Unit 3

3.1 The role of technology in healthcare

impact	تأثير
Modernised	حديثة او جديدة
Productivity	إنتاجية
providing	توفير
Reduce	يقلل
sector	قطاع
Surgery	عملية جراحية
Vaccine	لقاح

Medical technology	medical technology is used from moment you enter a healthcare facility until you leave يستخدم من اللحظة التي تدخل فيها المرافق الصحية لحين أن تخرج
Impact of technology on healthcare تغير القطاع الصحي من خمس سنوات للحين بسبب التطور التكنلوجي والاجهزة الحديثة أنظمة الرعاية الصحية بالامارات واحدة من أكثر الأنظمة تقدمًا بالتكنلوجيا في العالم التي يستخدمها متخصصين الرعاية الصحية	Five years ago, the healthcare sector looked different because of the introduction of new technology & devices at present. UAE healthcare systems are known to be one of the most technologically advanced in the world that're used by healthcare professionals
aim	increase care for patients & productivity of staff reduce(chance of mistakes & overall cost of providing healthcare)
used in	medicine & vaccine production treatment & recovery of patients to diagnose illnesses before symptoms, show so it can prevent illnesses from happening
because of technology,	doctors can do tests & get clear diagnosis in a short time & they can perform surgery in areas of body that are difficult to access

latest advances in technology in healthcare :

Artificial intelligence (AI) Augmented reality (AR) & Virtual reality (VR)

3D Printing 5G Robotic surgery Artificial organs(أعضاء اصطناعية)

Medical Wearables Telemedicine services

Developments in healthcare

technology resulted in major improvements in healthcare :

patients are diagnosed quicker & quicker recovery times & living longer

better healthcare facilities

Modernised hospitals & equipment

3.2 Smart medical devices and wearables

use of smart medical devices & wearables

electronic devices that people can wear (smart watches & activity trackers: Fitbits)

- collect data about user's health & fitness in personalised database of user's health information

- Users can track information, challenge their well-being goals, and share collected data with people.

There's wearable devices for health conditions as diabetes & health disease

Examples of smart medical devices & wearables

fitness trackers and smart watches (commonly used)

it's usually wristbands have sensors to keep track of physical activity & heart rate.

Can sync to mobile applications & provide fitness guidance for users

Smart watches

tracking workouts in different exercise modes stress monitoring measuring step-count

mental health & movement & sleep tracking heart rate & blood oxygen level

tracking electrocardiogram (ECG) anywhere & any time & notifying user if something wrong

perform tasks that people do on their phones as read notifications, send simple messages, phone calls, play music while offering health-related benefits of fitness trackers

Smart hearing aids

developed with sensor technology uses AI & algorithm

filter out background noise as wind & focus on specific sound sources as speech

Wearable ECG monitors

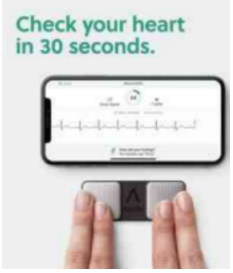
track heart rhythm and rate

can help users to track their heart health, some can measure vital signs such as blood pressure.

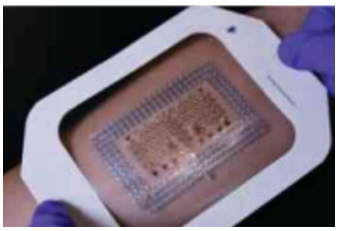
alert user when heart rate is abnormally

gets users to place their fingers on top of 2 electrodes & attach bottom electrode to their left ankle.

results are received within 30 seconds



Wearable biosensors



It improves the way remote healthcare & telemedicine work.

Biosensor devices : portable sensors come in form of patches and bandages

create 2-way communication between user & their healthcare provider

doctor can monitor health & give diagnoses based on physical motion & biofluids

measure and detect: heart & respiratory rate skin & body temperature posture falls step count

telemedicine : when health care provider & patient are not physically present with each other but communicate via phone or videocall

Sleep monitors

soft headband that helps people to learn their sleep needs & they can provide clinical solutions

track sleep cycles & help users who don't get enough sleep, who woke up late or too early.

can play music that can help increase sleep length & head band monitor is connected to mobile applications

اللهم اغفر لنا وافتح لنا فتحًا مبينًا ♥

3.3 Mobile applications and e-services

Mobile applications

million apps available to download today range in function from social media & shopping to health & fitness, among others

Some health-related mobile applications vary on what they do; some provide advice for users with specific problems as diabetes & book appointments & find nearest healthcare provider

E-services

electronic services provided using internet.

health-related online services range from booking appointments to accessing medical records & paying medical bills

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Applications and e-services used in UAE

SEHA (Abu Dhabi Health Services Company)

the largest services network in UAE. it operates all public hospital & clinics in Abu Dhabi

self-services to patients of SEHA patient portal & mobile app **:**

Reviewing your medical records and your families' records Managing appointments

Checking & downloading lab & radiology results Viewing educational materials

released in 2017 & available in Arabic & English

DHA (Dubai Health Authority)

app provides all DHA services

Dubai residents can access :

Manage appointments Lap results Medical fitness applications

Register & volunteer for blood donation services

supports English & Arabic language

Shefaa

MOHAP launched smart patient portal. digital communication platform between patients & healthcare providers

Shefaa portal services include :

Access to medical records Health education Questionnaires Opinion polls

E-payment options Vital Signs records Home-based healthcare Lab results & report

MOHAP e-services

MOHAP website for patients, healthcare professionals, businesses & governments

some services direct users to Shefaa portal

available services:

UAE citizens can access copies of their birth certificate Residents can request vaccinations for travel

patients can request screening for certain types of cancers

Nurses & midwives can register to practice their profession doctors can obtain their licence to practice

The benefits of health-related apps and e-services

Easy to access: using mobile phone at time during day

Saves your money & time: book appointment, check results & other service be done by mobile phone

Organisation: oragnize your medical records, appointments, results of tests, medication&other services

Empowerment: encourage you to make good decisions to your health

3.4 Augmented reality (AR) and virtual reality (VR)

	Augmented reality (AR)	Virtual reality (VR)
meaning	Technology allows laying information, videos and graphics on smart devices over reality 	simulated reality created by computer technology 
What you see	changes the real world by adding additional data to it	when person completely enters into digital environment & cannot see real environment around them
uses	used in gaming, trying on clothes or make-up, seeing constellations of stars in sky, and more...	VR games, car test driving & roller-coaster experiences

why AR & VR become popular	provide high quality assistance to doctors & other healthcare professionals in patient treatment health education for public to teach how to care for health
Uses of AR & VR in healthcare	
Medical training	- Medical students, doctors or surgeons can learn how to treat patients better or perform difficult operations without risk if making real-life surgery mistakes that could have life-threatening results
Robotics surgery	- When robotics devices perform high-precision operations, they're usually controlled by human surgeons using VR. It reduces time & risk of complications - accurate, smaller incisions are made, amount of blood lost reduced & recovery much quicker
Physiotherapy	VR helps patients overcome high levels of pain & have faster recovery through active therapy
Mental health treatment	Anxiety, stress, depression, phobias and post-traumatic stress disorder (PTSD) can be treated using AR & VR by placing patient is safe & calm environment where they can do meditations & other relaxation activities
Emergency treatment	AR can be used on maps to help people to find healthcare facilities, medical equipment as public AEDs, and pharmacies at speed
Personalised treatment	VR & AR can help doctors to explain medical treatments to their colleagues(زميل عمل) & patients in clear & visual way Doctors may demonstrate how operations will be performed and which steps a patient should take for more effective recovery

How AR and VR improves the patient experience

making them more aware of what's happening to their bodies before, during and after treatment

Doctors show patients what their surgery look like & what results should be once procedure completed

Self-guided treatment like meditation & physiotherapy can make recovery process more enjoyable & faster for patients; can experience their rehabilitation in form of an AR or VR game

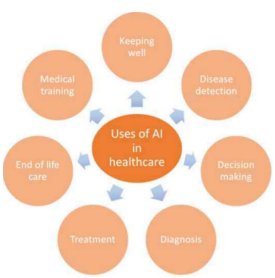
VR can be used as distraction tool for patients who're paining like labour(giving birth ألم ولادة) moment

3.5 Artificial intelligence (AI) الذكاء الاصطناعي

Scientist developed AI by studying how the brain work in different situations

(thinking in solve problems, understanding pictures)

How AI used in healthcare?
Keeping well
now they don't need to visit a doctor so much as the past AI used to develop apps that encourage healthy behaviours & help people to manage healthy lifestyle & allows healthcare professionals to understand day-to-day patterns of people they care. healthcare can give better guidance & support to patients
Early detection of disease
AI being used to detect diseases such as cancer, more accurately & in early stages to **review&read mammograms**(**30** (تصوير لكشف سرطان الثدي **times faster** than humans,with **99% accuracy**. level of accuracy(دقة) reduces need for follow-up examinations or second opinions. medical wearables & AI technology devices can help healthcare professionals to monitor(متابعة) & detect a potential heart attack & heart disease at an earlier, (more treatable stage مرحلة أكثر قابلية للعلاج).
Decision making
AI can recognise patterns which are consistent among patients with certain disease to use this data to recognise risk of other people developing a condition based on lifestyle, environmental, genetics or other factors(العوامل) AI can predict(تنبؤ) what diseases person is likely to develop based these factors
Diagnosis
Treatment
AI helps doctors to manage patients with chronic diseases based on their individual needs. **AI can help to create individual care plans & help patients with long-term treatment programmes.** **AI robots have been used more than 30 years in healthcare** simple to highly complex surgical robots that can help human surgeons or complete operations alone surgical robots, used in hospitals and labs for repetitive tasks, in rehabilitation(,إعادة تأهيل بعد اصابة) physiotherapy & support of those with long-term conditions.
End of life care
this generation people are living longer and dying in different & slower way they have conditions like heart disease, Alzheimer's and osteoporosis **Robots can help people to be independent for longer, reducing need for hospitalisation**(العلاج بالمستشفى) AI combined with newer technology means robots can have conversations and carry out other social interactions with people to keep aging(شيخوخة) minds sharp & reduce loneliness
Medical training
AI allows training to experience realistic simulations in way that simple computers cannot AI computer instantly provide learners with a scenario from large database **Robots can use natural speech to explain their problems** **learner's responses and decision can be challenged by robot** **Training can be done anywhere at any time.** with smartphone AI, training is possible if healthcare professional wants to refresh their skills when they're faced with a challenging scenario in a clinic



3.6 Telemedicine

telemedicine (defined by WHO as "healing from distance")

telemedicine **(**defined by WHO as "healing from distance")	use (computers & video calls & messaging) to communicate with patients
used technology to	- improve patient health - improve the level of access that people have to a doctor & medical information - Allows doctors & healthcare professionals to speak to & diagnose & treat patients from a distance, sometimes without an appointment
conditions via telemedicine *but non-emergency cases* عند الحالات التي لا تستدعي الطوارئ	Coughs & colds Asthma Allergies Headache & fever Muscle pain Obesity Joint & back pain Skin problems Minor burns حروق طفيفة Mental illness
aim to	- provide people at home with medical services that they required. patients in some cases, need to be physically assessed by doctor, so they will be referred to hospital.
why telemedicine is useful	**- for conditions that don't require laboratory tests or physical exam** **- barriers(عوائق) to physical treatment like :** Increased risk of spreading or contracting & infectious disease like covid-19 **- patient lives far from medical facilities like hospital or cannot get transport to it**
Benefits (work best when patient provides clear details about their signs & symptoms)	- **Convenience**: spend less time & money getting to & from hospital & waiting for doctor - **Improved access to care** : easy for disabilities, very old or not near healthcare facility to call doctor & speak from their own home - **Reduced risk of spreading infections at hospital or clinic**

How the UAE has enhanced telemedicine

Virtual clinics

In 2020, due to precautionary(احترازي) measures from covid-19 pandemic

MOHAB open it to strengthen telemedicine services using smart technology & digital communication

clinics provide consultation services similar to traditional medical services without visit hospital & provide delivery services for medicines across UAE

Virtual visits

MOHAP wanted to increase communication between patients in ministry-run hospitals & their families at home

Hospitals launch it to allow patients to keep in touch with their families through video call help to boost patient mood & improve their mental health

follows social distancing instructions & keep patients & healthcare staff safe from infections

3.7 5G

alternative	بديل
anxiety	وحدة
cellular wireless	لاسلكية خلوية
critically ill	مرض حرج
distracting content	محتوى يشتت الانتباه
generation	جيل
invasive	(مجتاحة (منتشرة

consultations	استشارات
clinic	عيادة
gain	يكسب
necessary	ضرورية
post-surgical complications	صعوبات مابعد الجراحة
progress	تقدم
wearables	أجهزة قابلة للارتداء

link between 5G & healthcare	5G meaning	fifth generation of cellular wireless technology & offer strong connection power & fast speed that have ability to transform how healthcare delivered
	benefits (فوائد)	Doctors will benefit from 5G in providing diagnoses could be faster, transfer large files,images & records
How 5G can improve technology in healthcare		
Telemedicine		
5G network can **support video-based consultations & improve the quality of care given** **patients can get treated sooner & gain access to specialist** who may not be available in nearest hospital or clinic		
Monitoring patients		
With medical wearables, healthcare professionals can monitor patients outside of hospital facility allows more personal care for each patient Doctors use of wearables increase their patient's interest in their health Wearables decrease hospital costs; patients can measure & record some of their health data & simply send data to their doctor Poor network connection slows progress of receiving data especially who had heart attack With 5G technology, healthcare professionals can monitor patients closely & data receives up to date (care & advice provided quickly)		
Artificial intelligence (AI)		
healthcare uses it to decide a diagnosis & best treatment plan for specific patient can help to predict which patients are more likely to have post-surgical complications which allows healthcare professionals to provide early care when necessary By using 5G networks, **healthcare professionals can use AI tools they need to provide best care possible wherever they are in hospital or clinic using any device**		
Augmented reality (AR) and virtual reality (VR)		
5G may **improve doctor's ability to deliver more advanced, less invasive treatments** 5G can be used to simulate difficult medical scenarios & allow alternative treatments for critically ill 5G can be used to improve patients' moods, reduce anxiety, or to distract patients who're in pain Patients can be provided with calming, distracting content using AR & VR It's important that connection quality is strong & fast to work		