

Improving diagnosis in Danish health care

In order for patients to receive the relevant treatment and care in the healthcare system, timely and correct diagnosis is a prerequisite. If a diagnosis is overlooked, delayed, or misdiagnosed, it can have serious consequences for patients and their relatives, and in the worst case, cause an inability to work, disablement or death. The healthcare system is also burdened by, for example, superfluous treatment, and the individual employees are affected when they (perhaps due to difficult working conditions) do not provide the optimal service to patients.

Thus, overlooked, delayed and incorrect diagnoses can have consequences on an individual, social, societal, and economic level, and there is a great potential to be found in improving the conditions for the diagnostic process.

Internationally, there is a growing awareness on diagnostic errors as a major and partly overlooked patient safety problem, as clearly shown in the 2015 report *Improving Diagnosis in Health Care* from the National Academy of Medicine in USA (1).

Also newer studies from the United States (2) show that diagnosis-related errors are common and are associated with high morbidity and mortality. Previous Danish figures have also indicated that the problem is prevalent in Denmark.

The Danish Society for Patient Safety (PS!) And the Patient Compensation Association have now carried out a new analysis of the area within a Danish context based on the Patient Compensation Association's data material. The project has received funding from the Health Foundation (Helsefonden).

The analysis focuses on the diagnostic process and looks at the possible causes and patterns that may be behind this process when it does not end with an optimal result. The aim is to create improvements for patients and to establish well-planned and safe working conditions for healthcare staff.

The analysis falls into two parts: A quantitative analysis that sheds light on the prevalence of overlooked, delayed and incorrect diagnoses in the Patient Compensation Association's data, and a qualitative analysis that provides an insight into where the weaknesses exist in the diagnostic process.

Definition of diagnostic error

In the report, the words misdiagnosis/diagnostic error are applied when an overlooked, delayed, or incorrect diagnosis prevents the patient from receiving a correct or timely treatment and the patient is harmed because of this.

The term diagnostic error is used because it is the best and simplest term. The term is also widely used in international literature. The present analysis is based on the Patient Compensation Association's data. Most cases with diagnostic errors are recognized according to the "specialist rule", where the treatment is assessed to deviate from the experienced specialist standard, i.e. cases where the Patient Compensation Association has assessed:

... That an (hypothetical) experienced specialist in the same circumstances would have acted differently, whereby harm could have been avoided.

This means that the report also uses the word diagnostic error in cases where there is no basis for professional criticism of the healthcare professionals involved. However, when the treatment has not lived up to the experienced specialist standard, there is room for learning and improvement, and that is the aim of this report.

Possible solutions

In order to propose possible solutions and initiatives that can improve the diagnostic process, Danish and international literature in the field has been reviewed. In addition, the results of the qualitative analysis have been presented and discussed in several sessions and in individual interviews with professionals in the Danish healthcare system. The report is rounded off on that basis with several proposed solutions.

The point is to provide an incentive for the departments and organizations within the healthcare system to start looking locally at what possibilities there are for improving the conditions for a successful diagnostic process.

The pursuit of a correct diagnosis will always be a balancing act. If the pressure to ensure correct diagnosis is great, for example due to fear of sanctions, there is a risk that the health professionals, in order to cover themselves, practice defensive medicine with overuse of examinations and diagnostic tests and with a possible consequence of overdiagnosis and overtreatment. This balancing act must be considered when assessing the various solution options and strategies.

Summary and conclusions

In the 10-year period 2009-2018, DKK 2.25 billion has been paid in compensation to patients who have been injured because of diagnostic errors in the Danish healthcare system.

The Patient Compensation Association's data does not reflect all diagnostic errors in Denmark since all compensable injuries are not reported. Thus, there are underreported figure in the area.

In this 10-year period, the Patient Compensation Association has settled a total of 13,000 cases involving a diagnostic error, of which 7,600 have been recognized. These are serious cases. Death due to diagnostic error, which is the most serious consequence of a patient injury, is almost twice as common for diagnostic error than that for other recognized treatment injuries. Over eight percent of recognized cases with diagnostic errors have resulted directly in the patient's death.

The following five major disease areas make up the majority (75%) of the cases recognized by the Patient Compensation Association as diagnostic errors: lesions (especially fractures and sprains), cancers, muscle and joint diseases (especially herniated disc), cardiovascular diseases (especially blood clots in the heart and blood clots in the brain/cerebral hemorrhage) and gastrointestinal diseases (especially volvulus and appendicitis).

The qualitative analysis

In the qualitative analysis, 213 selected cases were reviewed in detail. To review these cases, we recruited a team of three independent experts – all experienced medical specialists. They had access to medical charts, hospital records, lab results, x-ray-pictures etc.

To systematize the analysis, we developed a tool, making it possible to identify what phase in the diagnostic process was affected by error. This was translated and adapted from a tool originally designed by the American organization CRICO to analyze and learn from malpractice claims (3).

The tool divides the diagnostic process into 3 phases with 12 steps in total. For each case the reviewers registered, at what steps in the diagnostic process an error had occurred. During the review period the reviewers met twice to ensure consistency.

As you can see from the table below, the reviewers found that error frequently occurred in the first phase – during the “initial diagnostic assessment”.

Over all, in 80% of the cases reviewed, a contributing factor to the misdiagnosis could be found in the “initial diagnostic assessment”, which includes: medical history, objective examination, the doctor’s assessment of the patient and evaluation of symptoms, differential diagnostic considerations and prescribing of diagnostic tests.

Some cases were very serious: For instance a young man died because of a missing diagnosis of a pulmonary embolism. A milder case could be an elderly man, whose ruptured achilles tendon was overlooked.

Thus, the initial meeting(s) between a doctor and a patient and the assessments and reasoning made in this connection are a very critical phase in the diagnostic process.

Initial diagnostic assessment					Testing and results processing			Follow up and coordination			
80 %					27 %			33 %			
1	2	3	4	5	6	7	8	9	10	11	12
Problem noted – Care sought	History and Physical Conducted	Patient Assessed and Symptoms Evaluated	Differential Diagnosis Established	Diagnostic Test(s) Ordered	Tests Performed	Tests Interpreted	Test Results Transmitted to/ Received by Ordering Physician	Physician Follows up with Patient	Referrals/ Consults	Patient Information Communicated among Care Team	Patient and Providers Establish Follow up Plan
1%	23%	52%	44%	38%	2%	25%	0%	7%	24%	4%	1%

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Two subsequent steps in the diagnostic process, “interpretation of diagnostic examinations” and “referral and collegial consultation”, are also critical points.

For instance, there were several examples of misinterpretation of x-rays.

In the follow up phase we found a number of cases in which the patient should have been referred to another medical speciality.

For instance, a middle-aged man ended up visually impaired. His keratitis was overlooked, and he was not referred to an eye-specialist.

Several examples have been found in the material that major injuries can overshadow the diagnosis of minor injuries, e.g. in the event of an accident. In the same way, existing disease or a pregnancy can overshadow the diagnosis of a new disease.

Surprisingly many and relatively serious examples have been found of treatment, including surgery, having been carried out based on an incorrect diagnosis. It is treatment that is not only unnecessary overtreatment", but outright malpractice often resulting in serious patient injury. Consequences of a diagnostic error are thus not only expressed by the fact that the disease present is not treated in time, but also by the fact that patients risk being treated for diseases that they do not have.

Transition between different sectors is a known source of errors in the healthcare system. Relatively few cases have been found in the material, where sector transition is assessed to be a contributing factor. The fact that more cannot be found may be due to the fact that the problem does not always appear in the Patient Compensation Association's decisions, where the primary focus, all things being equal, is on the injury itself.

Only a few of the cases in the analysis material concern mental health disorders. Among other things, this is because there is generally a low recognition rate in psychiatric cases

Implications and solutions

In order to validate the results of the qualitative analysis and put them into perspective, these have been presented and discussed in several sessions and in individual interviews with professionals in the Danish healthcare system.

From this phase of the analysis, several suggestions have emerged as to how the diagnostic process can be improved by changing the organization and workflows in the healthcare system.

An important point is that the doctor should not handle the diagnostic process on their own, but can with benefit include information, observations and assessments from nursing staff and other professional groups as well as from the patient themselves and their relatives. The diagnostic process is a team collaboration.

The main findings:

- Annually there are approx. 760 people who receive compensation for injuries because of misdiagnosis, of which approx. 63 people die because of the patient injury. The average age for death due to diagnostic error is 55 years.
- The compensation in recognized cases after diagnostic error is huge; approx. DKK 248,000 on average when there is no death due to diagnostic error and approx. DKK 811,000 on average when the diagnostic error results in the patient's death.
- During the 10-year period 2009 - 2018, approx. DKK 2¼ billion in total was paid in compensation for cases with diagnostic errors.
- Cases with diagnostic error account for 29% of all recognized treatment injury cases.
- Overlooked and delayed diagnosis amounts to approx. 90% of all diagnostic errors.
- Five main groups of diseases together account for 75% of all diagnostic errors: Lesions, cancers, bone and muscle diseases, circulatory diseases, and gastrointestinal diseases.
- Orthopedic surgery and general medicine are the two most commonly involved medical specialties in diagnostic errors.

- Errors most often occur in the phase of the diagnostic process that can be referred to as ‘the initial diagnostic assessment’.
 - Two subsequent steps in the diagnostic process, ‘interpretation of diagnostic examinations’ and ‘referral and collegial consultation’, are also critical points.
 - Several examples have been found where one diagnosis/condition can overshadow the diagnosis of other significant injuries/diseases. For example, pregnancy can delay the diagnosis of breast cancer.
 - Several examples have been found of unnecessary operations and other treatment that have been carried out based on incorrect diagnosis and which have contributed to patient injuries.
 - Relatively few cases have been found where the material indicates that sector transition may be a contributing factor to the diagnostic error.
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References:

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