger and larger than females (of course a generalisation)
→ Would not be fair to have them verse each other, for example:
  ◆ Male tennis players play up to 5 sets
  ◆ Also, they serve up to 30km/h faster than females

Use of protective equipment

Protective equipment players wear:
→ Eg. Shin pads, mouth guards, helmets,
→ Some are compulsory, for example, mouthguards in Rugby Union, shin pads in Soccer
→ Some are non-compulsory - mouthguards in rugby league and face shields in hockey

Other protective equipment:
→ Mats in gymnastics
→ Padding around the goal posts in rugby league
Safe grounds, equipment and facilities

Safe grounds
- Many sports are played outside
- Important that the grounds where sports are held are kept safe and in order
- Dangerous for athletes to play on grounds which have holes, divots or dents in them
- It is also dangerous to be playing on wet grounds

Safe equipment
- Like grounds, equipment that is used in sports also needs to be kept in order
- Equipment which is not maintained will result in injury
- All equipment used should suit the athlete, in particular if the athlete is small or is a child, the equipment must be modified to suit his or her needs

Safe facilities
- Refers to the venue and the surrounds where the activity takes place
- Can include pool facilities during a meet, shade at a cricket match
- Should be safe for both athletes and spectators
- Bathrooms should work, running water and shade should be available
- Safe facilities also include enough space around the field in case the athlete runs of the ground at speed

Environmental Considerations

Temperature Regulation
- Convection, radiation, conduction, evaporation
- **Convection** - Heat transferred from a motion moving away from the source of heat taking the heat with it
- The athlete can support radiation by pouring water over their skin if too hot or wearing a windbreaker jacket if too cold
- **Radiation** - The transfer of internal energy in the form of electromagnetic waves, as the body produces heat, some is lost through radiation
- The athlete can support radiation by exposing more skin by removing clothing if too hot or exposing them to sun or warm fire if too cold
- **Conduction** - The transfer of heat between 2 object in contact with each other
- The athlete can support conduction by exposing skin and lying on a cooler surface such as a rock or metal if too hot
- **Evaporation** - The body’s main mechanism for heat loss, the transfer of heat to water resulting in a vapour and loss of heat
The athlete can support evaporation if too hot by adding water to the surface of the body, if too cold the athlete can remove water with a towel or by removing wet clothes

**Climatic conditions**

**Temperature**

**HOT TEMPERATURE**
- The body’s production of ATP causes both movement and heat
- Hot climatic conditions will add heat to the athlete by radiation
- Places athlete at higher risk of hyperthermia
- Could also lead to dehydration
- More difficult to thermoregulate
- Vital to have strategies to cool down the body

**COLD TEMPERATURE**
- May result in athlete losing too much heat
- Athletes must have strategies to maintain safe body temperature
- Often benefit from longer warm-ups

**Humidity**

**IMPACT OF HUMIDITY**
- The more humid it is, the less effective sweat is
- Makes thermoregulation difficult

**HOW HEAT AND HUMIDITY CAN CAUSE HYPERTHERMIA**
- The body’s thermoregulation mechanisms are hindered
- If the body produces heat, it will not be able to lose it efficiently enough
- Conduction may work if the breeze is cool, if the breeze is warm it can add more heat

**Wind**

**IMPACT OF WIND**
- Increases loss of heat through convection
- Also affect the movement of equipment such as balls

**HOW WIND AND COLD CAN CAUSE HYPOTHERMIA**
- Both cold conditions and wind cause a greater loss of heat
- Athletes need strategies in order to reduce the likelihood of hypothermia:
  - Warm clothing
  - Proper warm-up
  - Continuous movement

**Rain**

**IMPACT OF RAIN**
- Increases heat loss through convection
- Makes playing surfaces more slippery
If humid, heat loss reduced

**Altitude**

**IMPACT OF ALTITUDE**

- Different oxygen concentration at different altitudes
- If training at low altitude, performing at a high altitude will decrease performance as oxygen will be less available

**Pollution**

**IMPACT OF POLLUTION**

- Can cause health concerns
- Few strategies can help except for not participating or wearing a mask

**Guidelines for fluid intake**

**Pre-performance**

- Make sure they are well hydrated
- 2L a day is good for the average person
- Check hydration using colour of urine
- Drink 500ml at least 4 hours before exercise, 300ml 10-15 minutes before

**During performance**

- Prevent dehydration
- Just 2% dehydration affects performance
- Do not consume more than 1L per hour of exercise

**Post performance**

- Vital that fluids lost during performance are replaced
- Fluid lost should be replaced within 2 hours

**Acclimatisation**

**To Heat**

- Eg, fifa world cup Brazil, Rio 2016 olympics
- Many athletes travel to the country of competition a month before to acclimatise
- Brings; increased sweat rate, decreased heart rate, increased oxygen consumption

**To cold**

- Important for athletes coming from warmer climates
- Done the same way for heat
- Brings; lower temperature for shivering, improved blood flow to hands and feet, increased metabolic rate

**Altitude**

- Live high - train high
- Live low - train high
- Live high - train low
Taping and bandaging

Preventative taping
- When an athlete tapes a joint to prevent injury
- Tape used is usually rigid tape, there is no stretch
- Works by providing feedback through a sensation when there is movement which stimulates muscle strengthening around the joint
- Also works as a placebo

Evaluate the role taping plays in the prevention of injury
- Studies showed that ankle sprains decreased when tape was used
- Long term taping can lead to the athlete relying on the tape
- Can stabilise muscle strength but weaken the joint
- Should be used as a short term preventative measure
- Can irritate the skin and reduce proprioception

Taping for isolation of injury
- Helps for the healing of injury
- Reducing pain during exercise and preventing further injury
- Goals of taping:
  - Limit range of motion
  - Increase stability of joint
  - Compress soft tissue to reduce inflammation

Evaluate the role taping plays in the treatment of injury
- Helps reduce the reoccurrence of injury
- Reduces range of motion
- Provides structural support

Bandaging for immediate treatment of injury
- Part of RICER
- Helps decrease bleeding and inflammation
- Use of compression through the use of the bandages helps keep fluid away from the injured area
- Allows for a faster recovery
- Reduces movement, preventing re-injury
How is injury rehabilitation managed?

Rehabilitation procedures

Progressive mobilisation
- Refers to the gradual increase in motion/movement
- Required as after injury, application of RICER and medical attention, the joint becomes stiff from lack of use
- Slowly stretches muscles
- Also helps increase movement in muscles around the joint
- Uses dynamic, static, and PNF, but not ballistic
- Often begins with static and moves to PNF
- Progressive mobilisation is made specific to each case of injury and specific to the needs of the athlete

Graduated exercise

Stretching as graduated exercise
- Ballistic is generally avoided
- Begin with static and progress to PNF
- PNF stretching is the most common and beneficial
- Dynamic = usually towards the end as it requires more control

Conditioning as graduated exercise
- Process of strengthening muscles back to pre-injury strength
- Always specific to the injury
- Reversibility effect causes atrophy and therefore muscles need to be strengthened in order to combat it
- Exercise begins at low intensities and progressive overload is used to slowly build back the strength and endurance
- Once the strength and endurance is built back the power can begin to develop again

Total body fitness as graduated exercise
- Reversibility causes loss of total body fitness
- Reversibility begins after 2-3 weeks
- The athlete should be doing exercise when injured if possible
- Reversibility will be slowed down, the athlete will need to be restore pre-injury fitness
- Total body fitness refers to the health and skill related components of fitness
Training

During rehab
- Can help slow down the effects of reversibility
- Injury requires rest, this does not necessarily mean the entire body
- Athletes often train the non-injured side while resting the injured side

After rehab
- Athletes still require training after rehab before return to play
- Lack of engagement in their sport means the sport specific components have not yet been restored
- They may not be psychologically ready to return to play
- Aims to:
  - Develop sport specific components
  - Develop sport specific skills
  - Increase confidence
  - Ensure the athlete safely returns to play

Use of heat or cold

USE OF HEAT IN REHAB
- Has various aims and methods
- Aims:
  - Increase blood flow
  - Decrease pain
  - Increase flexibility
  - Decrease joint stiffness
  - Increase tissue repair

Heat packs
- Many different types:
  - Wheat bags
  - Chemically heated packs
  - Applied to the injured area like an ice pack

Hydrotherapy
- Heated pool around 40 degrees
- Increases blood flow, flexibility etc.
- Using buoyancy to decrease the weight and force on the injured area

Infra-red lamps
- Proceed heat via radiation
- Shines light on the injured area

Contrast therapy
- Athletes move injured area between an ice bath and a warm bath
Ultrasound

→ Applies heat using soundwaves during rehab on dense tissue

Microwaves

→ Heats deep tissue with a higher water content
→ Eg, muscles and vessels
→ Heated for less than 30 mins at 40 degrees

USE OF COLD IN REHAB

→ Technical term is cryotherapy

Ice massage

→ Ice is rubbed over the body/injured area for 15 min

Cold water imersion/ice bath

→ Used immediately following an injury
→ 15min at a time

Contrast therapy

→ Athlete moves injured area between ice bath and warm bath
→ Benefits of heat and cool

Vapocoolant sprays

→ Often used during games to cool an injured area
→ Often used for minor injuries
→ Used to prevent muscle spasms

Cryotherapy machine

→ May be used for larger injuries of the body
→ Cool the entire body rather than specific areas

Return to play

Indicators of readiness to return to play

→ Pain free:
  ◆ Means they are nearly ready to return to play
  ◆ Must be pain free when completing drills, mini games and playing the actual sport
→ Degree of mobility:
  ◆ Refers to amount of movement around injured area
  ◆ Movement should be smooth and shows confidence
  ◆ Restored mobility can be an indicator of readiness to play

Monitoring progress

→ Is very important
→ Usually done by comparing test results, AKA post-tests (after injury)
→ Once back to pre-test levels the athlete may be ready to return to play
Psychological readiness
   ➔ Psychological readiness must be examined before return to play
   ➔ Long term injury in particular can make an athlete anxious about returning to play
   ➔ If an athlete is not confident they may try to shield the injured side
   ➔ Some athletes are too eager to return to play
   ➔ Proper professionals must examine the athlete’s psychological readiness first
   ➔ Can cause re-injury if they return to play to early
   ➔ Should not return to play after full recovery

Specific warm-up procedures
   ➔ Many athletes are given specific warm-up procedures to return to play
   ➔ Can be in addition to normal warm-up
   ➔ Extra warm-ups target the injury
   ➔ In addition to warm-up exercises the athlete may also be given extra massage
   ➔ Extra warm-up must meet specific comp demands

Return to play policies and procedures
   ➔ Each sport has specific policies and procedures in regards to return to play
   ➔ Many policies are developed in conjunction with academic organisations such as
     Sports Medicine Australia

Ethical considerations

Pressure to participate
   ➔ External pressure:
     ◆ Coaches, teammates, fans
     ◆ Can also come from financial or loss of ranking while not playing
     ◆ Coaches can sometimes see their athletes as commodities
     ◆ Teammates may need the return of a vital member of the club
   ➔ Internal pressure:
     ◆ Most dangerous form of pressure
     ◆ Can cause them to return early or lie to medical staff about symptoms

Use of painkillers
   ➔ Pain exists to tell the athletes when an injury is occurring or has occurred
   ➔ May be ok to use panadol or nurofen but is it ok to use narcotics?
   ➔ Is it ok for the athlete to be injecting themselves or should the drug be administered by a professional?
   ➔ Painkillers are often used in high pressure matches
   ➔ Greater pressure on an individual rather than a team sport as they only have
titles to rely on during competition
   ➔ The athlete’s medical team will need to weigh up the risks
Improving Performance
FQ1. How do athletes train for improved performance?

Strength training

Resistance training

Elastic

➔ Requires elastic, large band or spring to create resistance
➔ Often used in rehabilitation or strength training programs
➔ Versatility, low cost, ease of transport
➔ Limitations:
  ◆ Resistance is smaller than other methods
  ◆ Resistance increases as the band is stretched (not uniform)

Hydraulic

➔ Generally very expensive
➔ Resistance is increased with the speed of the movement
➔ Useful for sports such as powerlifting, rugby, basketball

Other

➔ Parachute running/swimming
➔ Tyre flipping
➔ Weight sleds

Weight training

For endurance

➔ High number of repetitions and small rest periods
➔ The more sets the better
➔ Recommended, 4-5 sets or 30 repetitions

For hypertrophy

➔ Increase in gains and muscle mass
➔ 2-4 Sets of 15 reps, 2-3 mins rest

For strength

➔ Best achieved through lower repetitions and longer rest periods
➔ 2-4 sets of 10 reps, 3-4 mins rest
➔ Beneficial in most sports

For power

➔ Combination of strength and speed
➔ Requires athlete to lift weights at fast speed
➔ 1-3 Sets, 5 reps, 4 mins rest
**Equipment**
- Weight plates
- Weight machines
- Barbell
- Dumbbell

**Isometric training**
- Muscle produces force but no change in length
- Made popular by Bruce Lee
- Provides increase in strength for static contractions
- Benefits sports such as dance, gymnastics and martial arts
- Examples:
  - Pushing against a wall
  - Wall-sit
  - Planking

**Aerobic training**

**Continuous Uniform**
- Single exercise that goes for a period of time without rest
- Requires athletes to move into aerobic training zone and maintain for a minimum of 20min
- Between 65% - 85% max heart rate
- Athletes often train just below the lactate inflection point
- Beneficial for most sports with continuous aerobic movements:
  - Swimming
  - Marathon
  - Triathlon
- Improves athletes oxygen uptake and aerobic capacity
- Can become boring

**Fartlek**
- Intensity changes at random times
- Helps replicate many sporting environments
- Helps cardiovascular system adapt to changes quickly
- Examples:
  - Running around an oval going between sprints, jogs and walking
  - Outdoor cycling where the ground isn’t flat
- Trains both aerobic and anaerobic systems
- Helps body remove lactic acid
Long Interval
→ Longer periods of high workloads and shorter rest periods
→ 3+ mins and a 30 sec rest
→ Allows variety to be used throughout the training session
→ Benefits:
  ◆ Higher intensity utilised as the duration is not that long
  ◆ Athlete’s bodies can adapt and recover faster
→ Particularly beneficial for sports with higher workloads for an extended period and shorter rests

Anaerobic training

Developing power through weight and resistance training
→ Common in many sports, especially where size in an advantage
→ Through weight training - involves high intensity, long rest periods and low work volumes
→ Faster the bar speed the greater the improvements in power
→ For resistance training - higher intensities could possibly increase gains
→ Difference between weight and resistance training:
  ◆ Weight training requires weights
  ◆ Resistance training can use - parachutes, body weight, elastics, etc.

Plyometrics
→ Involves a stretch-shortening cycle to exert maximal force in short interval
→ The stretch-shortening cycle must be completed as fast as possible
→ Exercises often involve jumping, hoping and sprinting
→ Always performed at maximal power
→ Been shown to develop:
  ◆ Speed
  ◆ Power
  ◆ Force development
  ◆ Speed performance

Short interval
→ Short work periods followed by longer rest periods
→ Many know it as HIIT (high intensity interval training)
→ Benefits:
  ◆ Can focus on alactacid and lactic energy systems
  ◆ Improves waste removal speed
  ◆ Focuses on recovery after high intensity
  ◆ Increases speed and power
Flexibility training

**Static**

- Refers to the use of static isometric stretches to improve flexibility
- Pain should not be felt
- Joint should not be taken past range of motion
- Works by turning off stretch reflex, allowing the muscle to be lengthened
- Repeated and frequent exposure causes the body to adapt and increase muscle strength
- Increases joint ROM
- Helps improve performance by:
  - Preventing injury
  - Allowing more fluid and coordinated movements
  - Improves biomechanical efficiency

**Dynamic**

- Stretching with continual movement through the joint’s ROM
- Involves slow purposeful movements
- Intensity should be specific to the athlete and sport
- For increased flexibility the athlete should static stretch for 30 seconds followed by dynamic

**Ballistic**

- Involve bouncing movements in order to increase ROM and tendon elasticity
- Has not been shown to improve performance
- Is dangerous and needs supervision
- Seeks to move beyond the stretch reflex

**Skill Training**

**Drills practice**

- Fundamental core of all skill training
- In team sports, drills are often done as part of whole team training session
- Can often go for long periods of time and not be athlete specific
- Skills are often best learnt in short frequent sessions

**Modified and small-sided games**

- Modified game - replicates the sport and changes some of the rules
- Small-sided games - Increase playing time and repetition of the skill
- Often combined
- Useful for teaching skills at different levels of skill acquisition
Games for specific outcomes

**Decision Making**
- Once a skill is learned it is important to allow the athlete to use it in various situations
- Often small-sided and modified games allow the coach to focus on a specific outcome
- Can focus on a number of skills
- Examples; 3 on 2 games

**Tactical awareness**
- Often include rehearsal of set plays
- Develops decision making in relation to using the skills in order to achieve a specific outcome
- Larger tactical-awareness games might be a full trial-game or practice match
FQ2. What are the planning considerations for improving performance?

Initial planning considerations

Performance and fitness needs

Sport specific performance and fitness needs

➔ Key components of the sport should be the focus of training
➔ In a team sport, the sport specific needs essentially focus on the needs of the team

Athlete specific performance and fitness needs

➔ Each individual has their own specific needs, even specific roles within a team
➔ Often members within a team specialise a role/position within the team
➔ Individual athletes will have their own starting points

Elite and recreational/amateur differences

➔ Elites have much more detailed high performance fitness needs
➔ Elites complete a wider range of performance and fitness needs
➔ Recreational athletes will not have to complete as many tests
➔ They have a more general low-level performance needs

Schedule of events and competitions

➔ Major competitions and events are usually the first items that are included in a calendar
➔ These major events show an athlete when they need to peak
➔ The schedule of competition and events is used to guide the creation of a year plan
➔ The schedule of events is different between sports
➔ A particular athlete may have more events than another, such as State Of Origin in addition to the regular season

Elite and recreational/amateur athletes different schedule of events

➔ More complex schedule for elites
➔ Elites have a larger array of competitions including:
  ◆ Club
  ◆ Representative
  ◆ State
  ◆ Regional
  ◆ National
  ◆ International
➔ Amateur athletes may not create a detailed training schedule based around the competition schedule
Climate and season

➔ Important aspect when considering training programs
➔ Many sports are seasonal, eg. football which is usually played in winter
➔ A number of sports are not seasonal, eg. swimming, tennis
➔ Determines the types of environmental considerations

Elite/ recreational amateur differences

➔ The elite athlete will have to consider a wider range of climate compared to the amateur
➔ Elite athletes have to travel around the world and experience many different climates
➔ The recreational athlete does not have the same issues
➔ They do not have to travel large distances to get to competition

Planning a training year

Phases of competition

Pre-season

➔ Focuses on developing the basics or fundamentals required in the sport
➔ General mesocycle will focus on general body fitness
➔ Training begins to focus on sport specific aspects of training

In-season

➔ Can be very long or quite short depending on sport
➔ E.g. tennis comp lasts 2 weeks, netball tournament last 6 months
➔ Training focus shifts to strategy and tactics while maintaining fitness and skill level

Off-season

➔ Focuses on relaxation and recovery
➔ Training volume and intensity decrease
➔ Allows the athlete to recover from the intensities of competition

Subphases

➔ Marcocycle - Larger cycle, normally the whole year, can be longer depending on the sport
➔ Mesocycle - Smaller cycle and usually lasts a few weeks to a few months
➔ Microcycle - Even smaller, often lasts a week, focuses on a small singular aspect and add together to achieve mesocycle goals

Peaking

➔ When the athlete performs at their absolute best during competition
➔ The coach will want the athlete to peak during the most important competitions
→ Requires the athlete to have great general body conditioning and sport specific conditioning
→ The athlete will have to undergo intense training in order to be in the right condition for peaking
→ Just before competition they need to taper

**Tapering**
→ The reduction of training volume and intensity just prior to competition
→ Allows the body to repair small muscle injuries cause by high intensity training
→ Taper 2-4 weeks prior to competition
→ Allows the body to repair itself without the decrease in the benefits of training
→ Allows the body to replace nutrients required for competition

**Sport specific subphases**
→ The selection of what is focused on in order to cater for what is specific to the sport
→ Change throughout the year as training moves through different phases of competition

Elements to be considered when designing a training session

**Health and safety considerations**
→ Needs to suit the athlete in order to be safe
→ So they develop at a rate that is not harmful for them
→ Having adequate warm-up
→ Ensuring that equipment is safe and in working order
→ Field examined to be safe in order to train on
→ State of athlete's health - mental and physical

**Providing an overview of the session to athletes**
→ Results of training improve when the athlete is aware of what the aims are
→ Not normally a lengthy process
→ Often completed just before or even during warm-up
→ Allows athletes to have input

**Warm-up and cool-down**

**Warm-up**
→ Specific to the muscles and activities used in the session
→ Usually begins with whole body general low intensity exercises
→ Become more specific throughout warm-up
→ Often include forms of stretching
→ Prepares the body for the training session
**Cool-down**
- Occurs after training
- Speeds-up recovery
- Ensure good physiological adaptations
- Generally consists of low intensity movements
- Removes waste products from the body

**Skill instruction and practice**
- Makes up the greater portion of training
- Determined by the athlete’s stage of skill acquisition
- Usually includes a demonstration of the skill, which may be broken down into parts
- Provision should be short and to the point
- Should be clear, specific and useful
- Best method for practicing relevant skills is to play the sport
- Includes modified games, drills, etc
- Backbone of training in any sport

**Conditioning**
- Specific and mostly developed in the pre-season
- If sport has a long competition phase, reconditioning may be needed
- Timing, intensity and volume is vital
- Good condition will help prevent injury and improve performance
- Generally 20+ mins in a training session

**Evaluation**
- Must happen at the end
- Athletes should be given a chance to provide feedback to the coach
- Also include some planning for the next session
- Focuses on the achievement of goals

**Planning to avoid overtraining**

**Amount and intensity**
- Leads to overtraining when the athlete trains at a high intensity too often
- Strength training requires 48 hours for full recovery
- Overtraining occurs due to lack of adequate rest between training periods

**How much training is too much?**
- Individual aspects all contribute to an athlete’s risk of overtraining
- Should not be completing high intensity everyday
- Need only occurs 3 times a week
What do you do if you identify an overtrained athlete?

➔ Reduce amount of intensity and training sessions
➔ Athlete may need a complete break
➔ Often not identified until injuries occur

How can overtraining be avoided

➔ Have a good balance of amount and intensity
➔ Rest periods will be weekly, as well as longer throughout the year through a scheduled program
➔ Inclusion of recovery sessions

Physiological considerations

➔ Small muscle tears, often called DOMS
➔ If not fully recovered the small tears will get larger and take longer to heal
➔ The constant small amount of pain will lead to lethargy and getting worn out faster
➔ Decreases performance and strength
➔ Nutrition is also important as it’s the fuel of the athlete
➔ Without adequate nutrition the athlete will not adapt and recover properly

How do you identify an overtrained athlete?

➔ Signs of an overtrained athlete:
  ◆ Frequent errors in performance
  ◆ Illness
  ◆ Injuries
  ◆ Poor performance
➔ Symptoms of an overtrained athlete:
  ◆ Pain
  ◆ Lethargy
  ◆ Headaches
  ◆ Cramping
  ◆ Loss of appetite

Psychological considerations

➔ Lack of motivation

How do you identify an overtrained athlete?

➔ Signs:
  ◆ Moody and irritable
  ◆ Responds poorly to criticism
  ◆ Gives up when under pressure
➔ Symptoms:
  ◆ Lack of motivation
◆ Depression
◆ Sensitive to criticism
◆ Confusion during competition
FQ3 What are the ethical issues related to improving performance?

Use of Drugs

- Many athletes have been shamed in their sport due to the public discovering that they have used performance enhancing drugs.
- E.G Lance Armstrong used drugs to help him win all seven of his titles and was later stripped of those titles.
- Drugs are never ethical.

The Dangers of Performance Enhancing Drug Use

- The dangers are extensive.
- There are dangers to an athlete’s physical health, reputation, sponsorship deals, and income.
- The dangers should be enough to deter athletes from using performance enhancing drugs.

The Physical Dangers

- For strength.
- For aerobic performance.
- To mask other drugs.
- Dependant on the drug.
- Can include backne, acne, enlarged clitoris, shrinkage of the testicles, deepening of the voice, possible roid rage.

Damage to reputation

- A positive drug reading of an athlete will skyrocket the athlete into a social media frenzy for all the wrong reasons.
- The athlete may have spent a very long time building their reputation not only as a strong competitor in the field but also a role model for all ages.
- A positive drug test can cause an athlete’s reputation to be lost overnight.
- This event in their life alone can cause not only their sporting life but also their personal life into a downward spiral as many can not come back from such an event.

Sponsorship and income dangers

- Athletes often have sponsorship deals with leading brands and companies within the industry.
- These sponsorships can provide a large source of income for the athlete.
- A loss in reputation from an athlete leading to a negative image in the media will lead to companies withdrawing their contracts and ending their sponsorship with the athlete.
Many sponsorship deals have clauses which relate to negative media exposure and use of drugs, so in the event that the athlete is caught cheating or doping they can pull their sponsorship deals quickly.

Other dangers
- An athlete caught using drugs can ultimately lead to them receiving a lifetime or temporary ban from their sport.
- This results in a loss of income for the athlete and can lead to them not being able to provide for themselves or their family.

For Strength

**Human Growth Hormone**
- Is a chemical hormone which is produced by the body for growth and development.
- Increase during large periods of growth such as childhood and adolescence, can decline as the athlete ages.
- HGH is used for strength development as well as body composition.
- Stimulates fat mobilisation as an energy source and encourages muscle growth.

**Physical dangers of HGH**
- Nerve, muscle and joint pain.
- Swelling.
- Carpal tunnel.
- Numb tingling skin.
- High cholesterol.
- Gigantism.
- Muscular weakness.
- Diabetes.
- Osteoporosis.
- Heart Disease.
- Extensive bone growth.
- If bought on the black market the athlete will be unaware of the risks which may be present due to additives in the drug.

**Anabolic Steroids**
- Used by athletes to develop power and strength while changing body composition.
- They are derived from testosterone and have similar effects on the body.
- Testosterone is the male hormone which helps to develop secondary male characteristics, for example increased muscle size, body hair, deeper voice, etc.
- Improvements with anabolic steroids do not show without the combined use of training.
In response to the question, “Do anabolic steroids work?” the NSW Government fact sheet states:
“The answer to this is controversial. If you speak to athletes, body builders, trainers and some doctors, who have used or had experiences with anabolic steroids, they are certain that anabolic steroids increase lean muscle mass, strength and endurance. But scientific studies have only shown that anabolic steroids enhance physical performance through the effect of training, diet and motivation, which accompany the use of the drugs.”

Physical Dangers of anabolic steroids
- Aggressiveness (roid rage)
- Acne
- Irritability
- Baldness
- Hypertension
- Heart damage
- Liver issues
- Irregular periods (female)
- Enlarged clitoris (female)
- Infertility
- Diabetes
- High cholesterol

For Aerobic Performance

EPO for aerobic performance
- Erythropoietin (EPO) is the most commonly used drug for aerobic performance
- It is a naturally occurring hormone released from the kidneys
- It is used because it stimulates the bone to produce more red blood cells
- More red blood cells = more oxygen is carried around the body leading to higher oxygen intake
- Raises lactate inflection point

Physical danger of EPO use
- Increased risk of heart disease, stroke, cerebral/pulmonary embolism

Synthetic oxygen carriers for aerobic performance
- Chemicals that mimic haemoglobin
- Another form of drug use which improves aerobic performance
- Increase in oxygen carrying capacity of blood

Physical dangers of using synthetic oxygen carriers
- CVD, Stroke
- Embolism
- Mitochondrial infraction
To mask other drugs

Use of diuretics to mask other drugs

➔ Main reasons for use:
  ◆ Appearance
  ◆ Weight class
  ◆ Masking other drugs

➔ Diuretics cause the body to remove water from blood and excrete it as urine
➔ Dilute urine and makes positive results on drug tests less likely

Physical dangers of diuretics

➔ Can lead to:
  ◆ Dehydration
  ◆ Headaches
  ◆ Dizziness
  ◆ Poor coordination
  ◆ Fatigue
  ◆ Chest pain

Use of alcohol to mask other drugs

➔ Alcohol is a diuretic and depressant
➔ Effects on the body vary due to size, previous exposure and amount consumed

Physical dangers of alcohol use

➔ Nausea, vomiting
➔ Slowed nervous system, delayed reaction time
➔ Blurred vision
➔ Loss of consciousness
➔ Death

Benefits and limitations of drug testing

➔ Benefits:
  ◆ Creates a deterrent for athletes who may consider using drugs
  ◆ Promoting drug free sport, incorporating fair play
  ◆ Promotes safety and equity in sport
  ◆ Rewarding athletes for their training ability
  ◆ Protects reputations

➔ Limitations:
  ◆ Not all drugs can be tested for, new ones are created every day
  ◆ Testing exposes the athlete(nudity) before the tester
  ◆ New prohibited lists are developed each year which athletes need to keep track of
  ◆ Testing is expensive
Use of technology

Training innovations

VO2Max testing and how it improves performance
→ Measure maximum oxygen consumption in L per kg of body weight, maximum heart rate, muscle efficiency
→ Used to set heart rate training zones
→ Provides feedback on the effects of training
→ Allows the athlete to train more effectively

Lactate threshold testing and how it improves performance
→ Identify an athlete’s lactate inflection point
→ Helps set training zones
→ Where the athlete wants to be as close as possible to inflection point without entering it
→ Helps anaerobic training by forcing the body to deal with lactate overload and recover from it

Biomechanical analysis and how it improves performance
→ Analyses the athlete’s technique to ensure the movement is correct, safe and efficient
→ Allows athlete to last longer through more efficient movement patterns
→ Saves energy and provides athlete with advantage over others

Other training innovation
→ Heart rate monitors
→ GPS devices
→ Video analysis

Ethics and training innovation
→ Expensive and can only be accessed by clubs and athletes with the right funds
→ Can create unfair playing field
→ Women’s American Football team vs. Congo’s Women’s football team
→ Revolve around equity of access rather than safety

Equipment advances
→ Clothing equipment advances:
  ◆ Clothing has changed a lot over the years
  ◆ Clothing is much lighter and can be skin tight or loose, depending on the sport
  ◆ Eg. Speedo LZR banned for giving unfair advantage
  ◆ Clothing in contact sports has become tighter to make tackling more difficult
→ Protective equipment advances:
  ◆ Become lighter
  ◆ Cricket helmets and pads becoming much lighter, allowing for faster more free movements
→ General equipment advances:
  ◆ Lighter, advanced technology racquets
  ◆ Larger and lighter cricket bats
  ◆ Synthetic balls over leather
  ◆ Perspex backboards for basketball
→ Technological equipment advances:
  ◆ Hawk eye
  ◆ Spider cam
  ◆ Touch pads in swimming instead of using stopwatch to record time
  ◆ Video replay

Ethical issues related to Technology use in sport

Has technology gone too far?
→ One of the biggest ethical issues in sport
→ Both audiences and the athletes themselves want to see the athletes improve in their performance

Has technology created unfair competition?
→ Related to the equity of access
→ Access of technology is expensive
→ Equipment is expensive
→ If not all competitors have access to this technology, competition becomes unfair
→ Many sporting competitions involve athletes or clubs who either can or can’t afford the latest technologies
→ All major sporting competitions eg. NFL, AFL, NRL, have access to technologies, also includes sports such as elite golf or tennis
→ International sports competitions do not have the same level of equity
→ Individual athletes from poorer, underdeveloped countries cannot always afford the same technologies as other developed countries.