Chapter 2
# The History of the Patient Record and the Paper Record

This chapter introduces the long history of the patient record, from ancient times until now. From the Egyptians in 1600 BC to the Greeks with Hippocrates, *the father of medicine*, to the Arabs and then to the Age of Enlightenment in Europe and the development of natural sciences during the eighteenth century. From the first attempts to describe and classify nature that formed the first patient record, to the modern paper based records with their distinct headlines and sections describing the findings and symptoms, treatment of the patient and finally the outcome; followed by the organisation of the paper records to make them easy to follow. This chapter will also discuss the Greek-Latin terminology in the patient records.

2.1 The Egyptians and the Greeks

The first known record is Egyptian from 1600 BC, but it is not a proper patient record, rather a written document on papyrus describing surgical treatment of war wounds. The document lists a number of cases and is probably part of a textbook (Al-Awqati 2006). The document is also called the Edwin Smith Papyrus, see Fig. 2.1.

Then followed the Greeks with Hippocrates, sometimes called *the father of medicine*, who was active 2400 years ago at the god Asclepius' temple of healing on the island of Kos in today's eastern Greece. Hippocrates considered medicine as a science separated from religion and magic. Hippocrates took careful notes of his patients about symptoms, appearance of the patient, social situation etc. to decide on the treatment, he also recommended that these documents should be stored and used by new physicians involved in the treatment of the patient (Cheng 2001).

Hippocrates also introduced the oath, in Greek Όρκος or Hippocratic Oath, that all physicians should use and follow. The oath is still used today by physicians (North 2002; Winau 1994). The Hippocratic Oath also contain principle of confidential information given by the patient to the physician, which should be kept by
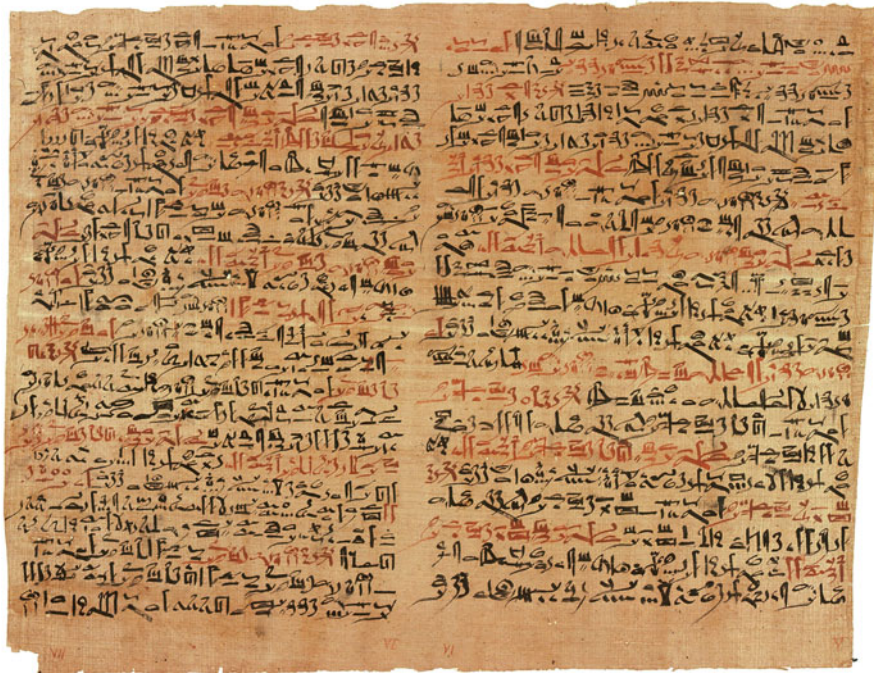
Fig. 2.1 Part of the Edwin Smith Papyrus describing in Egyptian hieratic script (a cursive hieroglyph writing) different surgery cases from 1600 BC (Published in Wikipedia)

the physician and not revealed to anyone else not involved in the treatment of the patient. Moreover, one more important guiding principle is that the physician should not harm the patient while treating him or her.

There are over 42 case histories that originate from Hippocrates, and were written down several hundred years after Hippocrates' death. These case histories describe symptoms day by day for a typical patient and the outcomes, most of them leading to the death of the patient.

Aelius Galenus, Claudius Galenus or just *Galen of Pergamon* should also be mentioned since he was a famous Greek physician, medical writer and philosopher living from 129 AD to 199 AD during the Roman Empire. Galen wrote extensive literature of the diseases and treatment of patients. Galen's writing influenced and dominated medicine in the Western world until the fourteenth century, i.e. for over 1300 years!

The Byzantine Empire from c. 330 AD to 1453 AD was the bridge between the Greco-Roman medicine and Arab or Islamic medicine. Specifically the Byzantine Greek physician Paul of Aegina, or Paulus Aegineta, who lived in 700 AD wrote the medical encyclopedia Medical Compendium in Seven Books, which later was translated to Arabic from Greek. This work was used for 800 years and was printed in Venice 1528 (Temkin 1962).

2.2   The Arabs

The knowledge of Greek medicine was kept and developed by the Arabs into so-called *Islamic Medicine* during the Islamic Golden Age, from the eighth century to the thirteenth century. The Arabs introduced the concept of hospital and the use of hospitals. They also were the first to keep written records of patients and their medical treatment. Students were responsible for keeping the patient records, which were later edited by doctors and referenced in future treatment (Miller 2006; Syed 2002).

2.3   The Swedes

With the evolution of natural science in early eighteenth century during the Age of Enlightenment in Europe, everything in nature was classified and described. The most famous representative of this was the Swedish scientist, botanist and physician Carl Linnaeus, (in Swedish Carl von Linné), who built up a whole classification system for naming organisms. Linné is also known as the *Father of modern taxonomy* and was active in the early eighteenth century at Uppsala University in Sweden.[1]

In the same environment and time period the Swedish physician Nils Rosén von Rosenstein was active, he applied for the position of lecturer, *adjunct*, at the faculty of Medicine at Uppsala University but to obtain this position the condition was that he must travel to study in Europe and also obtain a doctoral degree in medicine which was not possible in Sweden at that time. 1728 Rosén von Rosenstein obtained a scholarship to undertake his studies, as well as absence of leave from his teaching assistant position, with a full salary to travel in Europe. During 3 years he visited leading German, French, Swiss, Italian and Dutch universities including the famous Leiden University in Holland. He stayed in Geneva for 9 months and obtained medical training. In 1730 he defended his doctoral thesis in medicine with the title *De historiis morborum rite consignandis*, in English translated to *The correct documentation of the disease progression*, at the University of Harderwijk in Holland. The dissertation treated the principles of medical record writing and included the whole patient and his or her surroundings. Apart of Rosén von Rosenstein's impressions from his study trip in Europe he was probably inspired that scientists at that time, including Carl von Linné, were diligently classifying nature in written form.

Finally to become a lecturer in Medicine at Uppsala University he was required to make a dissertation test and he carried it out by writing a small thesis with the title *De usu methodi mechanicae in medicina*, in English *The use of mechanical methods in medicine*.

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[1]Carl Linnaeus, https://en.wikipedia.org/wiki/Carl_Linnaeus. Accessed 2018-01-11.

In 1740 Nils Rosén von Rosenstein became a professor of medicine at Uppsala University and started the first formal education in medicine in Sweden. Rosén von Rosenstein refurbished the *Nosocomium academicum*, later the Uppsala Academic Hospital. The hospital was very small, probably with only eight beds. Rosén von Rosenstein introduced the taking of careful notes of his patients, their symptoms, diagnosis and treatment as well as their social condition. The patients were mostly poor people.

The first formal medical record system in Sweden was developed and systematic medical documentation was introduced in connection with the opening of the Serafimerlasarettet (Seraphim Hospital) in Stockholm in 1752, (Nilsson and Nilsson 2003; Nilsson 2007)

In Sweden the paper based patient record system was developed and refined until 1980 when computerised patient record systems started to become more common and it was more or less completely digitalised by 2007, (Nilsson 2007). See Chap. 3.3 for more details about the early electronic patient record systems in Sweden.

For a description of the historical development of the patient record see also Gillum (2013).

2.4   The Paper Based Patient Record

Patient records are written for several reasons, for the physician as a memory support, but also to be used by other physicians involved in the healthcare process of the patient. Clinicians such as nurses, physiotherapists, dieticians, psychologists etc. are also involved in writing in the patient record. Since the nurses usually take care of the patient on a daily basis they also write daily notes in the patient record, while the physicians make notes at certain time points. The other reason for documenting the healthcare process of a patient is for legal reasons, since it is required by law in many countries.

Patient records have many different names, for example patient record, health record, case sheet, and case history. A paper based record contains certain distinguishable parts: the identity of the patient, the reason for the visit, the history and background of the patient (*anamnesis*, the results of *physical examination, current symptoms* (status), *assessment* and *treatment*, time points of documentation, the result of the treatment, the *discharge letter* (Greek $\epsilon\pi\acute{\iota}\kappa\rho\iota\sigma\iota\varsigma$ decision, judgement, in Swedish *epikris*) and who has written the record, see Fig. 2.2 (Nygren and Henriksson 1992; Nilsson 2007).

During the doctor's visit the physician listens first to the anamnesis from the patient, the physician then checks for symptoms, trying to exclude possible symptoms, leading to a *diagnosis*, containing the name of the disease and the possible *body part* where the disease is situated. Symptom is interchangeble with *finding* in this book, as well as disease is used interchangeably with *disorder*.
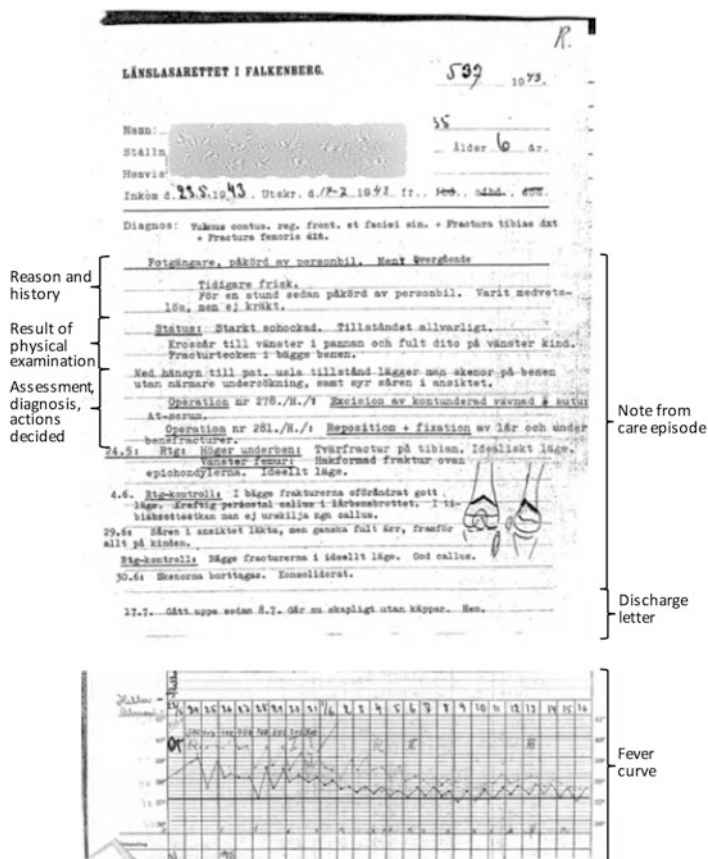
Fig. 2.2 Description of the parts of a Swedish medical record from 1943. A 6 year old boy was hit by a car and obtained a fracture on his femur. He was treated for this for 6 weeks on the hospital, and then discharged from the hospital when he could walk again. (The whole health care episode fits into a one page.) (© Läkartidningen, 2010-04-12, number 15 (http://www.lakartidningen.se/OldWebArticlePdf/1/14161/1003.pdf. Accessed 2018-01-11.) All rights reserved—reprinted with permission from Läkartidningen)

For patients admitted to the hospital the patient record contains daily notes of the status and progress of the treatment. These notes are usually taken by the nurses who also take daily care of the patient.

The discharge letter should contain a summary of the whole healthcare period, with instructions on how the patient should be taken care of after discharge from the hospital.

There are several ways to write a medical record: one is the source oriented patient record that it is divided based on the source of the information; one is the physician', the nurse', the laboratory or the radiology results and various other sources.

Another well-known model is the *Problem Oriented Medical Record (POMR)*, (Weed 1968). The model is based on an early decision on the main problem or problems of the patient, thereafter each problem is assessed on a daily basis without loosing focus on the patient. The SOAP model originates from the POMR model (Cameron and Turtle-Song 2002). *SOAP* stands for:

- *Subjective* (anamnesis, actual reasons for visit).
- *Objective* (findings when observing).
- *Assessment* (analysis).
- *Plan* (treatment and healthcare plan).

The paper record file gets thicker the more visits the patient has made. One observation is that older paper record sheets may have a different color e.g. more towards yellow than newer records, which shows how long time the patient may have been visiting the hospital for. The paper record file may also have red time stamps and the distance between them indicates the level of problems a patient may have, see Fig. 2.3.
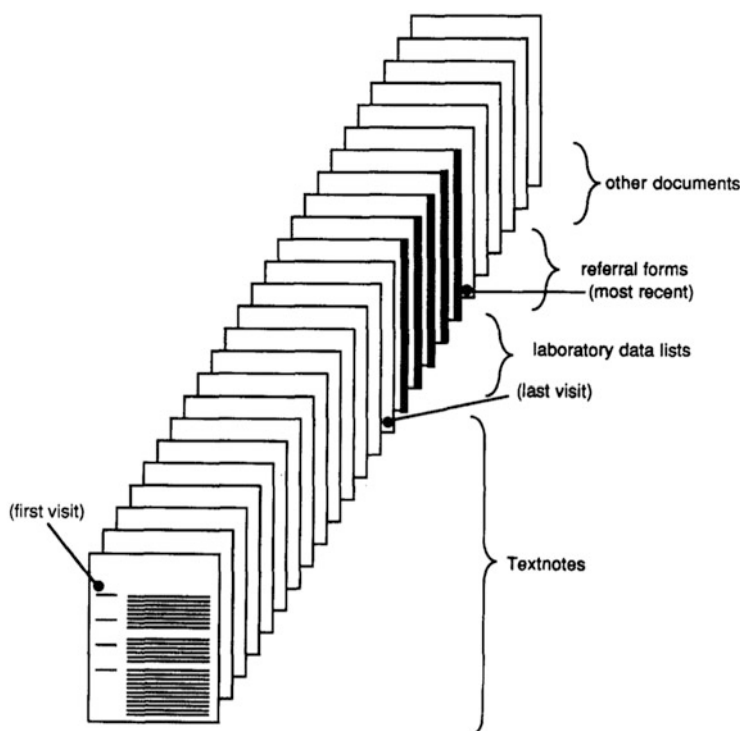
Fig. 2.3 The different parts of the medical record in a timeline, there can be another order of the paper record where the last visit is in the beginning of the file (© 1992 Elsevier Inc. All rights reserved—reprinted with permission from Elsevier Inc. Published in Nygren and Henriksson (1992))

Obviously it is difficult to analyse paper based patient records using computational linguistic methods, since the paper record needs to be scanned and the characters recognized with optical character recognition (OCR) techniques; however, in the next chapter we will demonstrate how to analyse electronic (digital) patient records.

2.5   Greek and Latin Used in the Patient Record

Greek language was obviously used by the Greeks in the early versions of the patient record and Greek physicians were famous during the antique period, both during Greek and later Roman rule. Many of the Greek documents were translated to Arabic by the Arabs after the fall of the western Roman Empire. The Arabs improved medicine a lot stretching over 500 years, during the Islamic Golden Age stretching from 700 to 1200 AD, and many of their manuscripts regarding medicine were translated to Latin. Many of the Arabic terms describing drugs and chemistry remained in their original form but Latinised.

Latin became the language of the scholars in the western world from 1000 AD. In the thesis by Nilsson (2007), she gives many examples of Swedish patient records using Swedish language to describe the status of the patient.

Generally pathological terms such as diseases and symptoms are written with Greek vocabulary, and anatomical terms such as body parts where the disease occurs are written with Latin vocabulary.

In Swedish many of these foreign terms are adapted to Swedish morphology using Swedish inflections, the so-called *swedification* for medical terms in Swedish, the same for English, German and French (Grigonytė et al. 2016).

Regarding swedification of medical terms in Swedish, by Grigonytė et al. (2016), write that prefixes are less affected by swedification than suffixes which are more common and therefore adapted to Swedish morphology. An example is the Greek-Latin medical term *cholecystitis* "gallbladder inflammation" that is written *koleocystit* in Swedish. Using the Swedish *k* in the prefix instead of *c* and removing the *-is* in the suffix.

In an article by McMorrow (1998) there is an interesting overview of the road of Greek-Latin medical terminology through the Islamic Golden Age and the medieval Europe into the nineteenth century.

2.6   Summary of the History of the Patient Record and the Paper Record

This chapter discussed the origin of patient records from ancient times to now, the reasons for producing patient records, the structure of patient records, the different distinct parts, how the records were filed and stored, and the POMR and SOAP

models used to structure the patient record, but also the language they are written in and the influences and use of Greek and Latin. The different languages they are written in influence each other in orthography and inflections of terms. This is important to know for the understanding of how the electronic patient record systems of today are structured and work.