

## DESCRIPTION OF THE CLINICAL DECISION SUPPORT SYSTEM (CDSS)

Our CDSS was a rule-based system that suggested appropriate laboratory tests based on the indication(s) entered by the GP. The CDSS did not query the EHR for existing conditions but relied on the GP to enter the correct indication(s) into the CDSS. For each condition, several order sets were developed for distinct clinical situations. For instance, for the condition type 2 diabetes, order sets were developed for screening, diagnosis, and follow-up of the condition. For the follow-up of type 2 diabetes, separate order sets were developed for the follow-up of patients with or without diabetic nephropathy. These order sets were based on clinical practice guidelines available through the EBPracticeNet platform. Included in this platform are recommendations on laboratory test ordering developed by the Flemish College of Family Physicians.

Upon opening the CPOE, GPs were prompted to enter the indication(s) for which laboratory tests were ordered, through a searchable drop-down menu of common indications or a list of indications which could be selected through tick-boxes. Selecting one or more of these indications prompted a new window where the appropriate tests for these indications were shown as being ordered. In this window, the user was then able to accept the suggested panel, to cancel one or more of the ordered tests, or to add additional tests. The user was not restricted in ordering any tests, but was 'nudged' in the direction of ordering only the appropriate tests.

## SELECTION OF STUDY INDICATIONS

The selection of study indications was based on four criteria: frequency in primary care, baseline inappropriateness, availability of trustworthy guidelines for primary care, and the potential for diagnostic error. The rationale for using these criteria was discussed in the protocol for the study.

After user testing and review of the CDSS functionalities, we chose to exclude obesity as a study indication. Clinical practice guidelines suggested screening for diabetes in patients with obesity and user testing informed us that it was more practical to include this order set as part of the indication type 2 diabetes. In addition to this change, user testing also informed us that a distinction was necessary in the indication diarrhoea, more specifically between chronic and acute diarrhoea. Finally, we developed our CDSS to include 17 study indications:

1. Cardiovascular disease
  - a. screening
  - b. follow-up
2. Hypertension
  - a. Diagnosis
  - b. Follow-up general
  - c. Diuretic or ACE-I/sartan treatment
  - d. Hypertensive nephropathy
3. Type 2 diabetes
  - a. screening
  - b. Follow-up 3 monthly
  - c. Annual follow-up
  - d. ACE-I/sartan treatment
4. Anaemia
  - a. Clinical suspicion of anaemia
  - b. Microcytic or normocytic anaemia
  - c. Macrocytic anaemia
5. Liver pathology
  - a. Clinical suspicion or in case of risk factors
  - b. Follow-up
6. Medication monitoring
  - a. Statins

- b. Rheumatoid arthritis treatment (methotrexate, azathioprine, leflunomide, sulfasalazine, cyclofosfamide, chloorambucil)
  - c. Diuretic or ACE-I/sartan treatment
  - d. Isotretinoin
7. gout
8. chronic kidney disease
  - a. Screening (diabetes, hypertension, CVD, family history of stage V CKD)
  - b. Monitoring stage I - IIIa (eGFR  $\geq$  45)
  - c. Monitoring stage IIIb (eGFR 30-44)
  - d. Monitoring stage IV - V (eGFR  $\leq$  29)
9. suspected lung embolism
10. suspected acute coronary syndrome
11. acute diarrhoea
  - a. Patients at risk
  - b. Elderly
12. chronic diarrhoea
13. thyroid disease
  - a. Diagnosis
  - b. Monitoring after treatment changes
  - c. Monitoring stable disease
14. unexplained fatigue
15. sexually transmitted infections
  - a. Screening
  - b. Diagnosis
16. rheumatoid arthritis
  - a. Diagnosis
  - b. Follow-up RA treatment (methotrexate, azathioprine, leflunomide, sulfasalazine, cyclofosfamide, chloorambucil)
17. general check-up.

## DEFINITIONS

**Indication:** the reason(s) why the laboratory exam was ordered, e.g. anaemia, STD, diabetes, ... . There were 17 predefined indications, but GPs could add other indications in free text. Some of the predefined indications had sub-indications, e.g. for 'diabetes', GPs could specify whether it was for screening, 3-monthly or annual follow-up.

**Order set:** the set of appropriate lab tests the CDSS proposes when selecting a single indication, e.g. ticking diabetes-annual follow-up would prompt the following tests: cholesterol (total, HDL, LDL, triglycerides, glucose fasting, HbA1c, Creatinine, eGFR and albumin/creatinine ratio (urine)

**Lab panel:** all lab tests ordered during a single patient encounter

**Lab result:** the complete report of all test results.

**Tests** (as outcome measure): all parameters reported in the lab result: e.g. TSH, GPT, RBC. In some cases a single ordered test (e.g. leukocyte formula) would result in multiple reported tests (neutrophiles, eosinophiles, monocytes, ...). We used the number of reports tests to calculate the outcome measure (test volume).

**Test result:** the value reported in the lab result, e.g. 12,5mg/dl (for the test hemoglobine).

**Abnormal test:** a test of which the result falls outside the reference values. We used the reference values provided by the participating laboratories.