**Why and wherefore in first-aid : (difficulties in first-aid solved by question and answer) / by N. Corbet Fletcher.**


**Contributors**

Fletcher, N. Corbet.

**Publication/Creation**

London : Joh Bale, Sons & Danielsson, 1914.

**Persistent URL**

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# Why and Wherefore in First-Aid

By N. CORBET FLETCHER
M.B., M.R.C.S.

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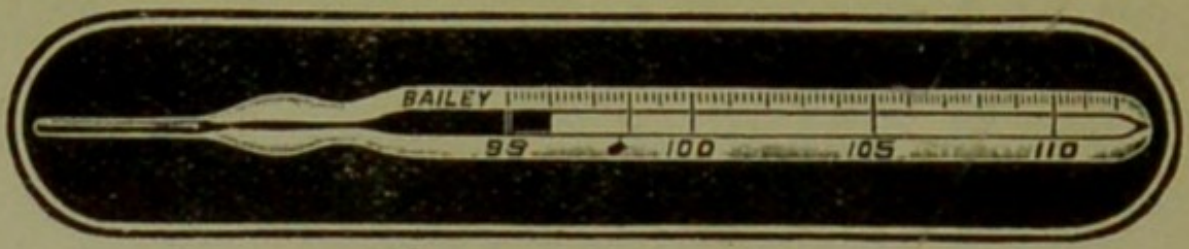


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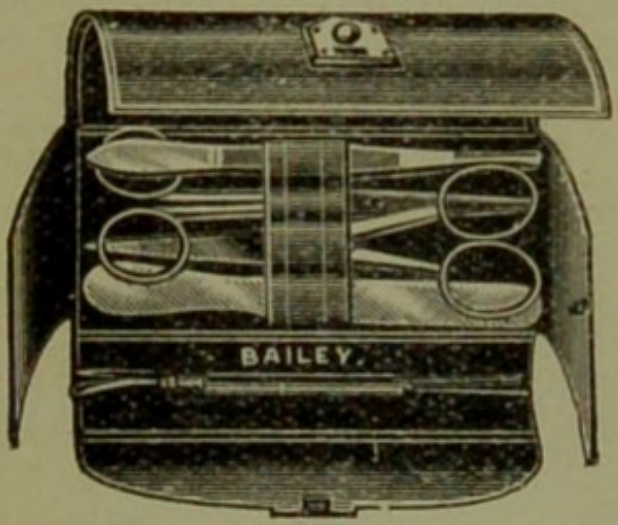


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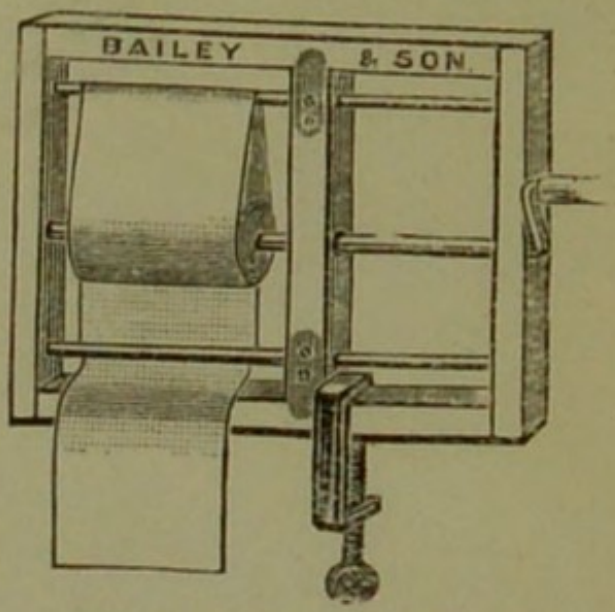


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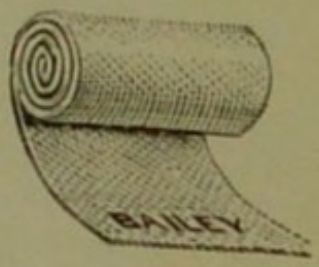


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# WHY

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IN

# FIRST-AID

(Difficulties in First-Aid solved by Question and Answer)

BY

N. CORBET FLETCHER,

B.A., M.B., B.C.Cantab., M.R.C.S.Eng.

Author of "A Compendium of Aids to First-Aid,"
Surgeon Lecturer to L. and N. W. Rly. Ambulance Centre,
Examiner and Lecturer to St. John Ambulance Association and to
the British Red Cross Society.

*A clever Question is half-way towards Knowledge.*—Bacon.

LONDON

JOHN BALE, SONS & DANIELSSON, Ltd.

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1914

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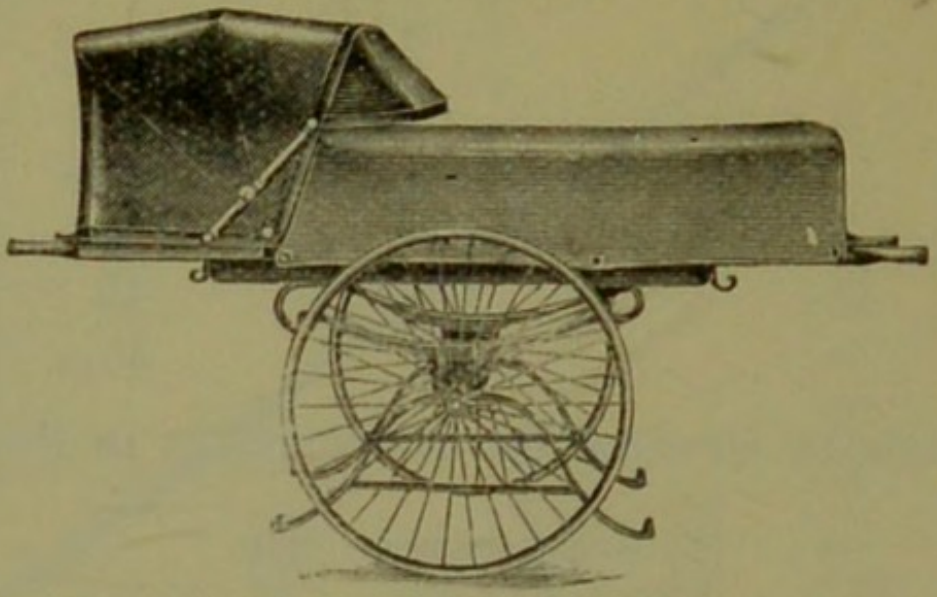

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# PREFACE.

THESE Queries and their Answers are supplementary to my *Compendium of Aids to First-Aid*, the ever-increasing popularity of which has encouraged me to persevere in my attempts to assist all earnest Students of First-Aid.

They were first prepared for my Broad St. Ambulance Class to explain some of the Difficulties in First-Aid and in our Official Text-book. Together with numerous additional Queries, which followed their appearance, they are now produced in this booklet at the urgent requests of many who read them in their original form.

I am aware that the Difficulties of any subject can only be appreciated when Teachers and Pupils combine together to present their special points of view. In answering each Query, therefore, I have endeavoured to place myself in the position of the Student who actually asked the question.

If my Book succeeds in clearing away some of the Difficulties, and if it helps Students in their efforts to attain to Efficiency in First-Aid, then my object is accomplished and my labour is amply rewarded.

166, *Haverstock Hill*,
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N. CORBET FLETCHER.

*September*, 1914.

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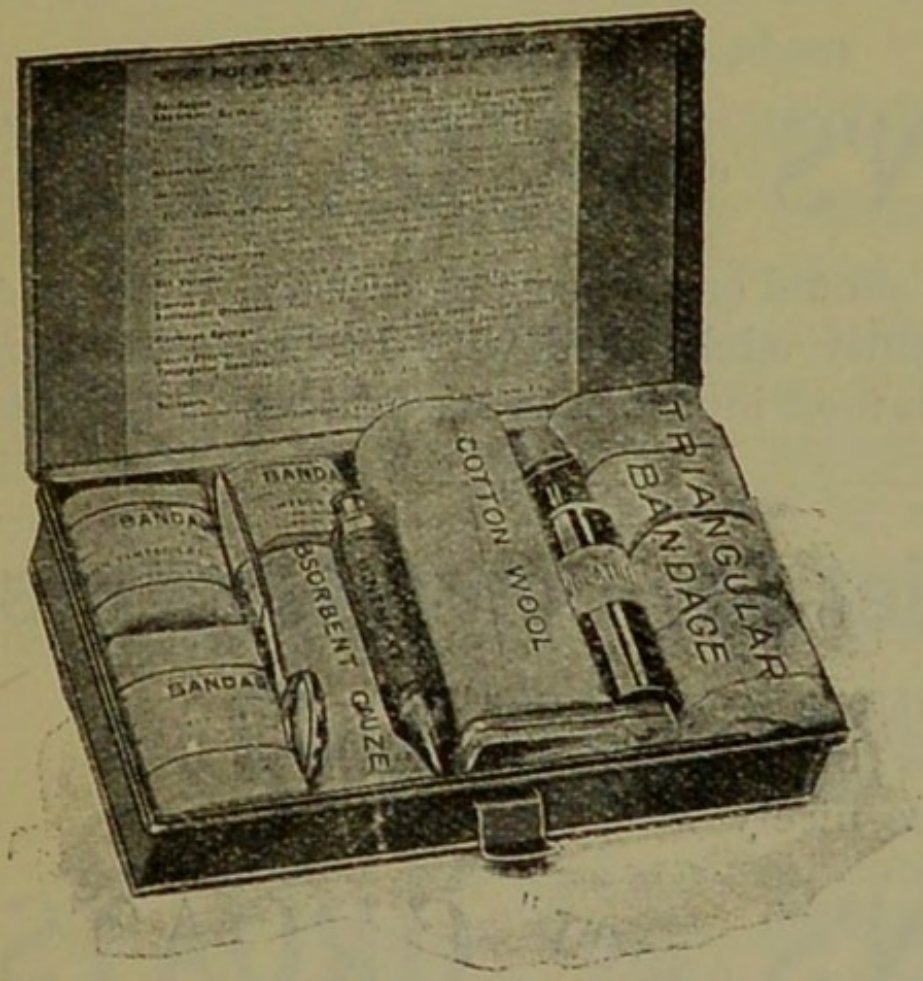


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# WHY AND WHEREFORE

IN

# FIRST-AID.

## CHAPTER I.

## INTRODUCTORY.

THE "Why-and-Wherefore" Attitude is the secret of success in the Study and Practice of First-Aid. In the Difficulties of the Subject it demonstrates that appreciation which is the root and substance of **Knowledge**. If combined with **Commonsense**, it assists and encourages us in our pursuit of the **Experience**, by which we hope in the examination room and in the street emergency to give unmistakable evidence of our Efficiency in First-Aid.

### (1) Appreciation of Principles and Difficulties of First-Aid.

These three—Knowledge, Commonsense, and Experience—are the Primary Factors, on which the Principles of First-Aid depend, and without which Efficiency, viz., the power to carry out the objects intended, cannot be attained. Thus, **Knowledge** makes us *resourceful*, *explicit*, and *discriminating*; **Commonsense** helps us to be *heedful*, *observant* and *tactful*; and **Experience**, which is the personal trial and testing of the teachings of Knowledge and Commonsense, enables us to deal effectively with the

*Cause*, *Hæmorrhage*, and the *Removal* of the patient, to exercise a wise choice of *Emetic*, and to provide *Air Warmth*, and *Rest* for the patient and the part.

Under these circumstances, if we pause to consider how we may cultivate to the best advantage this critical "Why and Wherefore" attitude, then we shall agree that Knowledge of First-Aid is acquired partly from Text-books, Lectures, and Demonstrations, and partly from Practice Classes, in which questions and answers occupy a most important part.

To attain Efficiency, therefore, we must utilize all these sources of Knowledge and more particularly the Practice Classes, wherein, if we make it a regular custom to answer the questions set on every possible occasion, we shall test, correct, and increase our Knowledge and shall acquire Experience which will be invaluable in detecting, appreciating, and overcoming our Difficulties both in Study, and in actual Treatment.

## (2) Application of Principles to Difficulties.

The outstanding Difficulties in Examination and in Treatment are to realize and cope with the varying Requirements of the Question or Case, and at the same time to apply the Principles of First-Aid. This combination may be obtained, as follows :—

In the handling of each emergency we must establish at the outset the General Rules of the particular condition, and, keeping them prominently in our minds, we must rapidly review the Principles of First-Aid and convince

ourselves that, in carrying out the General Rules, we shall not neglect any of the main Principles. For example, in the treatment of a compound fracture with arterial hæmorrhage we must first apply the General Rules of Hæmorrhage, in accordance with which we have to consider the position of the patient, the elevation of the part, digital pressure, &c., whilst we pay attention meanwhile to the possibilities of aggravation of the fracture. This done, we must bring into play the General Rules of Fractures, which teach us first that the broken bone requires immediate fixation and support together with careful splinting and bandaging, and secondly that careful and steady handling is throughout essential. In carrying out these Rules, we avoid or modify any step which might have a harmful effect on the recently treated hæmorrhage.

When, therefore, we are satisfied that we have treated the patient and the part in strict accordance with the General Rules of both Hæmorrhage and Fractures, then we must apply the Principles of First-Aid and practise our "Why-and-Wherefore" attitude by asking ourselves a series of questions. Have we been *resourceful* and used to advantage what is at hand? Have we been *explicit* and given proper instructions? Have we been *discriminating* and treated the most important injury first? Similarly, we must question ourselves on the removal of *Cause*, the provision of *Air* and *Rest* for patient and part, the maintenance of *Temperature of Body*, &c., &c.

Briefly put, the General Rules must in each case, whenever practicable, be moulded and welded to the Principles of First-Aid.

## (3) Classification of Difficulties with Key-word.

Success in answering questions fully and correctly, and in treating any given emergency methodically depends, as we have just seen, on the development of some definite Scheme, absence of which may depreciate the value of the answers given and the treatment advocated.

This disadvantage exists also in the handling of the present series of questions, which were originally collected from many and various sources in response to inquiries into the Difficulties actually experienced by First-Aiders. Further, it creates a need for the adoption of some definite scheme, if these indiscriminate queries are to be marshalled and answered satisfactorily, and if they are to possess any real educational value.

A similar necessity was noted a short time ago in an examination, when there were set a number of plain, straightforward questions, which were not well answered. These were difficult only because, if complete and comprehensive answers were to be given, some means of reviewing rapidly the whole range of First-Aid was essential.

One of the questions was :—

**In what conditions (and how) does the Patients' Face afford valuable Suggestions in First-Aid Diagnosis ?**

If, without looking at the solution given below, we consider this concrete example, and more especially if we remember that we are all more or less conscious of some degree of nervousness in an examination, then we shall

realize the Difficulties of ensuring that our answer shall include each and every possible condition. In fact, these systematic solutions prove that the questions had a much wider scope than even the examiner realized.

In attempting, therefore, to grapple with the Questions, a Tip or Key-word (see my *Compendium of Aids to First-Aid*) was found—viz., **MISHAPS**—which covers all the common Emergencies of life and comprises :—

I. **MAIMS** (fractures, dislocations, sprains) ;
II. **INSENSIBILITY ;**
III. **SCALDS** AND OTHER LOCAL INJURIES (burns, bruises, bites, bee stings, foreign bodies, &c.) ;
IV. **HÆMORRHAGE** (and WOUNDS) ;
V. **ASPHYXIA ;**
VI. **POISONING** (accidental and suicidal) ; and
VII. **SHOCK.**

---

Working on this Scheme, therefore, we should obtain an answer to this Question somewhat as follows on the next page, and we may thus summarize our conclusions.

The patient's **Face**, through changes in its Colour, Folds, and Expression, affords us valuable suggestions as to condition of the **Circulatory** and **Nervous Systems.** Together with the Eyes, it demonstrates the degree of **Pain, Shock** and **Exhaustion** (especially in hæmorrhage) from which the patient is suffering. For these reasons it constitutes, as we shall see later, an important **Standard Guide** and indicator of the patient's general condition.

| | | |
|---|---|---|
| **M** | **Maims.** | |
| | *a.* Fractures. | If Pain severe—Face pale; Expression drawn, anxious. |
| | *b.* Dislocations. | If Shock marked—Face white; Lips blanched. |
| | *c.* Sprains. | Pupils equal, contracted. |
| **I** | **Insensibility.** | |
| | Apoplexy. | Face flushed. Lips and ears red. Expression |
| | Compression. | immobile. Alteration in Folds of *one* side, or |
| | Alcoholism. | of size and reaction of Pupils suggest Brain mischief. |
| | Epilepsy. | Signs of Asphyxia during fit. Otherwise, Face pale, immobile. |
| | Concussion. | Face and Lips pale. Pupils equal, contracted. Folds normal. Expression immobile. |
| **S** | **Scalds.** | |
| | **B**urns. | Face may be normal, or, if local injury severe, |
| | **B**ruises. | suggestive of Pain and Shock. |
| | **B**ites of Animals. | Injury may be to Face itself and visible. |
| | **B**ee-stings, &c. | |
| **H** | **Hæmorrhage.** | If bleeding severe, Face white; Lips blanched. Expression pinched, anxious. Pupils dilated. |
| **A** | **Asphyxia.** | Face (lips and ears) blue. Eyes staring, prominent and bloodshot. Expression terrified. Pupils dilated. |
| **P** | **Poisoning.** | |
| | *a.* Corrosives. | Burns lips, tongue. Face pale, may be livid. Expression drawn, anxious. Pupils equal. |
| | *b.* Irritants. | Signs as for Corrosives, but slower in onset. |
| | *c.* Narcotics. | Face pale or slightly bluish. Expression sleepy or comatose. Pupils contracted (Opium, pinpoint). |
| | *d.* Irrito-Narcotics. | Face flushed. Lips livid. Eyes prominent, staring. Expression anxious (Strychnine, terrified and signs of Asphyxia during paroxysms). |
| **S** | **Shock, &c.** | Face pale, white. Lips blanched. Expression anxious. Pupils contracted. |

As a further proof of the value of a Scheme, we may add another of these questions, and endeavour to write down the solution before we study the answer, which has been worked out and is attached below. The Query was worded thus :—

**In the Treatment of what conditions (and why) do you recommend the External Application of Warmth.**

In this question also it is evident that the answer, which must be given to obtain a good percentage of marks, is not so simple as it appears at first sight. If, however, we make use of our Key-word, then we shall be able to satisfy ourselves that we shall at any rate remember the most important conditions for which the External Application of Warmth—either as fomentations to the part or as blankets to the patient—would be necessary and should be recommended.

We may, therefore, anticipate the solution of this Query by laying down the facts that **External Warmth** is advisable and should be recommended in all conditions in which the Patient is exhibiting signs of severe **Shock** and **Collapse**, and also when we have to alleviate **Pain** in the Part (which may be due either to inflammation or to bruising and distension with blood) and to deal with or to anticipate **Wound-poisoning.** The ways in which these various objects are accomplished will be discussed, each in its proper place, in the Queries.

———

| | | |
|---|---|---|
| **M** | **Maims.** | |
| | *a.* Fractures.<br>*b.* Dislocations.<br>*c.* Sprains. | If Pain severe, Warmth will soothe, and later promote absorption of effused blood. If Shock marked, Warmth supports Body Temperature. |
| **I** | **Insensibility.** | |
| | Apoplexy.<br>Alcoholism.<br>Compression.<br>Concussion. | Warmth supports Body Temperature and prevents loss of heat, which follows dilatation of superficial vessels due to the abeyance of functions of Brain. |
| **S** | **Scalds, &c.** | |
| | Burns.<br>Bruises.<br>Bites of Animals.<br>Bee-stings. | Warmth anticipates the onset of Shock and Collapse, which may accompany each of these conditions. It also soothes Pain, prevents Wound-poisoning; and in Animal Bites promotes free Hæmorrhage. |
| **H** | **Hæmorrhage (and Wounds).** | Boracic Fomentations ease Pain, and prevent Wound-poisoning. |
| **A** | **Asphyxia.** | When breathing is re-established, Warmth anticipates and prevents Shock, Exhaustion and Relapse. |
| **P** | **Poisoning.** | |
| | *a.* Corrosives. | Warmth minimizes Shock and Exhaustion. |
| | *b.* Irritants.<br>*c.* Narcotics. | Warmth is invaluable for Collapse, and may be made useful for keeping patient awake. |
| | *d.* Irrito-Narcotics. | Warmth is indicated for Collapse and Exhaustion. |
| **S** | **Shock.** | Warmth supports Body Temperature, and combats the Depression of the Heart and Nervous System. |

## (4) Formation of Scheme with Key-word.

If, therefore, we borrow this list, we have at once a workable Scheme, on which we may tabulate our Answers to a miscellaneous list of Questions. Further, in the following Chapters we shall adopt the plan of writing down the Queries and of dividing our Answers into two portions. In the first, we shall endeavour to meet the Difficulties raised by each Question with a definite and concise explanation; in the second we shall follow this up with a general criticism on the point or points at issue, with which we shall deal at greater length. By this means we hope to clear up the Difficulties which beset the Student who at one time or another asked the question. Lastly, we shall end each Chapter with a Summary of the Questions which have been discussed, and which will then be available for revision at leisure.

# CHAPTER II.

## MAIMS.

### PART A.—FRACTURES.

**(1) How can we classify Fractures?**

There are three main groups and three sub-groups.

---

Fractures may be classified according to their Effects into three main groups—Simple, Compound, and Incomplete; and according to their Complications into three sub-groups—Complicated, Comminuted, and Impacted.

This division is superficial and arbitrary. We must not imagine that, as their names imply, a Simple fracture is less serious than a Compound, because the so-called Simple fracture may prove more difficult to set, and later on be longer in re-uniting than the Compound, although the **immediate** dangers of the latter—Hæmorrhage, Shock, and Wound-poisoning—are more pronounced.

**(2) Why mention, if we may not seek for, Mobility and Crepitus?**

Unless we realize the full significance of these Signs, we may ignore them with disastrous results to the fracture and the patient.

---

These Signs are specially mentioned in the Text-book because they may present themselves during our handling

of the patient. Mobility of a fracture is the movement of the broken fragments, of which Crepitus (bony grating) is the expression, as appreciated by our Sense of Touch.

**Mobility** is a reliable sign of fracture, search for which is left to experienced hands, because careless or ignorant manipulations of the broken bone will increase the internal damage already present, and may convert a Simple into a Compound or Complicated fracture. **Crepitus** is a most unreliable sign, and is open to serious errors in diagnosis.

**(3) What do we mean by the terms Deformity and Irregularity?**

Deformity refers to the limb and is apparent to the sense of Sight. Irregularity is applied to the fracture and is more palpable to Touch than Sight.

---

The difference between these terms is best illustrated by the following examples: With a Fractured Clavicle, the dropped shoulder and the tilted head of the patient are palpable to Sight and constitute **Deformity;** whereas the **Irregularity** or alteration in the form of the bone at the seat of fracture may only be detected with the fingers by the sense of Touch. Again, with Fractured Fibula or Ribs there may be no apparent Deformity; but Irregularity in the line of bones will probably be detected by the fingers during examination. In the latter instances, therefore, Irregularity is present without Deformity.

**(4) With Fractures, what are the chief Dangers, apart from aggravation of fracture?**

Shock, Hæmorrhage, and Wound-poisoning.

---

With Fractures, as in all conditions in which First-Aid may be necessary, these three dangers may arise, though in this instance they are most to be feared when the Fracture is Compound, Complicated or Comminuted. Further, the last two—**Hæmorrhage** and **Wound-poisoning**—will aggravate and increase the effects of the first—**Shock**.

In the prevention of Wound-poisoning, the avoidance of any unnecessary manipulation of the wound, and the application of a dry antiseptic dressing (Boracic lint) are most conducive to success.

**(5) With Fractures, how do we estimate the Effects on Patient?**

Our Standard Guides supply proofs of these Effects.

---

In estimating the Effects of an Emergency upon the Patient, we must have some definite objects; and, for this reason, we have adopted the term **Standard Guides,** which remind us of the most important factors and include the degree of **Consciousness**, the **Face,** the **Pulse,** and the **Breathing**.

With Fractures, these **Guides** vary considerably because they depend upon the exact nature of the local injury and upon the Pain, Shock and Hæmorrhage, which may be present. Thus, the patient may feel faint or be *Insensible;* his *Face* may be normal in colour, or extremely pale; his *Pulse* may be regular and strong, or rapid and weak; and his *Breathing* may be easy and natural, or rapid and weak.

In all emergencies, therefore, we establish a Golden Rule and **Watch the Standard Guides.**

**(6) Can a Fracture be Complicated, Comminuted, and Compound?**

This rare fracture is commonly the result of a bullet-wound.

---

One or more of the sub-groups of fractures may complicate each of the first two main groups. Thus, if a cart knocks a man down in the street, and if one of its wheels, passing over his leg, inflicts a **wound** which exposes the tibia, causes an **injury** to a large artery or nerve, and produces a **fracture** of the bone into three or more pieces —then we have a Compound, Complicated, and Comminuted fracture.

Lastly, we always remember our Golden Rule and **When in doubt, Treat as more serious injury.**

**(7) Why do bones of children bend and not break?**

The bones are partially developed, pliable, and more resistent to external violence. Therefore, they may bend without breaking.

---

**Greenstick** fracture is commonly found in young people, and usually affects the long bones. It consists of a break of one part of the thickness of a bone with a bending of the remaining portion, just as a green stick will partially snap when applied forcibly across the knee. This is due to the fact that the bones are chiefly composed of cartilage, and that the lime salts have not yet been deposited.

**(8) Why do bones of old people break so easily?**

The bones become thin and brittle with advancing years.

---

In old age a process of absorption (especially in certain parts—*e.g.*, neck of femur) occurs in the long bones, and renders the long bones so frail that a slight degree of violence will often produce a fracture.

**(9) In splinting a fracture, why apply upper bandage first?**

The upper fragment of a fracture, being the more liable to movement, must be the first secured.

---

**First control the fracture, then control the Splints** is the Golden Rule in the successful treatment of fractures. In a fractured bone the lower fragment is more or less cut off by the break from the movements of the muscles. Therefore, when we control the splints, we fix the upper fragment by applying the upper bandage first. Otherwise, while we are tying the lower bandage, the upper fragment may slip and cause us to lose control of the fracture.

**(10) In bandaging a limb, why do we commence at the fingers?**

The reverse process would tend to obstruct the circulation of the limb.

---

**Bandaging** a limb differs from **splinting** in that we always bandage from below upwards. If we fixed our bandage high up and worked downwards, we could not

avoid some interference with the circulation, especially the venous return of the blood. Further, we always leave the extremities exposed (*e.g.*, finger-tips) so that we may quickly recognize and remedy undue pressure effects.

**(11) With Fractured Base, why may signs be present in Ear, Eye and Nose?**

Each organ is in direct communication with the Base of Skull.

---

The involvement of these organs depends on the actual position of the fracture. In the Base of the Skull there are numerous openings through which the nerves and vessels for the organs pass, and along which blood and clear brain fluid may escape and present themselves at the organ, when a fracture has occurred.

It is important to note that these signs may be entirely absent, and that in our diagnosis we may have to depend on the history of the accident and the loss of consciousness.

**(12) With Fractured Clavicle, why place pad in armpit?**

The pad performs the functions of the broken collar-bone.

---

The clavicle acts as a prop or stay in keeping out the shoulder, which, when this bone is broken, tends to fall forward and inward. Therefore, by placing a pad in the armpit we form a lever with the long armbone, the lower end of which we bind to the side; in so doing, we exert pressure on the pad as a fulcrum and lever out the point of the shoulder.

**(13) With Fracture of both Clavicles, why are pads unnecessary?**

The method adopted braces up the shoulders, by traction of back bandage.

———

In the former method the pad helps to keep the shoulder back. In this method the back bandage fixes both shoulders and keeps them in their correct position, not by leverage but by direct traction.

**(14) With Fractured Clavicle, why use the St. John Sling?**

This sling cannot cause pressure on the fractured collar-bone.

———

The St. John Sling is useful for any serious injury (fracture, wound, burn, &c.) in the region of clavicle and point of shoulder, when pressure must be avoided in these parts. Further, with Fractured Clavicle it raises the elbow, and tends to bring the outer fragment, which is pulled down by the weight of the arm, into apposition with the inner.

**(15) With Fractured Elbow, why remove splint on arrival at home?**

To avoid possible pain and discomfort.

———

During Transport the angular splint is necessary to prevent further aggravation of injury. On arrival at shelter, however, it should be carefully removed, because the swelling of the joint (which will always develop subsequent to the accident) may cause pain which might be increased by the pressure of the Splint.

**(16) With Fractured Sternum, how should we remove patient to shelter?**

The patient is best removed recumbent and on stretcher.

———

In placing the patient upon the stretcher, the method detailed for Fractured Spine is most suitable, because thereby we shall avoid causing increased pain to the Patient and aggravation of injury to the Part.

A similar course of action should be adopted in removal, when necessary, of a case of Complicated Fracture of Ribs.

**(17) With Fractured Ribs, why is patient inclined to injured side?**

This position limits the movements of the injured, and gives free scope to those of the uninjured, side of chest.

———

When the ribs of one side are broken, there will be a diminished range of movements. For the proper supply of air, therefore, the patient is dependent on an increased activity of the sound side, which must not be handicapped in its movements. By inclining the patient toward the injured side, we accomplish both objects; and, above all, we carry out our Golden Rule—**Fix Fracture First.**

**(18) With Fractured Ribs, why use Sling when patient is recumbent?**

The sling controls the arm and helps to keep the fractured ribs at rest.

———

The muscles of the upper arm and the ribs are so interwoven that the slightest change in the position of the former

will pull on the ribs. Therefore, just as in splinting a fracture we apply the upper bandage first to control the upper fragment, so in this case, even when the patient is recumbent, we use a sling, which controls the arm and prevents any movements of the muscles attached to the ribs.

**(19) With Fractured Spine, should patient be placed upon his back?**

No unnecessary movement is allowable in such cases.

---

In this, as in all cases of First-Aid Treatment, the object is prevention of further injury. If the patient is found lying on his face, and if his removal in the absence of the doctor is necessary, then it is advisable to take steps to **remove him in the same position as found.**

Otherwise, in turning him we may injure the spinal cord, while we render subsequent expert examination of the part more difficult, and we expose the patient to pressure on the fracture with consequent increased pain and discomfort. In other words, we act according to our Golden Rule and **Avoid meddlesome First-Aid.**

**(20) With Fractured Patella, why raise leg and shoulders?**

The muscles are relaxed, and the fragments are kept in apposition.

---

The strong thigh muscles in their lower part spread out into a sheath of fibrous tissue, which encases the patella and is attached to the head of the tibia. When the knee-cap is broken, this fibrous sheath will limit the separation

of the broken fragments. To attain this object, therefore, we raise the leg and shoulders, and in so doing we relax both thigh and abdominal muscles, which are inter-dependent.

* * * *

## PART A.—**Summary of Fracture Queries.**

(1) How can we classify Fractures ?

(2) Why mention, if we may not seek for, Mobility and Crepitus ?

(3) What do we mean by the terms Deformity and Irregularity ?

(4) With Fractures, what are the chief Dangers, apart from aggravation of fracture ?

(5) With Fractures, how do we estimate the Effects on Patient ?

(6) Can a Fracture be Complicated, Comminuted and Compound ?

(7) Why do bones of children bend and not break ?

(8) Why do bones of old people break so easily ?

(9) In splinting a fracture, why apply upper bandage first ?

(10) In bandaging a limb, why begin at the fingers ?

(11) With Fractured Base, why may signs be present in Ear, Eye, and Nose ?

(12) With Fractured Clavicle, why place pad in armpit ?

(13) With Fracture of both Clavicles, why are pads unnecessary ?

(14) With Fractured Clavicle, why use St. John Sling ?

(15) With Fractured Elbow, why remove splint on arrival at home ?

(16) With Fractured Sternum, how should we remove patient to shelter?

(17) With Fractured Ribs, why is patient inclined to injured side?

(18) With Fractured Ribs, why use sling when patient is recumbent?

(19) With Fractured Spine, should patient be turned upon his back?

(20) With Fractured Patella, why raise leg and shoulders?

## Part B.—DISLOCATION OF JOINTS.

**(1) In Dislocation of Joint, what are the Causes?**

Direct, Indirect and Muscular Violence.

---

It is noteworthy that the same Causes which may produce a Fracture will at times result in Dislocation. Thus, a blow on the hand—*e.g.*, with a fast-travelling cricket ball—may cause **Direct Dislocation** of one or more of the digital joints; a fall upon the hand may be followed by **Indirect Dislocation** of the shoulder or elbow-joints; excessive action of the muscles—*e.g.*, in yawning—may be complicated by a **Muscular Dislocation** of the Jaw. Lastly, since a Sprain of Joint is a "missed" Dislocation, the same Causes may give rise to Sprains.

**(2) In Dislocation of Joint, why is Numbness present?**

The head of the displaced bone presses on the nerves and blood-vessels in its neighbourhood.

---

This pressure on the nerves and blood-vessels often produces numbness at the seat of injury and tingling (pins and needles) sensations below the joint, in consequence of this irritation of the nerves and interference with the local circulation.

**(3) With Compound Dislocations, what are the chief Dangers?**

Hæmorrhage, Shock, and Joint-poisoning (Sepsis).

---

The injury to adjacent blood-vessels may give rise to **Hæmorrhage,** which may be external or internal, causing in the latter instance marked swelling of the joint. Further, the damage done to the neighbouring blood-vessels and nerves may culminate in severe **Shock.** Lastly, the joint may be infected (**Joint-poisoning**) and ultimately disorganized by the entry of germs through the wound.

The dangers of these Complications will be increased considerably by careless manipulations. For this reason no active treatment of joint injuries is allowable, because as our Golden Rule teaches us—**First-Aid duties end where the Doctor's begin.**

**(4) How does Dislocation resemble Sprain of Joint?**

In both, the ligaments and tendons round the joint are stretched and even ruptured. Both are usually due to external violence.

---

Dislocations of joints are comparatively rare, providing roughly one case to every ten fractures. Further, they affect chiefly the early adult age, being most frequently

seen between the ages of 20 and 40; and they are present in the upper limb in 85 per cent. of the total number of cases.

**(5) How does Dislocation differ from Sprain of Joint?**

Dislocation is an actual displacement; Sprain a momentary disturbance of one or more of the bones which form the joint.

---

Dislocations, having once occurred, are more liable than Sprains to recurrence. Further, the joints commonly affected by **Dislocations** are, in order of frequency, the shoulder, thumb, jaw, fingers, and elbow; by **Sprain,** the ankle, shoulder, wrist, and knee.

**(6) With Dislocations and Sprains of Joints, how does Treatment differ?**

The Treatment is identically the same for both conditions.

---

Dislocations, Sprains, and Fractures involving joints are peculiar, *partly* because they are similar in their Effects—the essential difference between them being that in the first-named there is an actual separation of the bones which form the joint—*partly* because in First-Aid they all require the same treatment, which in each instance covers distinct differences for outdoor and indoor emergencies.

* * * *

PART B.—**Summary of Dislocation Queries.**

(1) In Dislocation of Joint, what are the Causes?
(2) In Dislocation of Joint, why is Numbness present?

(3) With Compound Dislocations, what are the chief dangers?

(4) How does Dislocation resemble Sprain of Joint?

(5) How does Dislocation differ from Sprain of Joint?

(6) With Dislocations and Sprains of Joints, how does Treatment differ?

## PART C.—Sprains of Joints, &c.

**(1) What are the indications for External Applications?**

Pain, Hæmorrhage, and Wound-poisoning (Sepsis).

———

External Applications are used for three objects:—

i. To relieve **Pain**, due to bruising, hæmorrhage, &c.

ii. To reduce **Swelling**—due to hæmorrhage, inflammation, &c.

iii. To minimize or prevent **Wound-poisoning.**

As our Golden Rule tells us, **Cold Applications are indicated immediately after injury and Hot Fomentations later,** except when Pain and Inflammation demand the reverse. It is remarkable that in the first two of these conditions, Cold and Heat often produce the same result; and that the one may fail, where the other will succeed.

**(2) With Sprains, what are the indications for Cold Applications?**

Pain, Hæmorrhage, and Inflammation.

———

Cold contracts the muscular coats and promotes coagulation of blood in the small vessels. We, therefore, usually

resort to Cold Applications *immediately after an injury*, because we hope by these means to relieve **Pain,** to favour clotting, to limit the **Extravasation** of blood (which always results from local injuries, especially Dislocation and Sprain of the Joint), and to anticipate the onset of **Inflammation.**

**(3) With Sprains, what are the Contra-indications for Cold Applications?**

The presence of a marked degree of Shock, and the extremes of Age.

---

Cold Applications increase the **Shock,** which may be present. Further, they must be used *continuously* and not intermittently, because, unless so used, they will aggravate the inflammation owing to the alternate contraction and dilatation of the blood-vessels, which process, as in Frost Bite (by arresting and then accelerating the blood-stream) will lower the vitality and tend to destroy the tissues. For this reason, therefore, they must be avoided as far as possible with **elderly and very young patients,** except when urgently indicated by severe pain. Lastly, they are of no practical value after twenty-four hours.

**(4) With Sprains, what are the indications for Hot Applications?**

Pain, Hæmorrhage and Inflammation (Sepsis).

---

Heat, *especially when combined with moisture,* is particularly indicated in the treatment of inflammatory affections.

It acts in a diametrically opposite way to Cold, and causes a general dilatation of the smaller blood-vessels and a free flow of blood; but, though *moderate* Heat acts in this way, *extreme* Heat will stop **bleeding** by directly stimulating the muscular fibres of the vessels to contract.

We, therefore, advise Hot Applications *subsequent to the injury*, because by thus dilating the blood-vessels we wish to promote the absorption of the effused blood and so relieve **Pain**. When, however, there is **Inflammation** (leading signs — pain, redness, swelling) and **Wound-poisoning** already present, as in septic wound, or suspected, as in dog or snake-bite; or when the pain does not react to Cold, then Hot Applications are indicated immediately after injury.

**(5) What condition absolutely contra-indicates Hot Applications?**

Hernia—the dangers of which would be considerably increased by Heat.

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In the treatment of a **Hernia** (which is the result of abdominal strain, and is usually a protrusion of the bowel itself through the muscular walls of the abdomen) we *never* apply Hot Applications. These would dilate the blood-vessels, increase the congestion of the part, and hasten the process of strangulation of the bowel. On the contrary, we take all possible precautions to diminish the local congestion already present, *partly* by placing the patient in the position most suitable for the relaxation of his abdominal muscles, and *partly* by means of Cold Applications to the swelling.

**(6) Why does Heat act, when Cold fails to relieve pain?**

The Cause of the pain determines the success of the remedy.

---

As we have seen, when the inflammation is fully established, then Heat, by relaxing the vessels and tissues, will relieve the pain and tension, and will hasten the healing process. On the other hand, in the early stages of inflammation, when the pain is chiefly due to distension of the part with blood, then Cold, by controlling the local circulation, will be more efficacious.

* * * *

## PART C.—**Summary of Sprain Queries.**

(1) What are the indications for External Applications?
(2) With Sprains, what are the indications for Cold Applications?
(3) With Sprains, what are the contra-indications for Cold Applications?
(4) With Sprains, what are the indications for Hot Applications?
(5) What condition absolutely contra-indicates Hot Applications?
(6) Why does Heat act, when Cold fails to relieve pain?

# CHAPTER III.

## INSENSIBILITY.

**(1) What do we mean by Insensibility?**

Insensibility is a serious depression of the highest Brain Centres.

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Loss of consciousness signifies that, owing to a disturbance of the highest Nerve Centres by some Cause, the functions of the Brain are in abeyance. Further, we know that of these Centres the last to be affected are those which control the Breathing and the Circulation.

**(2) In Insensibility, why can Hæmorrhage be or not be "apparent"?**

The depression of the Brain Centres causes a slowing of the blood-stream.

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Any Cause which affects the Brain Centres and produces Insensibility must influence and **depress both the Respiratory and Circulatory Centres** to a greater or less degree: and, further, since the patient falls to the ground, it follows that heart and circulation are slowed, and that hæmorrhage "*may or may not be apparent*," even where there is an extensive wound of some part. In other words, Insensibility is Nature's First-Aid for hæmorrhage.

**(3) In Insensibility, what are the special Dangers in Treatment?**

Aggravation of injuries present and creation of others.

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**Aggravation of the injury** is a Danger, the possibilities of which, though present in all First-Aid Treatment, have a special significance when the patient is unconscious. Owing to his condition, such a patient is not able to give expression to the increased pain which is being caused and which would under other circumstances indicate the aggravation of injury.

The two other Dangers, which may be superadded to the Emergency, are Burns and Asphyxia.

**Burns** are caused by hot-water bottles more frequently than is usually believed. It should always be remembered that pain is felt not in the part affected, but in the Brain, which, since its functions are in abeyance, is unable to signal to the muscles to withdraw the part which is being burned or otherwise injured. For this reason, the testing and wrapping of hot-water bottles must never be neglected.

**Asphyxia** may be caused by the administration of food —fluid or solid—during *partial* or *complete* loss of consciousness, and we must on all occasions remember our Golden Rule—**To feed an unconscious patient is to kill him.**

**(4) In Insensibility, what are the indications for Artificial Respiration?**

Cessation of respiration, especially when the Cause is palpable and removable.

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The common forms of violent death, in which Asphyxia and Insensibility play leading parts, and for which Active First-Aid is urgently indicated, are Hanging, Strangulation, Drowning and Suffocation.

In all of these the loss of consciousness is due to an interference with respiration, which brings about a poisoning of the blood through deprivation of oxygen and thus *indirectly* causes paralysis of the Brain Centres.

In these conditions **the indications** for Artificial Respiration are **self-evident;** but in two groups of Insensibility, viz., the Narcotic Poisons, and the Nervous Affections (Shock, Collapse)—in which the interference with the breathing is *directly* due to poisoning and consequent paralysis of the Respiratory and Circulatory Centres, and for which Active First-Aid may be so essential—the evidence may not be so clear. **The clue** to the necessary treatment, therefore, **depends on the establishment of the Cause of the Emergency.**

**(5) In Apoplexy, why does one half of the body differ from the other?**

Each half of the Brain controls the opposite half of the body.

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The Brain is divided into two halves, each of which controls and directs the movements of the opposite half of the body. Therefore, when a blood-vessel bursts in one half of the Brain, the control of this half is cut off and produces a paralysis of one half of the body.

**(6) How far does Compression resemble Apoplexy?**

Except in mode of Causation, the resemblance is complete.

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Both conditions result from the bursting of a blood-vessel in the Brain and the consequent rise in the intracranial pressure; both may produce the same signs and symptoms; and both call for the same treatment. In Compression, however, **Accident;** in Apoplexy, **Disease** is the Cause of the ruptured vessel. The only difference, therefore, is the **mode of Causation.**

**(7) In Apoplexy and Compression, is paralysis always present?**

Paralysis of the face and limbs may or may not be present.

---

The diagnosis of Apoplexy rests on the Insensibility and on the absence of any external Cause. The paralysis, which depends on the actual position of the affected vessel, **may or may not be present.** Further, it is well to remember that the signs of paralysis are *usually delayed* and may not show themselves for some hours after the stroke. Compression differs only in that there are signs or history of Accidental Cause.

**(8) In Epilepsy, can we by any means prevent the movements?**

Nothing can prevent the convulsions, which must run their course.

---

Epilepsy is due to a sudden failure and loss of control of the highest Brain Centres. As in Apoplexy, complete loss

of consciousness is the outstanding feature; but in this condition the **Insensibility is always sudden and complete.** It may or may not be followed rapidly by the convulsive movements, interference with which is inadvisable, because it often creates an unconscious resistance by the patient and may cause rupture of the contracted muscles.

**(9) If we must speak to patient, why include Hysteria under Insensibility?**

The diagnosis of Hysteria in an emergency is open to serious errors.

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Hysteria is only a partial loss of consciousness, which results from the disturbance of the Brain Centres by some Cause, e.g., Anæmia, Alcoholism, and General Ill-health. It is included among the Causes of Insensibility, because it may be **difficult, even for experts, to differentiate** between it and certain other conditions, especially Epilepsy. It is, therefore, regarded and treated as a most serious condition, in accordance with our Golden Rule—**When in doubt, treat as more serious injury or condition.**

**(10) In Hysteria, has a Mustard Leaf any special value?**

It causes **local** pain, and also **reflex** stimulation of the Brain Centres.

---

Hysteria being a General Disturbance of the Nervous System, a mustard leaf is a valuable addition to treatment, *partly* because, acting through the sensory nerves of the skin, it reflexly **stimulates** both Heart and Respiration

and may restore consciousness after true Syncope; and *partly* because, as a local **irritant,** it produces pain, which may distract the patient from the performance of emotional acts and movements.

A mustard leaf, being also a **counter-irritant,** may be used in other conditions to relieve pain and congestion of internal organs.

**(11) In Brain Injuries, should Smelling Salts be used?**

Where we have reason to suspect Brain Injuries, we withhold Smelling Salts.

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As we shall see under "Shock," Smelling Salts have a true stimulating effect on the Brain-Centres through the nerves of smell. In cases of Brain Injuries, in which cerebral hæmorrhage might or might not be present, **they should always be withheld,** because they might aggravate or re-start the bleeding. Also, if we through carelessness upset the contents of the bottle we may cause severe burns of the patient's face and eyes.

**(12) In Alcoholism, what are the special Dangers?**

Dangerous Collapse of patient and Relapse after apparent recovery.

---

Alcoholism must always be regarded as a serious condition, and must be treated with the same care and consideration as any other Cause of Poisoning. Like Opium, it produces a narcotic effect on the Nervous System with its accompanying risks and danger of **Collapse,** and

it possesses the same liability to a **Relapse** or recurrence of the original condition.

Lastly, we must in this, as in all emergencies, apply our Golden Rule—**First-Aid Duties end where the Doctor's begin**—and leave it to the doctor to decide whether the patient *must* be sent to hospital or *may* be left in the care of the policeman.

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## Summary of Insensibility Queries.

(1) What do we mean by Insensibility?
(2) In Insensibility, how can Hæmorrhage be or not be "apparent"?
(3) In Insensibility, what are the special Dangers in Treatment?
(4) In Insensibility, what are the indications for Artificial Respiration?
(5) In Apoplexy, why does one half of the body differ from the other?
(6) How does Compression differ from Apoplexy?
(7) In Apoplexy and Compression, is paralysis always present?
(8) In Epilepsy, can we by any means prevent the movements?
(9) Why include Hysteria under Insensibility, if we must speak to patient?
(10) In Hysteria, has a Mustard Leaf any special value?
(11) In Brain Injuries, should Smelling Salts be used?
(12) In Alcoholism, what are the special Dangers?

# CHAPTER IV.

## SCALDS, STINGS, AND LOCAL INJURIES, ETC.

**(1) With Scalds and Burns, why may we not break Blisters?**

The unbroken Blister protects from Shock and Wound-poisoning.

---

The two great and pressing dangers of Scalds and Burns are Shock and Sepsis. If we break the blister we expose the subjacent raw surface to cold air and increase the danger of **Shock**, and also the risk of **Sepsis**, which would aggravate the effects of the Shock already present. Therefore we always take steps to protect and keep intact any blisters present.

**(2) With Burns, what are the Dangers?**

Shock, Wound-poisoning, and Hæmorrhage.

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This Query is repeated, because, when answering such a question on Burns, we are apt to overlook Hæmorrhage. The danger of this complication, if rare, is still very real, more especially when the Burn is caused by a strong electric current.

**(3) Why do we fear Burns in the region of the Neck?**

The nearer the Burn is to the trunk, the greater is the Shock.

---

Scalds and Burns are of great danger because they may cause death within the first twenty-four or thirty-six hours. This tendency depends on (i) the extent of area involved, and (ii) the position of the injury.

Burns about the chest and abdomen are especially dangerous, *partly* because they lay bare a very large surface area which is exposed to risk of **Sepsis**; and *partly* because, the nearer the burn is to the trunk, the more quickly will **Shock** appear and the more severe will be its degree.

**(4) With Burns and Scalds, what is the Cause of Shock?**

Shock is due partly to the mental effects, and partly to some unknown local cause.

---

The Causation of **Shock** is unknown; but it is thought that **a special poison**, which favours this condition, must be formed at the seat of injury. The evidence, on which this theory is based, is that signs of blood destruction and of inflammation of internal organs are found long before the tissues could possibly have been invaded by germs.

The **mental effects** depend *partly* upon the nature and extent of the injury, and *partly* upon the age, sex, and physical endurance of the patient. The younger and weaker the patient, the greater is the risk of Shock.

**(5) With Burns, why are oily substances best avoided ?**

Oily substances provide a medium favourable to germs, and increase the risk of Sepsis.

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These remedies render the subsequent cleansing of the injury more difficult, and, being liable to become rancid, favour **Wound-poisoning.** For this reason, even Carron Oil (historical in fame) is not advisable, except when it is combined with Eucalyptus Oil (10 per cent.), which makes the mixture antiseptic.

On the other hand, scrapings of raw potato are valuable in Treatment, because the potato is easily procurable, is **clean**, and consists chiefly of starch, which is **alkaline** (soothing) and **antiseptic**.

**(6) With Lime Burns, what precautions are necessary ?**

Water added to Lime makes a caustic ; weak vinegar, a harmless salt.

---

In the treatment of Lime Burns or of Eye Injuries due to Lime, it is essential to brush away as much lime as possible with a *dry* camel's hair brush, because the addition of water will slake the lime and aggravate the original burn. Further, if the part is then washed with a weak solution of vinegar or acetic acid, the lime, through its conversion into a harmless salt, will be robbed of its chief danger.

**(7) With Bites of Animals, what are the Special Dangers ?**

Hæmorrhage, Shock and Wound-poisoning.

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As we have seen under "Fractures," any question in examination on the Dangers of any stated condition invites our consideration of these three risks which may be called **the great Dangers of First-Aid**.

In this instance, the **Hæmorrhage** may be immediate or may be delayed—since we know that with contused and lacerated wounds the bleeding is usually slight, whereas with incised and punctured wounds it is more often profuse. **Shock** may be due either to physical pain or to mental emotion and fear of the consequences of the wound, when it may verge on Collapse.

**Wound-poisoning** may arise immediately, being due to the introduction of some *inevitable* poison, as with bites of rabid animals or venomous snakes; or, on the other hand, it may be delayed and may be caused by the *infection of the wound with germs* (Sepsis), either in spite of efficient treatment or as a consequence of careless handling of the wound.

(8) **With Dog and Snake Bites, why do we encourage Bleeding?**

Free Bleeding will remove any poison which may be present in wound.

---

An immediate **constriction** between the heart and the part obstructs the venous return of the blood; a **recumbent posture** of the patient slows the heart and *general* circulation; and a **pendant position** of the part limits the *local* blood supply. All these measures prevent the entry of the poison into the general circulation: but the promotion of **free bleeding from the wound** itself is most important,

because it will **wash away the poison**, which may be present and inevitable to the wound.

**(9 With Wasp and Plant Stings, what is the value of the Blue Bag ?**

The Blue Bag contains several alkalies and quickly supplies a sedative lotion.

---

A **Sting** is partly painful, partly itching in character. It is usually caused by the injection beneath the skin of some poison, which may be either animal (wasps, bees, gnats, mosquitoes) or vegetable (nettles) in origin.

In all cases of true stinging, an **irritant fluid**, thought to be of the nature of formic acid, is introduced. The secret of success in treatment is to apply *immediately* weak alkalies, which neutralize the acid poison introduced and soothe the wound. The **Blue Bag** is composed of **several alkalies,** of which soda is the chief constituent, and when *moistened with water* provides a most **suitable sedative** application.

**(10) With Wasp and Bee Stings, what is the peculiar Danger ?**

A rapidly fatal result may follow a sting, especially when the poison is injected into a vein.

---

The severity of the local injury and its constitutional effects depend on the **virulence** of the poison introduced, and also upon the peculiar **susceptibility** of the individual, each of which varies considerably.

In some patients there may be no appreciable effects,

whereas in others signs of dangerous **Collapse** may *immediately* intervene. In many of the fatal cases there is a history of grave symptoms which invariably developed after a sting, the dangers of which are increased tenfold, when the poison is injected directly into the circulation.

**(11) With severe Collapse, following a Wasp Sting, how should we act ?**

Free Stimulation with brandy is indicated, in addition to Supportive measures.

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When signs of grave Collapse rapidly develop after a sting, we must apply without delay our general **Supportive measures** (bed, blankets, hot-water bottles, &c.). Then, *if there is not an immediate response to this treatment*, we must resort to free and unstinted **Stimulation** with Brandy or Ammonia (Sal Volatile), on which the possibilities of recovery may depend. This we do, because the longer we can keep the heart acting, the greater will be the dilution of the poison and the less its depressing effects on the heart. This illustrates our Golden Rule that **Stimulants require Special Signs.**

**(12) With Foreign Body in Nose, how can we make a child sneeze ?**

By irritation of the lining of the nose.

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That *Tact* is necessary in our dealings with children is emphasized in this condition, in which it may be most difficult to induce sneezing. However, the twisted corner of a handkerchief or of a piece of paper, if applied to the

unaffected nostril, will usually produce the desired result, whereas we may not succeed in persuading the child to smell the pepper-box.

**(13) With Foreign Body in Ear, Nose or Stomach, what are the Dangers ?**

Any immediate danger is due to Meddlesome First-Aid.

---

Foreign bodies in these organs cause **no immediate danger, except from interference.** Thus, if a pea is present in Ear (or Nose), syringing with water will cause the pea to swell and will aggravate the condition, quite apart from the possibilities of injury to the delicate membrane of the ear.

Again, when a foreign body (especially a sharp-edged one), is present in the Stomach, we abstain from giving an emetic or an aperient, each of which might have serious consequences. In short, we must, as our Golden Rule teaches, **Avoid Meddlesome First-Aid.**

**(14) With Foreign Body in Eye, how can we facilitate eversion of eye-lids ?**

Make patient turn eye-ball away from the lid under examination.

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*If a doctor is not available,* eversion of the lids may be necessary. This examination is rendered more easy, if we can persuade the patient to look directly upwards when we are exploring the lower lid ; and again to keep his eyes fixed on the ground while we are everting the upper lid. In

other words, the patient must **turn his eye away from the foreign body.**

* * * *

## Summary of Scald and Local Injuries' Queries.

(1) With Scalds and Burns, why protect Blisters ?
(2) With Burns, what are the Dangers ?
(3) Why do we fear Burns in region of neck ?
(4) With Burns and Scalds, what is the Cause of Shock ?
(5) With Burns, why are oily substances best avoided ?
(6) With Lime Burns, what precautions are necessary ?
(7) With Bites of Animals what are the Special Dangers ?
(8) With Dog and Snake Bites, why do we encourage Bleeding ?
(9) With Wasp and Plant Stings, what is the value of the Blue Bag ?
(10) With Wasp and Bee Stings, what is the peculiar Danger ?
(11) With Severe Collapse, following Wasp Sting, how should we act ?
(12) With Foreign Body in Nose, how can we make a child sneeze ?
(13) With Foreign Body in Ear, Nose, or Stomach, what are the Dangers ?
(14) With Foreign Body in Eye, how can we facilitate eversion of eyelids ?

# CHAPTER V.

## HÆMORRHAGE.

**(1) What are the Three Varieties of Hæmorrhage?**

Hæmorrhage may be External or Internal; or Combined External and Internal.

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It is important to recognize that, as there are three **Kinds** of Hæmorrhage—Arterial, Venous, and Capillary—so there are three **Varieties;** and more especially that External and Internal may be present together, in which case *the external loss, as compared with the internal,* may be insignificant.

For example, with Fractured Ribs the presence of a wound with slight bleeding might (unless we are careful to estimate its true effects) cause us to overlook the severe Internal Hæmorrhage from which the patient is really suffering.

**(2) With Arterial Hæmorrhage, what is the Natural Mode of arrest?**

Retraction of the torn vessel wall, and pressure of the deposited blood clots.

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If an artery is torn completely across, it contracts at the point of division and retracts within its sheath by reason

of the elasticity of its muscular wall. Further, the blood, which spurts from its open mouth, deposits itself in layers both in the now empty sheath and in the surrounding tissues in the form of blood-clot, until it constitutes a plug, which, in addition to the natural contraction of the artery-wall, stops the bleeding.

This process may succeed in a small artery, *e.g.*, a digital artery, but if the vessel is a large one—*e.g.*, the femoral—then the current of blood will sweep away the clot, with fatal results, unless artificial methods be adopted without delay.

**(3) With Venous Hæmorrhage, what is the Natural Mode of Arrest?**

Collapse of vessel-wall and formation of blood clot.

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Venous Hæmorrhage is rarely severe except where there is some obstruction above the wound (*e.g.*, varicose veins, tight garter, &c.), and when the injured part is held in a dependent position. Further it will be aggravated by muscular strain and exertion.

Apart from these three Causes of Aggravation, Venous Hæmorrhage will usually react promptly to pressure aided by the natural collapse of the vessel wall and the deposit of blood clot.

**(4) With Capillary Hæmorrhage, what is the Natural Mode of Arrest?**

Collapse of capillary wall, and formation of blood clots.

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Capillary Hæmorrhage seldom gives rise to anxiety, and

usually undergoes **spontaneous arrest** which calls for little treatment. In this kind of bleeding, the clots are formed partly by the drying of the blood exposed to air, partly by the collapse of the vessel wall following the injury, and partly by a diminution in the pressure of blood in the small arteries.

**(5) With Arterial Hæmorrhage, may we always expect spurting?**

Blood will always spurt, if the artery is near the surface of the wound.

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When we have to deal with a wound, in which a deeply situated artery is injured, then the pulse-wave may be lost during the escape of blood through the tissues, and the blood may well up in a continuous stream from the injured vessel.

**(6) Why must Blood Clots not be disturbed?**

Blood Clots protect from Wound-poisoning and Reactionary Hæmorrhage.

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Blood Clots are Nature's First-Aid, and serve a double purpose.

First, they tend to **prevent further loss** of blood, as has already been explained; and, secondly, they **protect the wound** against the introduction of any poison from outside. For these reasons, they must not be disturbed.

**(7) What is Reactionary Hæmorrhage ?**

Any serious bleeding subsequent to the injury.

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During recovery from Shock, a **reaction** sets in. In consequence of, and as a part of, this improvement in the patient's general condition, the heart beats more forcibly and gives rise to further bleeding, which we call Reactionary or Intermediary Hæmorrhage.

**(8) How does Internal differ from External Hæmorrhage ?**

Except in the appearance or non-appearance of the blood, there is no difference.

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In the whole range of First-Aid any question pertaining to Internal or Concealed Hæmorrhage invariably elicits the least satisfactory answer.

All these difficulties will disappear if we forget the qualifying adjectives—Internal and External—and remember that Hæmorrhage simply means the escape of blood from the blood-vessels which normally contain it. **The Effects,** therefore, and the **Signs and Symptoms** of such loss are *identically the same* both when the blood escapes from the body and is seen, and when it passes internally into a closed cavity (*e.g.*, chest, abdomen), and is concealed.

**(9) What circumstances may mask the signs of Arterial Hæmorrhage ?**

A deep situation of the injured artery, and the presence of Asphyxia.

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When the artery is deeply situated, and the injury is complicated by Asphyxia, then we may have a masking of the signs of Arterial Hæmorrhage. The **position** of the injured artery may, as we have seen, result in loss of pulsation, while the **Insensibility** will cause slowing of the stream of blood, which will be dark red in colour, because its purification in the lungs is impossible owing to the co-existent **Asphyxia.**

**(10) What circumstances may mask the signs of Venous Hæmorrhage?**

The size and position of the vein.

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If a large vein is injured, such as the Internal Jugular, the blood may escape with a very definite spurt owing to its proximity to the heart and the influence of the respiratory movements. Further, venous blood, if exposed to air in its passage from a *deep* wound, may undergo oxygenation and become bright red.

**(11) With Hæmorrhage, what are the outstanding Dangers?**

Syncope, Shock, Collapse, and Wound-poisoning.

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Hæmorrhage, **when severe**, constitutes beyond all question the most urgent danger to life, which may either be lost through **Syncope** or Shock within a few minutes, or may be in jeopardy for many weeks afterwards as a sequel to **Shock** and Exhaustion consequent on the loss of blood.

Since, therefore, **Syncope, Shock**, and **Collapse** are the outstanding Dangers, our object is at all times to stop the

bleeding at the earliest moment, while we pay attention to the possibilities of **Wound-poisoning**.

We must, however, remember that Hæmorrhage is not always the most important problem in treatment, and that our Golden Rule instructs us to **Treat the most serious condition first.** Thus, a case of *moderate* Hæmorrhage may be or may become complicated by Asphyxia, and until the Cause of the Asphyxia is removed and breathing re-established, the bleeding is unimportant. On the other hand, if the bleeding be *most severe*, *e.g.*, from femoral artery, then we should have to give prior attention to stopping the bleeding, because, this done, we can restore the patient by Artificial Respiration.

**(12) On examination of the Pulse, what may we learn?**

The strength, rhythm, tension, and rate of the Heart Beat.

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The Pulse is our most **valuable Guide** to the condition of the patient's heart, and may be estimated with our *fingers* on any superficial artery. The lower end of the radial artery is usually chosen, because at this point it is convenient, near the surface, and resting on bone.

The **Strength** is the *pulsation* transmitted to the examining finger and this may be strong, bounding, feeble or absent. It affords direct evidence of the force of the Heart Beat.

The **Rhythm** is the regular *recurrence of pulsations*, the absence of which would suggest the presence of some

Disturbance or Disease of the Heart. The pulse may be irregular in time and strength.

The **Tension** is the *force necessary to obliterate the pulsations*, and teaches certain facts which can only be correctly appreciated by expert fingers.

The **Rate** is the *number of pulsations* per minute, and tells us the frequency of the Heart Beats. Since the rate of the pulse will vary with many factors, *e.g.*, age, sex, position, meals, &c., its importance is as nothing compared with the strength, tension, and rhythm, alterations in which should immediately put us on our guard.

**(13) With Internal Hæmorrhage, why do we bandage the limbs ?**

The circulation in the limbs being cut off, the work of the heart is lessened.

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The Effects of Hæmorrhage depend *partly* on the amount of blood lost and *partly* on the rate of loss. If, therefore, blood is escaping rapidly from the blood-vessels, the heart and circulation will be seriously disturbed. The heart will beat more quickly in its efforts to draw on its supplies and to replace the blood lost until, if the bleeding continue, it will exhaust itself.

By binding up the four limbs, from their extremities *towards* the trunk, we can diminish considerably the *peripheral* circulation, because, owing to their divisions and subdivisions, the farther away the arteries and veins are from the heart, the greater is their area of distribution.

By this means, therefore, **we can lessen the amount of**

**work** which the heart must do; and, by thus saving its energy, **we can preserve the strength** of the patient.

**(14) With Hæmorrhage, what are the indications for Bandaging Limbs?**

Serious Effects and Symptoms as shown by changes in our Standard Guides.

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This method of treatment (*as is also the use of the Tourniquet*) is heroic, is necessary on rare occasions, involves considerable discomfort to the patient, and is not without certain risks. It should, therefore, only be adopted when *specially* called for by our **Standard Guides—consciousness**, some degree of failing; the **face**, blanched; the **pulse**, almost imperceptible at the wrist; the **breathing**, shallow, sighing. Lastly, it may, as we have just seen, be required for cases of External as well as Internal Hæmorrhage.

**(15) With Bruises, why apply Witch Hazel?**

Witch Hazel acts directly on the effused blood and promotes clotting of blood.

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Ice or cold water dressings control bleeding *indirectly* by causing constriction of the vessel wall, whereas Witch Hazel acts *directly* on the blood and promotes coagulation. The clots, so formed, block the bleeding vessels, and then tend to contract, thus constricting the blood-vessels in their turn. Witch Hazel, therefore, is a most useful styptic.

**(16) When a limb is torn off, why does Hæmorrhage come on later?**

Such accidents provide the most typical examples of Reactionary Hæmorrhage.

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In cases of Accidental Amputation of a limb or part of a limb, the injury is accompanied by a tremendous tearing of the vessel walls, and is, therefore, most liable to be followed by Reactionary Hæmorrhage.

Further, the bleeding (which, as we have seen, is due to the disturbance of the blood clots present in the mouths of the divided vessels, and results from the increasing activity of the heart, which supervenes after the Effects of Shock have passed off) may be precipitated and aggravated by excitement or the injudicious use of Stimulants.

**(17) In Nose Bleeding, what are the objects of Treatment?**

Nose Bleeding may be the result of **Accident**, when it may be arterial, or of **Disease**, when it is usually venous or capillary in character. It varies considerably in severity in different cases, and may stop spontaneously or may require special expert treatment.

**(i) The Position of the Patient.**

In Nose Bleeding, as in all cases of hæmorrhage, the Position of the Patient is of primary importance, because the heart and circulation will be stimulated and the bleeding increased, if the patient stands or bends his head over a basin. Again, if the patient is lying on his back, the

blood will pass backwards into the throat and tend to suffocate him.

We should, therefore, place him in a **sitting posture with his head thrown well back** and encourage him to sniff air gently through the affected nostril.

**(ii) Pinching the nostrils.**

Further, if we pinch the nostrils firmly with finger and thumb, we shall in many instances control the bleeding, either *directly* by exerting pressure on the bleeding point, which is often situated just within the opening of the nose; or *indirectly* by allowing the blood to collect within the nostrils and thus giving it an opportunity of clotting.

**(iii) Raising arms above head.**

Again, by loosening all constrictions of neck and chest—*e.g.*, collar, corsets, shirt, vest, &c.—we shall promote the venous return of blood. If, in addition, we raise the patient's arms above his head or place his hands on the top of his head, we shall still further carry out this object, because we increase thereby the capacity of the chest and we lower the blood-pressure in the large venous trunks and the right side of the heart.

**(iv) Application of Cold to Nape of Neck.**

The temperature of a part may be lowered, either *directly* by means of an ice-bag, or *indirectly* through the evaporation which follows the application of a towel wrung out of cold water.

Evaporation requires heat. Therefore, the loss of heat, which accompanies either method, acting on the muscular walls brings about constriction of the vessels, so

that Cold applied to the *nape* of the neck may be beneficial as auxiliary treatment. If, however, Cold is applied to the *whole* head (*i.e.*, forehead, face, and neck), then these effects are increased, and all the vessels, nose veins included, will be affected.

**(v) Placing feet in hot water.**

The Heat brings about dilatation of the vessels of legs and feet, and, by drawing more blood to these parts, tends to lessen the congestion of the brain and head vessels. This object of treatment possesses a latent cause of further mischief, because, if the patient stoops over the vessel of hot water, the steam therefrom may dilate the vessels of the nose and encourage the bleeding.

**(18) In Ear Bleeding, why must not Ear be plugged?**

If the flow of blood is obstructed, the more severe the bleeding, the greater is the risk of Compression; *and* the less severe the bleeding, the greater the risk of Sepsis.

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Ear Bleeding, after a blow, may be caused by rupture of the lining membrane, or, *when it is accompanied by other evidence of head injury*, it may be one sign of Fractured Skull.

Plugging the ear, therefore, is dangerous, because we may introduce germs which will flourish in the retained blood and discharge and may possibly cause **Septic Infection** of the lining membrane of the Brain. Further, when the flow of blood is brisk and severe, then by preventing its escape we may increase the possibilities of **Compression of the Brain.**

Lastly, if we attempt to probe, plug, or syringe the ear *at any time* we may injure the delicate membrane of the ear.

**(19) In Stomach Bleeding, why is blood dark and like coffee grounds?**

The stomach juices act on and alter the hæmoglobin of the blood.

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Blood from the stomach is usually curdled and brownish in colour, somewhat resembling coffee grounds, owing to the action of the acid stomach juices upon the hæmoglobin. It is usually intermingled with half-digested food, and is often accompanied by a history of old standing stomach disorder.

It is well, however, to remember that this alteration in colour and appearance of the blood is not *in itself* peculiar to or evidence of Disease of the Stomach; and that the blood may have been swallowed (*e.g.*, in nose bleeding, fractured base of skull, &c.), in which case, if it becomes intimately mixed with the stomach contents, it will undergo the same changes.

**(20) In Lung Bleeding, how do we exclude Stomach Bleeding?**

By the absence of vomiting, the character of the blood, and the history of the case.

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In Lung Bleeding, there is usually a history of an old-standing **cough** with expectoration, and possibly of previous attacks of bleeding.

Further, there is **no vomiting** and the hæmorrhage may or may not set in with a cough. Also, the blood is usually **bright red,** and frothy (due to admixture of air); and it may be intermingled with slimy-looking mucus.

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## Summary of Hæmorrhage Queries.

(1) What are the varieties of Hæmorrhage?
(2) With Arterial Hæmorrhage, what is the Natural Mode of Arrest?
(3) With Venous Hæmorrhage, what is the Natural Mode of Arrest?
(4) With Capillary Hæmorrhage, what is the Natural Mode of Arrest?
(5) With Arterial Hæmorrhage, may we always expect spurting?
(6) Why must Blood Clots not be disturbed?
(7) What is Reactionary (Intermediary) Hæmorrhage?
(8) How does Internal differ from External Hæmorrhage?
(9) What circumstances may mask the signs of Arterial Hæmorrhage?
(10) What circumstances may mask the signs of Venous Hæmorrhage?
(11) With Hæmorrhage, what are the outstanding Dangers?

(12) On examination of Pulse, what may we learn?

(13) With Internal Hæmorrhage, why do we Bandage Limbs?

(14) With Hæmorrhage, what are the indications for Bandaging Limbs?

(15) With Bruises, why apply Witch Hazel?

(16) When a limb is torn off, why does Hæmorrhage come on later?

(17) In Nose Bleeding, what are the objects of Treatment?

(i) The Position of the Patient.
(ii) Pinching the Nostrils.
(iii) Raising arms above head.
(iv) Application of Cold to Nape of Neck.
(v) Placing feet in hot water.

(18) In Ear Bleeding, why must ear not be plugged?

(19) In Stomach Bleeding, why is blood dark and like coffee grounds?

(20) In Lung Bleeding, how do we exclude Stomach Bleeding?

# CHAPTER VI.

## ASPHYXIA.

**(1) In Asphyxia, what is the Cause of Death?**

The poisoning of the blood leads to paralysis and exhaustion of the Brain Centres.

Asphyxia—which means pulseless—is a state of suspended animation in which the blood is so altered that free interchange of Carbonic Acid for Oxygen is impossible.

In consequence of this interference or poisoning **the Brain Centres,** which control the Circulation and Respiration, **are at once affected**, the immediate result being loss of consciousness with paralysis of the voluntary muscles, including those concerned with breathing. The special involuntary Heart muscle, however, may continue to act for a few minutes after cessation of respiration. Hence the immense value of treatment.

If the condition is not relieved, then there follows **complete paralysis and exhaustion of the Brain Centres,** which results in death.

**(2) What is the real object of Artificial Respiration?**

The introduction of air into the lungs and consequent purification of the blood.

In the Brain the Circulatory and Respiratory Centres are closely interdependent; and we know that in Asphyxia the former will continue to act for three or four minutes after the complete paralysis of the latter.

If, therefore, having *first* removed the Cause, we imitate and carry on by artificial methods the natural movements of breathing, then we shall fill the lungs with air, and so **sustain and stimulate the heart** and circulation. The resulting purification of the blood, then, gives the Respiratory Centres an opportunity of recovery; and after a time we may find that both Centres are again working in harmony, and that life has been preserved.

In Asphyxia, above all other conditions, we possess the best illustration of our Golden Rule—**First remove the Cause or remove from the Cause.**

**(3) How do the various Methods of Artificial Respiration act?**

They produce alternate expansion and contraction of the chest wall itself.

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The objects of all the Methods—Laborde's excepted—are **to increase and diminish alternately the capacity of the chest** itself, and to cause air to flow in and out of the lungs so that a fresh supply is always available.

It is noteworthy that some of the Methods may be combined, as opportunity presents, and that all the movements must be carried out slowly and deliberately **in direct imitation of natural breathing.**

**(4) How does Laborde's Method act?**

By stimulation of the Respiratory Centre itself.

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The Respiratory Centre is stimulated to activity through any nerve which carries sensations to the Brain, more particularly by some of the nerves which supply the larynx.

In Laborde's Method tongue traction **mechanically stimulates these nerves,** and through their action on the Brain Centres may restart the breathing.

**(5) In Drowning, what are the Dangers?**

Death may result from Asphyxia, or Shock, or subsequent Collapse.

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Drowning may cause death within two minutes either from **Asphyxia** following submersion, or from **Shock**, in consequence of injuries to head or abdomen. Further, its effects are aggravated by mental fear and physical **Exhaustion** due to exposure, struggling, &c. For this reason, **Collapse** is liable to occur subsequent to the accident, and has a marked tendency to Relapse.

**(6) In Drowning, what are the objects of Treatment?**

In all forms of Asphyxia we must remember (i) that the insensibility comes on very quickly; (ii) that it is accompanied by paralysis of all the voluntary muscles; and (iii) that the special involuntary muscle of the heart may continue to act after all the ordinary muscular movements have ceased.

**(i) Why do we ignore the Circulation at first ?**

We do *not* ignore the Circulation. On the other hand, knowing or hoping that the heart is still feebly beating, or that it has only just ceased to beat, we begin without delay to stimulate its action *through* the Respiration. Until this is done any other treatment is futile and not permissible.

After the breathing has been re-established, then we adopt measures—*e.g.*, external warmth, friction, &c.—which will sustain the restored circulation and with it the temperature of the body. As we shall see later under "Shock," it is possible to overload the patient with blankets.

**(ii) Why is chest flicked ?**

Flicking the chest with a towel causes pain, which is more severe when the towel is wet. This **stimulates the Respiratory Centre** through the sensory nerves of the skin, and brings about a forcible inspiration, which helps to sustain both Circulation and Respiration.

**(iii) Why do we use Smelling Salts ?**

The action of Smelling Salts, which we shall discuss more fully under "Shock," is precisely similar except that the stimulus is conveyed through the nerves of smell.

**(iv) Why do we apply Friction to the Limbs ?**

Friction of the limbs *towards* the heart facilitates the return of the venous blood, and increases the activity of the recently restored circulation, which is handicapped in its action by a feebly beating heart.

**(v) Why do we apply Poultices to the Chest ?**

Poultices produce local warmth and redness from

increased flow of blood in the vessels of the skin This. stimulation of the Superficial Circulation both *directly* lightens and assists the work of the heart, and also *indirectly* relieves the internal Congestion of the Lungs.

**(vi) What precautions are necessary in applying Poultices ?**

The poultices should be large and applied *directly* (without any intervening muslin or calico) to the front and back of the chest. They should not be too heavy and thick, lest they handicap the restored Respiratory Movements, which will be feeble at first and will gradually increase in depth and frequency.

**(7) In Hanging, what is the Cause of Death ?**

Asphyxia, Dislocation of Spine, or Strangulation.

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In Hanging death occurs by **Asphyxia**, by **Dislocation** of Spine or Fracture of the Cervical Vertebræ, or by **Strangulation** if the fall and constriction of the neck took place gradually. It differs from the latter in that the body is suspended.

**(8) With Swelling of Throat, what are the leading signs ?**

Pain, difficulty in swallowing, and the history of the case.

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Swelling of the Tissues of the Throat is a most dangerous condition. The signs are local **pain**, marked **difficulty in breathing and in swallowing**, together with an irritating

**cough** and a peculiar **change in the voice**. These signs will vary in severity with the extent of the Swelling and will be most suggestive when they are combined with a History of having followed *rapidly* on the inhalation of steam or the swallowing either of boiling water or of a corrosive poison.

**(9) With Swelling of Throat, what are the objects of Treatment?**

Treatment in this, as in all other conditions is, in First-Aid, directed to the Patient and the Part.

**(i) Why place Patient before fire?**

Cold affects all local inflammations harmfully, because, instead of causing dilatation of the vessels as Heat does, it tends to constrict them. Cold air, therefore, will irritate the upper respiratory passages, especially the glottis. Further, it will cause spasm and coughing, which will increase the Swelling of the Tissues of the Throat.

**(ii) Why are hot fomentations applied to the Throat?**

Heat, *especially when combined with moisture*, will soothe the pain. Further, by causing an increased flow of blood to the surface, it will, as we have seen under "Drowning," have a tendency to diminish the congestion and inflammation of the Throat. The fomentations must be wrung out and used as dry as possible, because dry Heat cannot scald.

**(iii) If the Throat is closed, how can Artificial Respiration do good?**

The Swelling of Tissues of the Throat involves the upper part of the larynx only. If, therefore, we can by artificial methods drive air past this obstruction in and out of the

lungs, we shall keep the patient alive in urgent cases until the arrival of the doctor.

**(iv) Which are the most suitable Animal or Vegetable Oils?**

Amongst the Vegetable Oils, Olive, Rape, Linseed and Castor are usually most suitable, while the Animal Oil, which is most likely to be available, is Cod-liver Oil. All these oils may be recognized because they float on water and leave a greasy mark on paper.

**(10) In Collapse and Electric Shock, how is Asphyxia produced?**

Asphyxia is due to paralysis of the Circulatory and Respiratory Centres.

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The exact Cause of death in Collapse and Electric Shock is uncertain, a fatal result being due to exhaustion and **paralysis of the Brain Centres**, which results *either* in the arrest of the heart *or* in the stoppage of the breathing.

In all such cases, therefore, the immediate adoption and perseverance with Artificial Respiration, *even when life appears extinct*, gives the best hope of recovery. In other words, *since there are no absolute signs of death* except putrefaction, we always assume in these as in all other conditions—that the patient is still alive and take action accordingly until the arrival of the doctor.

**(11) In Asphyxia due to Water Gas, why is Oxygen necessary?**

A chemical change takes place in the hæmoglobin of the blood.

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Water Gas Asphyxia is poisoning by Carbonic Acid, which

may be present in large and undiluted quantities in pits, wells, cellars, mines (especially after explosions, constituting what is known as choke-damp) and in lime-kilns.

The Gas combines with the hæmoglobin and produces a state of coma, for which Artificial Respiration is urgently indicated, together with pure Oxygen, which, *if available*, will materially assist in the purification of the hæmoglobin.

**(12) In Asphyxia due to Water Gas, are the symptoms always urgent?**

The Gas acts as a narcotic as well as an asphyxiant.

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Death may take place **immediately on exposure** to the Gas; or the signs may be **gradual in onset**, Coma being preceded by headache, giddiness, drowsiness, &c. If, however, the excess of Carbonic Acid is associated with a deficiency of Oxygen, then, *in addition to these narcotic effects*, we may have urgent signs of Asphyxia.

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## Summary of Asphyxia Queries.

(1) In Asphyxia, what is the Cause of Death?
(2) What is the real object of Artificial Respiration?
(3) How do the various Methods of Artificial Respiration act?
(4) How does Laborde's Method act?
(5) In Drowning, what are the Dangers?
(6) In Drowning, what are the objects of Treatment?
(i) Why do we ignore Circulation at first?
(ii) Why is chest flecked?
(iii) Why do we use Smelling Salts?
(iv) Why do we apply Friction to Limbs?
(v) Why do we apply Poultices to the Chest?
(7) In Hanging, what is the Cause of Death?
(8) In Swelling of Throat, what are the leading signs?
(9) In Swelling of Throat, what are the objects of Treatment?
(10) In Collapse and Electric Shock, how is Asphyxia produced?
(11) In Asphyxia due to Water-Gas, why is Oxygen necessary?
(12) In Asphyxia due to Water-Gas, are symptoms always urgent?

# CHAPTER VII.

## POISONING.

**(1) What circumstances suggest Poisoning?**

Sudden serious symptoms, especially in several persons, are suggestive.

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*There are no absolutely typical signs of Poisoning*, which is often difficult to diagnose because it may simulate Disease and *vice versâ*.

The diagnosis, therefore, rests on the Picture of the Emergency and the combination of circumstances presented. Thus the **sudden** (not immediate, except with Corrosive Poisons and Prussic Acid) **onset of several serious symptoms** in one or more patients previously in good health—following the taking of a meal, medicine, or drink—would rightly be regarded with suspicion. The **discovery of a poison**, or a poison bottle, and the **progress of symptoms**, either progressively better or progressively worse, would provide confirmatory evidence.

**(2) In Poisoning, what are the leading symptoms?**

The leading symptoms are either Gastro-intestinal or Nervous.

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The action of Poisons being either *local or central*, it follows that, with certain provisions, there are **two main**

**groups of symptoms**, each of which may be divided into three stages which follow closely one upon the other; and that in the Irrito-Narcotic Poisons these two groups are combined.

**(3) In Corrosive and Irritant Poisoning what are the leading symptoms?**

Local (Contact), Gastro-intestinal, and Central (Nervous) symptoms.

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The Corrosives (Strong Acids and Alkalies) and the Irritants (Phosphorus, Mercury, Arsenic, &c.) produce similar effects and symptoms. These are mainly **Gastro-intestinal at first**, and differ only in that the Irritants are less severe in their local, less rapid in their central effects, and are associated with a metallic taste in the mouth, which is not burned.

Their three Stages of Symptoms are:—

(i) **Local** (Contact). Immediate burning and pain in mouth, throat, stomach.

(ii) **Gastro-intestinal.**—Nausea, vomiting, diarrhœa, thirst, &c.

(iii) **Central** (Nervous). Shock which may culminate in Collapse and Death.

**(4) In Narcotic Poisoning, what are the leading symptoms?**

Drowsiness, Deep Sleep, and Complete Insensibility.

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The Narcotics (Alcohol, Opium, Belladonna, Prussic Acid, &c.) produce their effects on the Central Nervous

System after absorption, and may be divided into the following three stages, all of which are Nervous :—

(i) **Drowsiness.**—The patient is drowsy, but can be easily roused.

(ii) **Deep Sleep.**—The patient can be roused only by violent movements and measures.

(iii) **Complete Insensibility.**—The patient cannot be roused at all, and may die in a comatose condition.

**(5) In Irrito-Narcotic Poisoning, what are the leading symptoms ?**

Gastric, Intestinal, and Nervous Symptoms.

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The last class of poisons, the Irrito-Narcotics (Ptomaines, Strychnine) combines, as their name signifies, the symptoms of both of these groups of poisons :—

(i) **Gastric.**—Nausea, Vomiting—not very marked with Strychnine.

(ii) **Intestinal.**—Diarrhœa, thirst—more prominent with Ptomaines.

(iii) **Nervous.**—In Strychnine Poisoning, Convulsions and Asphyxia are the most marked and frequent complications ; in Ptomaine, Collapse. In each, death may result in Coma.

**(6) How do Poisons act ?**

Their action may be local or central ; or both local and central.

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Poisons act **locally** on contact with the skin, the mouth, the throat, and the stomach, *e.g.*, Corrosives, Irritants ;

**centrally** on the Nervous System, either after absorption, *e.g.*, Opium, Prussic Acid, or through Shock, *e.g.*, Corrosives; and also both **locally and centrally**, *e.g.*, Oxalic, Carbolic Acids.

**(7) How do Emetics act?**

Emetics, like Poisons, have a local or central; or a local and central action.

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Salt and Mustard act **locally,** irritate the stomach, and cause vomiting; but, since in cases of Poisoning, this may be a difficult thing to accomplish, successful results depend on the draught being made sufficiently nauseous, and on its being **rapidly swallowed**, and not slowly sipped.

Tickling the throat acts **centrally** through stimulation of the sensory nerves to throat and stomach, whilst Ipecacuanha Wine in large repeated doses combines both **local and central** action.

**(8) How do Antidotes Act?**

The action may be chemical or mechanical; or both chemical and mechanical.

---

An **Antidote,** being that which will neutralize or counteract anything which may produce bad effects, may be chemical or mechanical or both.

Thus, poisons are less dangerous when taken after a full meal, because the food **mechanically** encloses the poison and protects the stomach, while it delays its absorption.

On the other hand, Acids and Alkalies neutralize each other by direct **chemical** action.

Again, examples of combined **chemical and mechanical** Antidotes are found in milk, which, being **chemically** converted into milk-clot by the acid juices of the stomach, next catches up the poison **mechanically**; and in eggs, the albumen of which precipitates and forms a similar clot with Mercury salts. It is noteworthy that in these cases an emetic must follow to rid the stomach of the resulting precipitate.

**(9) In Poisoning, what are the main objects of Treatment?**

The main objects are to **get rid of the Cause** as quickly as possible, or, if this is impossible to do or inadvisable to attempt, to **neutralize the Effects** as rapidly and as completely as possible.

**(i) Why wash out Mouth?**

Unless the mouth is washed out, some of the poison will remain to do further local mischief, and will ultimately be swallowed and absorbed from the stomach. Further, a routine examination of the mouth is ensured.

**(ii) Why do we withhold Emetics in Corrosive Poisoning?**

The so-called stains of Corrosive Poisons are in reality severe burns. Emetics are therefore withheld because the poison may have so ulcerated the wall of the stomach that the strain and retching involved in vomiting may cause rupture of this organ with fatal results. Further, we remember our Golden Rule—**With Mouth Stains Withhold Emetics.**

**(iii) Why do we give Demulcent Drinks ?**

Demulcent Drinks will **dilute** the poison, **soothe** the injured, and **protect** the uninjured parts of the stomach, while they (*e.g.*, milk and eggs) may promote clotting which will **mechanically entangle** the poison.

In addition, the filling of the stomach with fluids will **facilitate vomiting.**

**(iv) Should we give Emetic before Demulcent Drinks ?**

It is immaterial whether the Emetic be given before or after these drinks, provided that the patient be made to vomit without delay.

Since, however, the difficulties of making an otherwise healthy patient vomit may be increased by the paralysing effects of the poison both *locally* on the stomach and *centrally* on the Nervous System, the task may be rendered much easier when the stomach is filled with fluid.

Further, we have seen that an emetic will be necessary when the antidote forms a precipitate which catches up the poison.

**(v) What quantity of Milk may safely be given ?**

There is no limit in quantity, because, as we have seen, the more the patient can be made to swallow, the more dilute will the poison become, and the more easily and effectively will the emetic act.

**(vi) When and Why is the administration of Stimulants justified ?**

Remembering that the *use of Stimulants is best left to the discretion of the doctor*, we may feel justified **on rare occasions** in administering a moderate dose of brandy,

when Shock is severe and when medical aid is not available within a reasonable time.

Alcohol, though a narcotic, will, if properly administered, stimulate the heart and may carry the patient through the Shock which is associated with the Poisoning. Further, it may thus assist indirectly in getting rid of the poison, and justifies our Golden Rule—**Stimulants require Special Signs.**

**(vii) With which Poisons are Stimulants absolutely contra-indicated ?**

In **Opium** poisoning the narcotic effects of Alcohol would tend to aggravate the condition already present. In **Strychnine** poisoning, a more powerful depressant is indicated to overcome the excitant and convulsive effects of the poison.

**(viii) Which Method of Artificial Respiration is recommended ?**

If respiration should cease, Artificial Respiration will be indicated. In such cases Sylvester's Method may prove valuable, though Schäfer's will probably be most serviceable, because, if the patient should vomit as consciousness returns, then any possibility of the vomited matter obstructing the throat is prevented by the position of the patient.

**(10) In which group of Poisons may Sleep Symptoms arise ?**

The Narcotic.

---

The Narcotic Group is not limited to Opium and its

preparations. It includes other drugs capable of producing Sleep, *e.g.*, Belladonna, Alcohol, Chloroform and Prussic Acid.

**In addition to these poisons,** Sleep Symptoms may arise in Sunstroke, prolonged Exposure to Cold, Apoplexy, and Head Injuries (Concussion, Compression), although in all these the condition verges on and may terminate in Coma.

**(11) With Carbolic Acid Poisoning, what are the Nervous Symptoms?**

Collapse, due to effects on Brain Centres.

---

Carbolic Acid, as we have seen, has not only a **local** corrosive, but also a **central** paralysing action. In consequence of this latter effect, **Collapse** may supervene and will show itself in pallor of the *face*, a cold, clammy skin, a weak feeble *pulse*, and faint, shallow *breathing*. The patient may die in a *comatose condition*.

**(12) With Carbolic Acid, what is the action of Epsom Salts?**

The Salts combine with the Acid to form a harmless soluble salt.

---

Epsom Salts (Magnesium Sulphate) provide the best **antidote** for Carbolic Acid, because they consist of Sulphates which interact with the Acid and give a harmless salt; but they must be dissolved in milk or water (1 oz. to 1 pint), and administered very freely, if we would neutralize *all* the Acid.

Sodium Sulphate (Glauber's Salts) is equally useful.

Failing these, chalk may prove a good substitute; but oil, in which Carbolic Acid is soluble, should be withheld until we believe that all the poison is removed from the stomach.

**(13) With Oxalic Acid Poisoning, what is the great Danger?**

Rapid and fatal Collapse.

---

In its **local** effects Oxalic Acid presents symptoms which closely resemble those of Sulphuric Acid; in its **central** effects it is like Carbolic Acid, though it differs in that the Nervous Symptoms are far more urgent and serious. The danger, therefore, is early and marked **Collapse. In Treatment**, the salts of Lime (chalk, plaster, whiting) must invariably be used, because Soda and Potash combine with Oxalic Acid, and form a very soluble poisonous salt. With both Oxalic and Carbolic Acids, a liberal dose of Castor Oil should be *subsequently* administered.

**(14) How far does Prussic Acid resemble Strychnine Poisoning?**

Both are Central or Nervous Poisons.

---

With Prussic Acid the symptoms are **immediate**; with Strychnine they are **more gradual** in onset. With Prussic Acid insensibility occurs immediately; with Strychnine consciousness is retained to the last. Convulsions are rarely seen with Prussic Acid, and invariably present with Strychnine. Lastly, in both conditions death takes place usually either from Collapse (due to paralysis of heart) or from Asphyxia.

**(15) In Prussic Acid Poisoning, may an Emetic be given?**

If possible, administer **large** doses of emetic without a moment's delay.

---

The effects of Prussic Acid on the Brain Centres (Respiratory and Circulatory) are almost **instantaneous**, and with a large dose of the poison death may take place in a state of **Collapse** within two minutes.

If, however, life can be preserved for half an hour, then, the elimination of the poison being as rapid as its absorption, recovery is almost certain. It is **not** a Corrosive Acid; and the administration of the emetic **must be immediate** and must precede any other treatment, *provided patient is able to swallow.*

**(16) With Diarrhœa, due to Poisonous Meat, why give Castor Oil?**

Diarrhœa demonstrates the presence of the poison in the bowel.

---

Diarrhœa being the evidence of the irritating effects of the Ptomaine (Irrito-Narcotic) poisons in the bowel, **Castor Oil** by stimulating the bowel to more rapid action **will the more quickly get rid of the poison.**

**(17) With Poisonous Meat, why withhold Castor Oil until emetic acts?**

Stimulation of the bowel causes increased risks of poisoning.

---

Our object being to get rid of the poison as quickly as

possible, we withhold Castor Oil in this, as in all cases of Poisoning, until the emetic has acted. Otherwise, the Oil would tend to drive the poison onward from the stomach into the bowel; but, when the stomach is emptied of its poison, then in all cases administration of a purge is sound treatment.

**(18) With Strong Ammonia, what are the Symptoms?**

If gaseous, it causes Swelling of Throat; if in solution, Gastro-intestinal Symptoms.

---

Strong Ammonia may produce symptoms either as an irrespirable **gas** or as a poisonous **solution.** It differs from Soda and Potash, in that it is very volatile and may give rise to Lung Affections and cause death from Suffocation. Throat Symptoms may also develop with the more volatile Strong acids, Hydrochloric and Nitric.

* * * *

## Summary of Poison Queries.

(1) What circumstances suggest Poisoning?
(2) In Poisoning, what are the leading Symptoms?
(3) In Corrosive and Irritant Poisoning, what are the leading Symptoms?
(4) In Narcotic Poisoning, what are the leading Symptoms?
(5) In Irrito-Narcotic Poisoning, what are the leading Symptoms?
(6) How do Poisons act?
(7) How do Emetics act?
(8) How do Antidotes act?

(9) In Poisoning, what are the main objects of Treatment?

(i) Why wash out mouth?

(ii) Why do we withhold Emetics in Corrosive Poisoning?

(iii) Why do we give Demulcent Drinks?

(iv) Should we give Emetic before Demulcent Drinks?

(v) What quantity of Milk may safely be given?

(vi) When and Why is administration of Stimulants justified?

(vii) With which Poisons are Stimulants absolutely contra-indicated?

(viii) Which Method of Artificial Respiration is recommended?

(10) In what group of Poisons may Sleep Symptoms develop?

(11) With Carbolic Acid Poisoning, what are the Nervous Symptoms?

(12) With Carbolic Acid, what is the action of Epsom Salts?

(13) With Oxalic Acid Poisoning, what is the great danger?

(14) How far does Prussic Acid resemble Strychnine Poisoning?

(15) With Prussic Acid Poisoning, may an Emetic be given?

(16) With Diarrhœa, due to Poisonous Meat, why give Castor Oil?

(17) With Poisonous Meat, why withhold Castor Oil till emetic acts?

(18) With strong Ammonia, what are the symptoms?

# CHAPTER VIII.

## SHOCK.

**(1) With Syncope, Shock, and Collapse, do the same Causes operate?**

Syncope follows Depression of the Heart; Shock and Collapse, of the Nervous System.

---

**Syncope**, which is the result of Disturbance of Heart and Brain Circulation, may be caused by Disease of Heart, by Pressure on Heart (which may be external—*e.g.*, tight lacing, crowd, &c.—or internal—*e.g.*, flatulence and distension of the stomach), by Physical Exhaustion and by Mental Emotion.

The Causes which operate to produce **Shock** may also result in **Collapse** and include Severe Injuries (especially abdominal)—*e.g.*, scalds, burns, kicks, crushes, &c.—Severe Hæmorrhage, and Poisoning. In the last-named, however, a difference arises, because some poisons—*e.g.*, Corrosives and Irritants—tend to produce Shock, whereas others—*e.g.*, Opium and Alcohol—are more likely to result in Collapse.

**(2) How do Syncope, Shock, and Collapse differ?**

They differ in the degree of Depression of Heart and of Nervous System.

---

**Syncope** is a serious Disturbance of the Heart, associated with a passing Depression of the Nervous System, which, however, may be grave in its effects and is usually accompanied by loss of consciousness.

In **Shock**, the degree of Depression of the Nervous System is more profound, and there is a marked Disturbance of the Heart, though Insensibility is not necessarily present.

In **Collapse** there are present signs of dangerous Depression of the Nervous System and the Heart, while loss of consciousness and muscular relaxation are more pronounced than in the two preceding conditions.

**(3) How does Syncope differ from Asphyxia and Coma ?**

Death may be instantaneous and due to Heart Failure.

---

Syncope, Asphyxia, and Coma are the three modes of **sudden** death, and they differ in that death begins in a different vital organ. Thus, in **Syncope** there may be sudden failure of Heart ; in **Asphyxia** there may be a more or less sudden interference with the Lungs and respiration ; in **Coma** there may be a more or less sudden disturbance of Brain.

**(4) What other Conditions resemble Shock ?**

Hæmorrhage and Concussion of Brain.

---

In **Severe Hæmorrhage** we have all the Signs and Symptoms of Shock, and in addition we have marked evidence of Respiratory Distress (Air-Hunger) due to the actual loss of blood.

In **Concussion of the Brain** we have a condition of Shock, due to the *direct* Disturbance of the Brain Centres following the injury to the head. Further, in such cases, Insensibility is a more prominent feature and is more constantly present.

**(5) In Syncope, what is the action of Smelling Salts ?**

They stimulate the Respiratory Centre through the nerves of smell.

---

Syncope is essentially a Disturbance of the Heart. Unlike Shock, it is **always** associated with a greater or less degree of Insensibility, which is caused by the resulting interference with the Brain Circulation.

In such cases, therefore, our treatment is directed to the Heart itself ; and Smelling Salts, which contain Ammonium Carbonate, are a useful adjunct to treatment, in consequence of their **stimulating effect on the Respiratory Centre** through the sensory nerves of smell. In other words, they have an *indirect* action on the heart.

**(6) In Syncope, what is the action of Sprinkling the Face ?**

This stimulates the Brain Centres through the sensory nerves of the skin.

---

Sprinkling the Face with hot and cold water produces an alternate dilatation and constriction of the vessels of the face, and **stimulates the Circulatory and Respiratory** Centres through the sensory nerves of the skin.

Like Smelling Salts, therefore, it has an **indirect**

**stimulant action upon the Heart**, and, owing to the alternate changes in the local circulation of the face, it results in a corresponding stimulus being sent by the Brain Centres to that organ.

**(7) In Shock, what is the action of Sal Volatile?**

It has a *direct* and *indirect* stimulating action on Brain and Heart.

---

Sal Volatile contains Ammonia and Alcohol, which are our most reliable stimulants, and which have a **direct action on both Brain and Heart.** Shock, therefore, being a condition of Depression of the Nervous System, in which there is a marked inhibition of the Heart, the combination of these drugs is very efficacious. Further, Sal Volatile may, like Smelling Salts, have an **indirect effect on Brain and Heart** through the sensory nerves of smell.

At the same time, the discovery and removal of the Cause of the Shock constitute the first step in treatment, and will be much more effective in producing the desired improvement in the condition of Brain and Heart.

**(8) In Shock, what degree of External Warmth is necessary?**

We require just enough warmth to produce a Reaction.

---

In the treatment of Shock, which is not necessarily attended by loss of consciousness, we strive to obtain what is known as a Reaction. By this we mean an improvement

in the patient's general condition, which shows itself through our **Standard Guides** in the returning **consciousness,** the improving colour of the **face,** the increasing strength of the **pulse,** and the greater depth and regularity of the **breathing.**

The **Reaction,** therefore, is the response to treatment, and **corresponds to the sensation of warmth** of which the patient may be conscious, and **which is throughout our best guide.** When our patient tells us that he feels warm and comfortable, then we know that our objects are accomplished. At the same time, as we have seen under "Drowning," we must not stifle our patient with blankets and other coverings, which, through interference with the breathing and the superficial circulation, might have an adverse influence on our other efforts in Treatment.

**(9) In Collapse what is the reason of Sudden Relapse?**

Relapse may be due to failure of treatment, or to injudicious treatment.

———

Collapse is a condition in which the Brain Centres and the Heart are both gravely depressed. **Relapse,** which signifies a "falling back," is the **recurrence of the original symptoms in a greater or less degree.**

Relapse may occur, either because the Depression of the Nervous System is such that it cannot be made to respond to treatment, or because we have failed to carry out our treatment efficiently. In the latter case the most common cause is the injudicious handling of the emergency, which

may result either from the *unwise* administration of Alcohol or the exposure of the patient to excitement.

Relapse occurs most frequently in Hæmorrhage, Asphyxia (especially Drowning), Poisoning (especially Opium, Phosphorus, and Alcohol), and Shock.

**(10) In Collapse, what are the indications for Bandaging Limbs?**

Alterations in our Standard Guides, especially the pulse.

———

Bandaging the limbs, as we have seen under "Hæmorrhage," is an extreme measure in treatment, because it must be done slowly, deliberately and carefully, if it is to serve its purpose. This will occupy an appreciable amount of valuable time, which can only be justified by the results of treatment.

Under these circumstances, therefore, we rely completely on our **Standard Guides**. If we find that, *in spite of Supportive Measures*, the **face** is becoming more pallid, the **breathing** more shallow, the loss of **consciousness** more marked, and in particular that the **pulse** is beginning to disappear at the wrist, then we shall feel justified in resorting to Bandaging of Limbs with its attendant dangers and discomfort to the patient, and with the full knowledge that, in so doing, we are delaying his removal to doctor and shelter.

**(11) In Collapse, how do hot Tea and Coffee act?**

Tea and Coffee have a direct and an indirect action on Heart and Brain.

———

Tea and Coffee act **directly** on Heart and Nerve Centres, which they stimulate. The warm drinks also cause increased activity of the stomach, which, acting through the sensory nerves, produces an **indirect** stimulation of the same organs.

**(12) In Collapse, why is treatment Supportive rather than Stimulant?**

True stimulation would aggravate Shock and Collapse.

---

The term "Stimulant" means anything which excites to increased activity, and must not be restricted to Alcohol, which is usually transient in its action.

Shock and Collapse being *Effects*, such temporary excitant treatment would be contrary to the Principles of First-Aid, though it may be justifiable in some cases of Poisoning—*e.g.*, Opium and Prussic Acid—where the Cause is still present.

Treatment in Collapse is, therefore, **supportive** rather than stimulant, and endeavours to restore the balance between the Circulatory and Nervous Systems, disturbance of which has resulted in loss of body heat and lowering of temperature due to the dilatation of the superficial blood-vessels.

* * * *

## Summary of Shock Queries.

(1) With Syncope, Shock, and Collapse, do the same Causes operate?

(2) How do Syncope, Shock, and Collapse differ?

(3) How does Syncope differ from Asphyxia and Coma?

(4) What other conditions resemble Shock?

(5) In Syncope, what is the action of Smelling Salts?

(6) In Syncope, what is the action of Sprinkling the Face?

(7) In Shock, what is the action of Sal Volatile?

(8) In Shock, what degree of External Warmth is necessary?

(9) In Collapse, what is the reason of Sudden Relapse?

(10) In Collapse, what are the indications for Bandaging Limbs?

(11) In Collapse, how do hot Tea and Coffee act?

(12) In Collapse, why is treatment Supportive rather than Stimulant?

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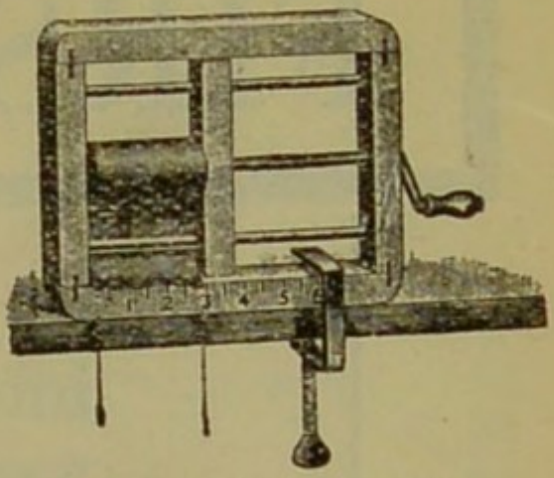

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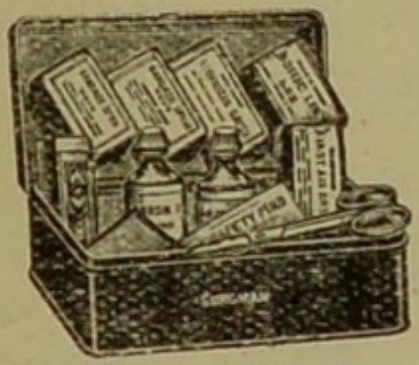

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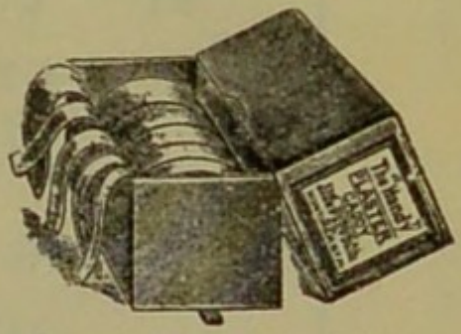

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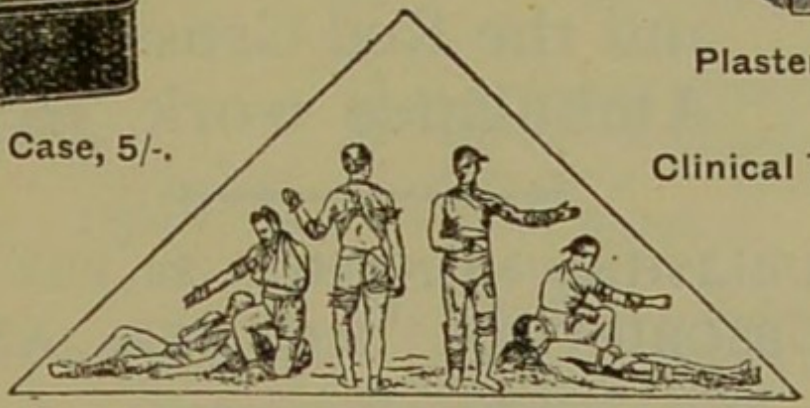

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