
UNIT 12 THE FIGHT AGAINST WOUND INFECTIONS

Structure

- 12.0 Objectives
- 12.1 Reading Comprehension
 - 12.1.1 Study Guide
 - 12.1.2 Passage for Reading
 - 12.1.3 Glossary
 - 12.1.4 Comprehension Questions
- 12.2 Vocabulary
- 12.3 Grammar and Usage
- 12.4 Writing
- 12.5 Let Us Sum Up
- 12.6 Answers to the Exercises

12.0 OBJECTIVES

In this unit our aim is to give you practice in reading comprehension by (i) setting a passage dealing with the growth of the antiseptic principle for treating wounds, (ii) giving a glossary of difficult words, (iii) asking questions relating to comprehension of the passage, and (iv) drawing your attention to the way pronouns and demonstratives are used to refer to something already mentioned in the passage. We have set an exercise eliciting words with similar meanings (i.e. synonyms) from the passage, and also helped you to match the name of some of the specialists in the field of medicine with their specialisation. The section of grammar and usage deals with the use of 'not only ...but also..' construction, active and passive voice forms of verbs and relative clauses (defining type). For practice in writing, you have been given an outline of the main points used in the reading passage and asked to complete it after reading the passage again.

12.1 READING COMPREHENSION

12.1.1 Study Guide

Here is an interesting account of how the British surgeon Joseph Lister succeeded in devising for the first time a truly antiseptic principle for treating wounds. In addition to describing the difficulties he experienced, the passage also describes how his revolution in surgery was applauded by German surgeons. After you have read the passage once, read it again with the help of glossary given at the end of the passage. After you have read and understood the passage you must answer all the questions and check your answers with the answers given by us at the end of the unit.

12.1.2 Passage for Reading

The fight Against Wound Infections

In 1865 the British surgeon Joseph Lister (1827- 1912) succeeded in devising for the first time a truly antiseptic principle for treating wounds. Until the middle of the nineteenth century, surgery was not only a very gruesome trade (there was no general anaesthesia before that time) but also a dangerous method of treatment which was always followed by a protracted and often fatal infection.

The patients died even after the slightest operation. All wounds suppurated, and in the hospital wards the sweetish smell of pus everywhere prevailed. The ancient doctrine that this was 'good and laudable pus', and must therefore be regarded as a sign of the favourable healing of the wound, was not yet dead.

In the hospitals of Lister's time, 'charpie' was used as dressing. Charpie was made out of old linen cloths, which had become easily teased through frequent boiling, and attendants; and patients who were not very ill teased out threads of varying lengths and thicknesses; and these threads were then brought together again to make a soft, absorbent materials. Before it was used to pack a wound or as a dressing, the charpie was washed only with cold water without soap and often it was not washed at all. The instruments and the sponges used to stanch blood were likewise washed only in cold water.

Like all surgeons in all countries Lister was troubled by the fact that a compound fracture, that is a fracture in which one or both of the broken ends of the bone had pierced the overlying skin and soft tissues never did well and that in such cases amputation of the limb nearly always had to be performed. Further in all countries the mortality rate from septic diseases after amputation varied between 30% and 50%. This was a dreadful state of affairs. As a preliminary to an attack on this problem, Lister had long been carrying out important work on inflammation and the behaviour of the blood during that process. He was led to the conclusion that wound suppuration was decomposition (or putrefaction) brought about by the effect of the atmosphere on blood or serum contained in the wound. But Lister was handicapped by the belief, widely held at that time, that putrefaction was due to oxygen in the air. He spent much time trying to exclude the air from wound but not unexpectedly, these efforts were unsuccessful.

Then in 1865 Lister learned for the first time about the important work of the French chemist Louis Pasteur (1822-1895) on fermentation and putrefaction. Pasteur had proved conclusively that organised corpuscles (i.e. living bacteria) are everywhere present in the air. This was the clue for which Lister was searching. He deduced that in the case of septic or 'putrefying' wounds, it was not the air itself but the organisms in the air, which caused the sepsis.

Lister decided that these organisms must be killing before they obtained access to the wound. He tested the killing effect of a number of substances on bacteria; and after very careful experiments he decided to use carbolic acid, not only as a wound dressing, but in a systematic manner. All the instruments to be used, were soaked in a solution of carbolic acid. So also was the wound itself, and Lister did a lot of research in order to find suitable materials for dressings which would give off the carbolic acid slowly into the wound. For many years also Lister had the atmosphere in the operating theatre sprayed with a fine mist of carbolic acid, and the spray was also used during the change of a dressing. But it was later shown that the spraying of the atmosphere was not necessary.

Having, after these experiments, decided on the method he would employ, Lister tried out his new principle on 12 August 1865 in the treatment of a compound fracture in a patient in his ward in the Glasgow Royal Infirmary. A perfect result was obtained. Two years later Lister published a series of cases treated by the aid of his principle, and within a short time he was performing operations which previously, because of the danger of sepsis, wouldn't have been undertaken by any surgeon. Lister's methods soon found favour in Scotland, but English surgeons were very slow to adopt them. It is to the credit of German surgeons that they understood, perhaps more quickly and more thoroughly than any others, the revolution in surgery which Lister had effected. His antiseptic principle was enthusiastically supported in Germany and it led to the great technical advances of German surgeons.

(Adapted from
Pollak, K. and Underwood, E. A.
The Healers.
Nelson, 1968.)

12.1.3 Glossary

antiseptic principle	:	the principle of preventing the growth of bacteria (used in treating wounds etc.)
gruesome	:	filling one with horror ; frightful.
trade	:	business
anesthesia	:	substances causing a loss of feeling (of pain, heat, cold etc.)
protracted	:	drawn out in time ; prolonged; lasting for a long time.
fatal	:	causing death or disaster
suppurated	:	formed pus
pus	:	thick yellowish white liquid formed in and coming out from a poisoned place in the body.

prevailed	: was generally felt
doctrine	: belief
laudable	: deserving praise
healing	: wounds becoming healthy and sound
charpie	: lint (or linen) shredded down to form a soft material for dressing wounds.
dressing	: clearing and bandaging a wound
teased	: (here, of cloth) break down to separate fibres
absorbent	: able to take in moisture
sponges	: elastic materials full of holes and able to absorb water easily
stanch	: check the flow of blood (from a wound)
compound fracture	: breaking of a bone complicated by an open wound in the skin *
pierced	: gone through
amputation	: cutting off (an arm or a leg)
limb	: an arm or a leg
mortality rate	: death rate
septic diseases	: infectious diseases caused by pus in a wound
varied	: changed or altered
dreadful	: causing anxiety and fear
preliminary	: coming first and preparing for what follows
carrying out	: putting into practice
inflammation	: heat of a part of the body (with pain, redness and swelling)
suppuration	: formation of pus
decomposition	: cause to become rotten; decay
putrefaction	: having become rotten: ill-smelling
brought about	: caused
serum	: thin, transparent part of blood
handicapped	: disadvantaged ; put to disadvantage
exclude	: prevent ; keep away
fermentation	: a slow decomposition process of organic substances induced by micro-organisms, or by complex nitrogenous organic substances (enzymes) of vegetables or animal origin.
conclusively	: with evidence; finally
clue	: something that helps to find the answer to a problem; idea
deduced	: reached a conclusion
organisms	: living animals or plants; here it refers to living bacteria
sepsis	: pus in a wound
access	: way (in) to a place
soaked	: become wet right through by being in liquid
solution	: (here) mixture with water
give off	: send out
sprayed	: spread
mist	: water vapour
infirmary	: rather old fashioned name for a hospital
a series	: a number of
undertaken	: agreed to be done
found favour	: approval
adopt	: accept
credit	: good name or reputation
revolution	: such a basic change that completely new methods are introduced.
effected	: caused to happen; brought about
advances	: progress

12.1.4 Comprehension Questions

Exercise 1

Answer the following questions on the passage you have read (section 2.1.2). You may refer to the passage again to find the answers.

1. What was the fate of a patient after a surgical operation until the middle of the nineteenth century?

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.....

2. Why was a wound not treated of its pus?

.....
.....

3. Why was charpie used as a dressing?

.....
.....

4. How were the surgical instruments cleaned before use in the middle of the nineteenth century?

.....
.....

5. Why was Lister, like all surgeons in all countries, worried about the fact that a compound fracture never did well?

.....
.....

6. What according to Lister, led to pus formation in a wound?

.....
.....

7. What was the effect of the widely held beliefs on the experiments done by Lister?

.....
.....

8. Which finding of Louis Pasteur's research helped Lister?

.....
.....

9. What did Lister infer from the work of Louis Pasteur?

.....
.....

10. What did Lister think was the best way to save a wound from the attack of organisms?

.....
.....

11. What did Lister use carbolic acid for?

.....
.....

12. Why did Lister spray the operating theatre with carbolic acid?

.....

.....

13. What was the nature of the revolution brought about by lister?

.....

.....

Contextual clues

Exercise 2

Complete the following sentences after studying the passage.

Example

'It' in sentence refers to charpie (or absorbent material)

1. 'It' in sentence 20 refers to
2. 'This' in sentence 29 refers to
3. 'This' in sentence 42 refers to
4. 'They' in sentence 46 refers to
5. 'It' in sentence 73 refers to

12.2 VOCABULARY

Exercise 3

Complete each of the following sentences with a verb from the following list. Use each verb only once:

Supported	Performed	Deduced	Undertaken
Soaked	Led	Sprayed	Followed
Varied	Troubled	Obtained	Effectuated

1. In the middle of the nineteenth century a surgical operation was _____ by death.
2. Lister was _____ by the fact that in the case of compound fracture the affected limb had to be removed.
3. The mortality rate after amputation _____ from 30% to 50%
4. Lister was _____ to believe that pus was formed by the effect of the atmosphere on the blood or serum contained in the wound.
5. Lister _____ that organisms in the air caused sepsis.
6. Lister _____ a perfect result when he applied the antiseptic principle on the treatment of a compound fracture in a patient.
7. Lister _____ all the instruments in a solution of carbolic acid before they were used for any surgical operation.
8. Lister ensured that the atmosphere in the operating theatre was _____ with carbolic acid.
9. In Lister's time surgery was _____ in very bad conditions.
10. Lister began to do such operations, which no one would have _____ some year's back.

Exercise 4

Refer back to the passage and find synonyms, (i. e. words with similar meanings) for the following words. The synonyms can be found in the para numbers indicated against each word.

Example	Words	Synonyms trade
	Business	_____
1.	Prolonged	_____
2.	Deadly	_____
3.	Frightful	_____
4.	Belief	_____
5.	Smallest	_____
6.	Praiseworthy	_____
7.	Unequal	_____
8.	Removal	_____
9.	Death	_____
10.	Horrible	_____
11.	Prevent	_____
12.	Entrance	_____
13.	Hospital	_____
14.	Approval	_____
15.	Progress	_____

Exercise 5

A doctor who performs operations is called a surgeon. Try to match the name of the specialist in the left-hand column with his speciality in the right hand column.

Name	Speciality
1. ophthalmologist	women's diseases
2. neurologist	nature of diseases
3. cardiologist	Skin
4. dermatologist	mental illness
5. gynaecologist	illness of children
6. pathologist	Nerves
7. psychiatrist	Heart
8. paediatrician	Eyes

12.3 GRAMMAR AND USAGE

Exercise 6

Use of 'not only ... but also ...'

Look at the use of 'not only ... but also...' in the following sentence from the reading passage :

Surgery was not only a very gruesome trade but also a dangerous method of treatment.

'Not only but also' is a coordinate conjunction and is used to add one statement to another.

Rewrite the following sentences using 'not only... but also...' constructions

1. Lister washed all his instruments in carbolic acid and sprayed it into the atmosphere.
2. German surgeons understood the importance of Lister's methods. They adopted them immediately.
3. The patients contracted fatal infection and fell prey to death.
4. Lister carried out important work on inflammation and studied the behaviour of the blood during that process.

5. Lister soaked in a solution of carbolic acid the hands of the surgeons and his assistants, and all the instruments to be used for the operation.

Exercise 7

Active and Passive verbs

Fill in the blanks by choosing the correct form, active or passive, of the verb in brackets.

1. Until the middle of the nineteenth century surgery _____ (follow) by fatal infection.
2. The smell of pus _____ (prevail) everywhere
3. Attendants and patients _____ (Tease) out threads out of the old linen cloths which had been boiled several times.
4. The instruments used for a surgical, operation _____ (wash) with cold water.
5. It _____ (find) that spraying of the atmosphere was not necessary.
6. A compound fracture never _____ (do) well
7. Lister _____ (learn) from the research of Louis Pasteur that organisms in the air caused the sepsis.
8. Lister _____ (use) carbolic acid in a systematic manner to prevent suppuration entirely in the affected part.
9. Lister's ideas _____ (appreciate) by the German surgeons and gained popularity.
10. Lister _____ (test) his antiseptic principle on 12 August 1865.

Relative Clauses

Exercise 8

Structures can be linked by using defining and non-defining relative clauses. Study how they are used in the examples given below.

1. Defining relative clauses
 - (a) Charpie was made out of old linen cloths.
 - (b) These cloths had become easily teased through frequent boiling.
- (a)+(b) Charpie was made out of old linen cloths which had become easily teased through frequent boiling.
 - (a) Attendants and patients teased out threads of varying lengths and thicknesses.
 - (b) The attendants and patients were not very ill.
- (a)+(b) Attendants and patients who were not very ill teased out threads of varying lengths and thicknesses.
 - (a) In a short time he was performing operations.
 - (b) The operations would not have been undertaken by any surgeon.
- (a)+(b) In a short time he was performing operations which wouldn't have been undertaken by any surgeon.

Sentences (a) are general and undefined. Sentences (b) tell us which 'cloths' 'attendants and patients', 'operations' is being referred to. That is why they are called defining clauses. They are put immediately after the noun they define. 'Who' is used for people, 'which' for things. There is a comma (,) before them.

Join the following sentences together as shown in the examples above.

1. The bone is called the femur. The bone extends from the hipbone to the knee.
2. The fluid makes up the internal environment. The fluid is contained in the blood and lymph.
3. The lacrimal gland is continually secreting fluid. The fluid keeps the eye moist and free from dust particles.
4. The portal vein carries to the liver the products of digestion. These products of digestion have been absorbed into the blood stream.
5. Juices play a part in the digestive process. The juices are secreted by the stomach, liver and pancreas.
6. Most of the energies derived from carbohydrates and fats. The energy is required by the body.

12.4 WRITING

Exercise 9

Here is an outline of the main ideas used in the reading passage. Complete it after reading the passage again.

Surgery before 1865 was very dangerous A compound fracture never did well Mortality rate from these diseases varied between 30% to 50% suppuration was caused by the effect of the atmosphere on the blood suppuration was due to oxygen in the air.....Lister learnt from Louis Pasteur that it was not..... but the living bacteria He used carbolic acidOn August 12,1865, he successfully experimented with his new..... for treating His revolution was.....

12.5 LET US SUM UP

In this unit we have given you practice in

- i) understanding a science passage dealing with the growth of the antiseptic principle for treating wounds.
- ii) drawing attention of the students of the way pronouns and demonstrations are used to refer to something already mentioned in the passage .
- iii) matching names of some of the specialists from medical science with their specialisation.
- iv) using active and passive form of verb
- v) using defining type of relative clauses.
- vi) writing a paragraph based on an outline provided.

12.6 ANSWERS TO THE EXERCISES

Exercise 1

1. A patient contracted a fatal infection and died.
2. A wound was not treated of its pus because there was the ancient belief that pus was a good and laudable sign of healing of the wound.
3. Charpie was used as a dressing because it was a soft and absorbent material.
4. The surgical instruments were cleaned with plain cold water before use.

5. Lister, like all other surgeons, was worried because a compound fracture always led to the removal of the affected limb and also increased the mortality rate of the patients.
6. Lister felt that it was either due to the effect of the atmosphere on blood or serum contained in the wound.
7. Lister tried to spend much of his time trying to exclude air from the wounds, and did not succeed in finding out a satisfactory explanation for the pus formation in the wounds.
8. Louis Pasteur's finding that living bacteria are present everywhere in the air helped Lister.
9. Lister learnt that it was not the air but the organisms present in the air, which caused sepsis.
10. Lister felt that these organisms must be killed before they found access to the wound.
11. Lister used carbolic acid for killing harmful organisms.
12. Lister sprayed the operating theatre with carbolic acid because he thought that it was necessary to keep the atmosphere clean to heal the wound. But gradually he realised that it was not essential.
13. Lister was the first person to introduce the antiseptic principle for treating wounds.

Exercise 2

1. Charpie, 2. amputation of the limb and high mortality rate from septic diseases. 3. the fact that living bacteria are everywhere present in the air, 4. Organisms, 5. antiseptic principle.

Exercise 3

- | | | | | |
|-------------|-------------|------------|--------------|----------------|
| 1. followed | 2. troubled | 3. Varied | 4. led | 5. Deduced |
| 6. Obtained | 7. soaked | 8. sprayed | 9. performed | 10. Undertaken |

Exercise 4

- | | | | | |
|---------------|------------|---------------|--------------|--------------|
| 1. Protracted | 2. Fatal | 3. Gruesome | 4. Doctrine | 5. Slightest |
| 6. Laudable | 7. Varying | 8. Amputation | 9. Mortality | 10. Dreadful |
| 11. Exclude | 12. Access | 13. Infirmary | 14. Favour | 15. Advances |

Exercise 5

- | | | | | |
|-----------------------|---------------------|--------------------------|---------|---------------------|
| 1. eyes | 2. nerves | 3. Heart | 4. skin | 5. women's diseases |
| 6. nature of diseases | 7. mental illnesses | 8. illnesses of children | | |

Exercise 6

1. Lister not only washed all his instruments in carbolic acid but also sprayed it into the atmosphere
2. German surgeons not only understood the importance of Lister's method but also adopted them immediately.
3. The patients not only contracted fatal infection but also fell prey to death
4. Lister not only carried out important work in inflammation but also studied the behaviour of the blood during that process.
5. Lister soaked in a solution of carbolic acid not only the hands of the surgeons and assistants but also the instruments to be used for the operation.

Exercise 7

1. was followed, 2. Prevailed, 3. Teased, 4. were washed, 5. was found, 6. did, 7. Learnt, 8. Used
9. were appreciated, 10. tested

Exercise 8

1. The bone, which extends from the hip-bone to the knee is the femur.

2. The fluid, which is contained in the blood and lymph, makes up the internal environment.
3. The lacrimal fluid is continually secreting fluid, which keeps the eye moist and free from dust particles.
4. The portal vein carries to the liver the products of digestion, which have been absorbed into the blood stream.
5. Juices, which are secreted by the stomach liver and pancreas, play a part in the digestive process.
6. Most of the energy, which is required by the body, is derived from carbohydrates and fats.

Exercise 9

Surgery before 1865 was very dangerous. It led to fatal diseases and even death. All wounds suppurated. A compound fracture never did well. Amputation of the affected limb was inevitable. Amputation led to septic diseases. Mortality rate from these diseases varied between 30 percent to 50 percent.

Lister had believed that suppuration was caused by the effect of the atmosphere on the blood or serum contained in the wound. Like many others he had also thought that suppuration or putrefaction was due to oxygen in the air. He learnt from the research of Louis Pasteur that it was not the air, but the living bacteria in the air, which caused sepsis. He decided to use carbolic acid to clean the atmosphere of the operation theatre, the instruments used and the hands of the surgeons and the assistants. He found suitable dressing materials, which would give off the carbolic acid in the wound. On August 12, 1865, he successfully experimented with his new antiseptic principle for treating. His revolution in surgery was received favourably both in Scotland and Germany.