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Scenario A: Prevention: Personalised Prevention Plan for Breast Cancer

Decision Support Hypothesis

1. Interpretation of genetic sequencing results
2. Disease Risk Index (patient phenotype data + gene data + family)
3. Notifications for data reviews and patients requiring attention
4. Patient steering guideline (personalized screening plan)
5. Suggestions for clinical procedures and diagnose
6. Notifications for relatives with potential genetic risk

2. Disease Risk Index

Established Risk Factors for Breast Cancer

(Personalised cancer prevention (Kliiniline käsitus), P. Padrik, 17. Mai)

Type	Factor	Relative Risk	Definition	Source Mapping
	Gender (female vs. male)	100		ID-code
	Age (less than 50 vs. over 50)	6.7		ID-code
	Race/Ethnicity			EGC
Endocrine factors	Age of menarche (less than 10)	1.4 to 1.9		EGC; EHIS – narrative text
	Age at first birth (more than 35)	1.7		EGC; EHIS – narrative text
	Nulliparity	1.4		EGC; EHIS – narrative text
	Age at menopause (more than 55)	1.3		EGC; EHIS – narrative text
Benign breast disease	ADH, LCIS	4.0 to 5.0		EGC – ICD10; EHIS – ICD10; EHIF – ICD10
Family history	First-degree relatives	2.0 to 7.0		EGC
	BRCA1/BRCA2 mutation	10 to 30		EGC
	P53 (Li-Fraumeni)	1.5 to 6.0		EGC
	Cowden syndrome	2.0 to 4.0		EGC
	Therapeutic radiation	35		EHIS – narrative text. Hospital Information Systems – narrative text
Modifiable Factors	Oral contraceptive pills	0.9 to 1.0		EGC – ATC. EHIF – ATC
	Estrogen replacement (more than 10 years)	1.1		EGC – ATC. EHIF – ATC

	Estrogen and progesterone	1.4 to 3.0		EGC – ATC. EHIF – ATC
	Obesity (BMI more than 30)			EGC – numeric. EHIS has Height and Weight data in CDA documents presented in free text. Exception is the School Medicine Growth Notice where Height and Weight are in structured form.
	Exercise (more than 3 hours per week)			EGC – classification. EHIS has behavioural data in CDA documents presented in free text, if any.
	Alcohol use	1.1 to 2.2		EGC – coded questionnaire. EHIS has behavioural data in CDA documents presented in free text, if any.
	Diet	1.0		EGC – coded questionnaire. EHIS has behavioural data in CDA documents presented in free text, if any.
	Mammographic density	2.2 to 5.3		
Family history: known malignancies in biological relatives, by degrees of relatives:	Number of first-degree relatives with breast cancer			EGC – coded questionnaire. EHIS has genealogy data in CDA documents presented in free text, if any.
	Number of second-degree relatives with breast cancer			
	Number of third-degree relatives with breast cancer			
	Age of onset of breast cancer in a relative			
	Bilateral breast cancer in a relative			
	Ovarian cancer in a relative			
	Male breast cancer in a relative			

Scenario B: Chronic Patient Monitoring: Personalised Monitoring (Cardiovascular Diseases, Diabetes Type II)

Decision Support Hypothesis

1. Suggestions for clinical procedures and diagnose
2. Notifications for over threshold measurements
3. Gene based medication suggestions
4. Patient steering guideline (personalized screening plan)
5. Disease Risk Index (patient phenotype data + gene data + family)
6. Notifications for data reviews and patients requiring attention

Established Risk Factors for Diabetes Type II

Finnish Diabetes Risk Questionnaire

Factor	Relative Risk	Definition	Source Mapping
Age			ID-code
Weight			EGC – numeric; EHIS has Weight data in CDA documents presented in free text. Exception is the School Medicine Growth Notice where Weight is in structured form.
Height			EGC – numeric; EHIS has Height data in CDA documents presented in free text. Exception is the School Medicine Growth Notice where Height is in structured form.
High blood pressure medications (has ever taken or not)			EGC – ATC. EHIF – ATC, EGC – ATC
Waist circumference			EGC – numeric. EHIS has Waist circumference data in CDA documents presented in free text, if any.
Physical activity (more than 30 min a day)			EGC – classification. EHIS has behavioural data in CDA documents presented in free text, if any.
Diet (eating vegetables, fruit or berries every every day or not)			EGC – coded questionnaire. EHIS has behavioural data in CDA documents presented in free text, if any.
High blood glucose (ever found or not)			EHIS – Until 2015 as a part of CDA document in narrative form; Hospital Informations Systems – in some cases in LOINC. This structure is copied to EHIS

			CDA as a narrative text.
Diabetes diagnosed in immediate family, other relatives (own parent, brother, sister or child, grandparent, aunt, uncle or first cousin)			EGC. EHIS has genealogy data in CDA documents presented in free text, if any.

EBMeDS Script Examples

Glucose and lipid tests for patients with BMI above 32

Aim

The aim of this script is to recognize patients with metabolic syndrome or those in a risk to get it.

Context

Patients with overweight and in risk for metabolic syndrome, with weight measured within 2 years.

Method

For patients aged 15-74 years, the script checks if the body mass index is above 32 kg/m² or if body weight is above 100 kg (in cases where body length is not recorded in the patient record). If such a patient does not have a diagnosis of diabetes or metabolic syndrome, or medication implying diabetes, and if tests to detect impairments of the glucose metabolism have not been performed during the last two years, reminder 1 suggests that they are due. If lipid tests have not been performed during the last five years, reminder 2 suggests that they are due.

Parameters

Name	Definition	Source Mapping
Age	The age (in years) of a patient [Function:AgeInYears(Birthdate)]	Birthdate is part of Estonian personal ID. Information about age and sex is available in all Estonian healthcare databases where data is not depersonalized.
AllAntidiabeticDrugs	Antidiabetic drugs of all kinds (including insulin and oral antidiabetic drugs) [ATC:A10*]	EHIF database – ATC code. EGC – ATC EHIS – As a part of CDA document in narrative text.
BMI	Body mass index (function) [kg/m ²] [Function:BMI(Height, Weight)]	EGC – numeric. EHIS has Height and Weight data in CDA documents presented in free text. Exception is the School Medicine Growth Notice where Height and Weight are in structured form.
Cholesterol	Serum or plasma: total cholesterol concentration measurement DK:[NPU:NPU01566] FI: [KL:4515][KL:2095][KL:45546][KL2:fP-Kol][KL2:fS-Kol][KL2:P-Kol][KL2:S-Kol] US:[LOINC:2093-3]	EGC - numeric EHIS – Until 2015 as a part of CDA document in narrative form. Hospital Informations Systems – in some cases in LOINC. This structure is copied to EHIS CDA as a narrative text.
Diabetes	Diabetes of any type (including gestational diabetes)	EHIS – ICD10 EHIF – ICD10

	<p>NL: [ICPC:T89][ICPC:T90][ICD10:E10*][ICD10:E11*][ICD10:E14*] NO:[ICD10:E10*][ICD10:E11*][ICD10:E14*][ICPC:T89][ICPC:T90] FI: [ICD10:E10*][ICD10:E11*][ICD10:E14*][ICD10:N08.3][ICD10:H36.0*][ICPC:T89][ICPC:T90] GB: [READ:C10E.][READ:C10..][READ:C10F.][ICD10UK:E10*][ICD10UK:E11*][ICD10UK:E14*][ICPC:T89][ICPC:T90] US: [ICD9CM:250*][SCT:73211009][SCT:199227004][SCT:46635009][SCT:44054006][SCT:190331003][SCT:11687002][SCT:4689409][SCT:237599002][SCT:199230006][SCT:237626009][SCT:401110002][SCT:19037108][SCT:190368000][SCT:190392008][SCT:190390000][SCT:314904008][SCT:19038909][SCT:313436004][SCT:275918005]</p>	<p>EGC – ICD10 Hospitals Information Systems – ICD10</p>
GlucoseTests	<p>Serum or plasma: fasting glucose tests (also as part of a glucose tolerance test) or HbA1c test. No result interpretation. DK: [NPU:NPU02192][NPU:DNK35249][NPU:AAB00061][NPU:NPU27300] FI: [KL:1468][KL:1469][KL:1467][KL:1471][KL:1473][KL:1560][KL:6128][KL:8514][KL:10019][KL:14124][KL:45230][KL:45376][KL:45789][KL2:fP-Gluk][KL2:fS-Gluk][KL2:fB-Gluk][KL2:P-Gluk][KL2:S-Gluk][KL2:B-Hb-A1C][KL2:B-Hb-A1c][KL2:B-HbA1c][KL2:B-HbA1C][KL2:B-GHBA1c][KL2:B-GHbA1C][KL2:B-GHbA1c][KL2:B-GHbA1C][KL2:B-GHb-A1C][KL2:B-GHb-A1c][KL2:B-HbA1cmmol][KL2:B-HbA1c(%)][KL2:Pt-Gluk-0][KL2:fP-Gluk-P][KL2:P-Gluk-2f][KL2:P-Gluk-2h] NL: [LOINC:2345-7][LOINC:4548-4] US: [LOINC:2345-7][LOINC:4548-4][LOINC:41995-2][LOINC:59261-8]</p>	<p>EHIS – Until 2015 as a part of CDA document in narrative form. Hospital Informations Systems – in some cases in LOINC. This structure is copied to EHIS CDA as a narrative text.</p>
GlucoseToleranceTest	<p>Glucose value in glucose tolerance tests (short or long) [mmol/l] BE: [SSM:136515.B] FI: [KL:1483][KL:1484][KL:1485][KL:1487][KL:4596][KL:4800][KL:6063][KL:10553][KL:10022][KL:10111][KL:12073][KL:20271][KL2:Pt-Gluk-R][KL2:Pt-Gluk-R1][KL2:Pt-Gluk-R2][KL2:Pt-Gluk-R3][KL2:Pt-Gluk-R6][KL2:Pt-Gluk24h][KL2:P-Gluk-2f][KL2:P-Gluk-R][KL2:Pt-Gluk-Pa] US: [LOINC:1518-0][LOINC:1542-0][LOINC:24353-5]</p>	<p>EHIS – Until 2015 as a part of CDA document in narrative form. Hospital Informations Systems – in some cases in LOINC. This structure is copied to EHIS CDA as a narrative text.</p>
Height	<p>Patient: any body height measurement BE: [HO:009A][LOINC:8302-2][LOINC:3137-7][LOINC:8301-4][LOINC:3138-5] FI: [FinLOINC:8302-2][FinLOINC:3137-7][FinLOINC:8301-4][FinLOINC:3138-</p>	<p>EGC - numeric. EHIS has Height data in CDA documents presented in free text. Exception is the School Medicine Growth Notice where Height is in structured form.</p>

	5][KL:10006] NL: [LOINC:8302-2][LOINC:3137-7][LOINC:8301-4][LOINC:3138-5] US: [LOINC:3137-7][LOINC:8382-2][LOINC:3138-5][LOINC:8302-2]	
MetabolicSyndrome	Metabolic syndrome FI: [ICD10:E66.00] US: [ICD9CM:277.7][SCT:237602007]	EHIS – ICD10 EHIF – ICD10 EGC – ICD10 Hospitals Information Systems – ICD10
Pregnancy	Pregnancy, including routine pregnancy examination as a diagnosis BE: [ICPC:W79][ICPC:W84][ICD10:Z32.1][ICD10:Z33*][ICD10:Z34*][ICD10:Z35*][ICD10:Z36*][ICPC:W78] FI: [ICD10:Z32.1][ICD10:Z33*][ICD10:Z34*][ICD10:Z35*][ICD10:Z36*][ICPC:W78][ICPC:W79][ICPC:W84] NO: SE: [ICD10:Z32.1][ICD10:Z33*][ICD10:Z34*][ICD10:Z35*][ICD10:Z36*][ICPC:W78]	EHIF – ICD10 EGC – numeric, ICD10 Hospitals Information Systems – ICD10
PregnancyAsRisk	Pregnancy classified as a risk factor ---	EHIF – ICD10 Hospitals Information Systems – ICD10
Weight	Patient: body weight measurement BE: [HO:0099][LOINC:29463-7][LOINC:3141-9] FI: [FinLOINC:29463-7][FinLOINC:3141-9][KL:10014] NL: [LOINC:29463-7][LOINC:3141-9] GB: [READ:22A.][LOINC:29463-7][KL:29463-7][LOINC:29463-7][LOINC:3141-9][KL:10014][FinLOINC:29463-7][FinLOINC:3141-9] US: [LOINC:3141-9][LOINC:3142-7][LOINC:8350-1][LOINC:8351-9]	EGC numeric. EHIS has Weight data in CDA documents presented in free text. Exception is the School Medicine Growth Notice where Weight is in structured form.

ACE inhibitors or sartans after acute myocardial infarction

Aim

To reduce mortality in acute myocardial infarction by suggesting efficient drug therapy.

Context

Mainly secondary care where initial treatment of patients with acute myocardial infarction takes place

Method

If a patient is not using an ACE inhibitor or angiotensin receptor blocker 48 hours after an acute myocardial infarction which he/she had less than 14 days ago, reminder 1 recommending an ACE inhibitor is shown. If adverse effect for ACE inhibitor is registered then sartan is suggested by reminder 2.

Parameters

Name	Definition	Source
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ACE/AR-inhibitors	ACE inhibitors and AT2 receptor blockers alone or in combination with other drugs AU: BE: FI: NO: SE: [ATC:C09A*][ATC:C09B*][ATC:C09C*][ATC:C09D*] GB: [READ:8B6B.][READ:8B6E.][ATC:C09A*][ATC:C09B*][ATC:C09C*][ATC:C09D*] US: [RxN:374938][RxN:371254][RxN:378269][RxN:378288][RxN:372007][RxN:374378][RxN:372614][RxN:373293][RxN:378137][RxN:373748][RxN:373749][RxN:451330][RxN:373731][RxN:371001][RxN:371506][RxN:372274][RxN:582032][RxN:374176][RxN:374177][RxN:373943][RxN:372945][RxN:452698][RxN:393442][RxN:372651][RxN:374612][RxN:374279][RxN:378276][RxN:370704][RxN:371247][RxN:374024][RxN:378991]	EHIF – ATC EGC - ATC
ACE_Inhibitors	ACE inhibitors alone or in combination drugs (Captopril; Enalapril; Lisinopril; Perindopril; Ramipril; Quinapril; Benazepril; Cilazapril; Fosinopril; Trandolapril; Spirapril; Delapril; Moexipril; Temocapril; Zofenopril; Imidapril) AU: BE: FI: NO: [ATC:C09A*][ATC:C09B*] GB: [ATC:C09A*] US: [RxN:374938][RxN:371254][RxN:378269][RxN:378288][RxN:372007][RxN:374378][RxN:372614][RxN:373293][RxN:378137][RxN:373748][RxN:373749][RxN:451330][RxN:373731][RxN:371001][RxN:371506][RxN:372274][RxN:582032][RxN:374176][RxN:374177][RxN:373943][RxN:372945][RxN:452698][RxN:393442]	EHIF – ACT EGC – ACT EHIS – As a part of CDA document in narrative text.
AcuteMyocardialInfarction	Acute myocardial infarction FI: [ICD10:I21*][ICD10:I22*][ICPC:K75] NO: SE: GB: [ICD10:I21*][ICD10:I22*] US: [ICD9CM:410*]	EHIF – ICD10 EGC – ICD10 Hospitals Information Systems – ICD10

Clopidogrel, prasugrel or ticagrelor and aspirin in acute ST-segment elevation myocardial infarction (STEMI)

Aim

Make sure that aspirin and clopidogrel, ticagrelor or prasugrel are given to a patient with acute myocardial infarction

Context

Mainly secondary care

Method

If a patient with acute myocardial infarction is not using both aspirin and clopidogrel, ticagrelor or prasugrel at 2 hours of diagnosis, a reminder on checking whether the patient has received these drugs is shown.

Parameters

Name	Definition	Source
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Aspirin	<p>Aspirin (Acetylsalicylic acid+ (excluding psycholeptics))</p> <p>FI: NO: SE:</p> <p>[ATC:N02BA01][ATC:N02BA51][ATC:B01AC06]</p> <p>GB:</p> <p>[READ:bu2..][READ:di1*][READ:je1*][READ:blm*][READ:bu4*][ATC:N02BA01][ATC:N02BA51][ATC:B01AC06][SCT:7947003]</p> <p>US:</p> <p>[RxN:376000][RxN:376412][RxN:375998][RxN:238118][RxN:378125][RxN:376425][RxN:238137][RxN:375995][RxN:692835][RxN:376869][RxN:238142][RxN:376080][RxN:374733][RxN:370945][RxN:378699][RxN:437745][RxN:376014][RxN:370826][RxN:437746][RxN:374709][RxN:376079][RxN:375985][RxN:437753][RxN:437759][RxN:437761][RxN:376899][RxN:378090][RxN:376009][RxN:374756][RxN:376085][RxN:484433][RxN:374753][RxN:374755][RxN:370946][RxN:376013][RxN:376015][RxN:376086][RxN:376083][RxN:376102][RxN:378216][RxN:374757][RxN:376120][RxN:376133][RxN:376131][RxN:647975][RxN:374758][RxN:374702][RxN:376143][RxN:437757][RxN:379282][RxN:377082][RxN:374765][RxN:370947][RxN:378761][RxN:370615][RxN:376012][RxN:370948][RxN:374760][RxN:374442][RxN:437080][RxN:379493][RxN:378760][RxN:450708][RxN:375697][RxN:578946][RxN:379149][RxN:434804][RxN:371453][RxN:377083][RxN:385499][RxN:370943][RxN:370949][RxN:376011][RxN:378091][RxN:378744][RxN:370944][RxN:370616][RxN:371918][RxN:376010][RxN:437765][RxN:379357][RxN:437763][RxN:370643][RxN:637684][RxN:393142][RxN:437767][RxN:437775][RxN:372778][RxN:372833][RxN:372870][RxN:372985][RxN:374711][RxN:370950][RxN:385600][RxN:437768][RxN:373278][RxN:370951][RxN:370952][RxN:437771][RxN:434862][RxN:450707][RxN:373408][RxN:373409][RxN:373427][RxN:405803][RxN:376416][RxN:373647][RxN:373649][RxN:578948][RxN:374494][RxN:373703][RxN:437772][RxN:437777][RxN:437779][RxN:370614][RxN:370942][RxN:379422][RxN:405802][RxN:370939][RxN:376394][RxN:370613][RxN:370610][RxN:370612][RxN:370941][RxN:437673][RxN:370940][RxN:379497][RxN:375972][RxN:370611][RxN:370609][RxN:374845]</p>	<p>EGC - ATC. The only source where information about over the counter medication is stored.</p> <p>EHIS – As a part of CDA document in narrative text.</p>
Clopidogrel	<p>BE: FI: NO: SE: [ATC:B01AC04]</p> <p>GB: [READ:BU5*][ATC:B01AC04]</p> <p>US: [RxN:374583]</p>	<p>EHIF – ATC</p> <p>EGC - ATC</p> <p>EHIS – As a part of CDA document in narrative text.</p>
Meta_P2Y12_Inhibitors	<p>Clopidogrel, prasugrel, ticagrelor</p> <p>FI:</p> <p>[Alias:Clopidrogel][Alias:Prasugrel][Alias:Ticagrelor]</p>	<p>EHIF – ATC</p> <p>EGC – ATC</p> <p>EHIS – As a part of CDA document in narrative text.</p>
Prasugrel	<p>FI: [ATC:B01AC22]</p>	<p>EHIF – ATC</p>

		EGC – ATC EHIS – As a part of CDA document in narrative text.
STEMI	ST elevation myocardial infarction FI: [ICD10:I21.0*][ICD10:I21.1*][ICD10:I21.2*][ICD10:I21.3*]	EHIS – ICD10 EHIF – ICD10 EGC – ICD10 Hospital Information Systems – ICD10
Ticagrelor	Alias for ticagrelor FI: [ATC:B01AC24]	EHIF – ATC EGC – ATC EHIS – As a part of CDA document in narrative text.

Beta blockers after myocardial infarction

Aim

Improve survival after myocardial infarction by promoting the use of beta blockers.

Context

Any healthcare setting where patients who have a history of myocardial infarction are seen and their medication is managed.

Method

If a patient who has had myocardial infarction within 12 months is not using beta blockers, and adverse effects related to beta blockers have not been recorded, a reminder is shown on the benefit of beta blockers.

Parameters

Name	Definition	Source
AcuteMyocardialInfarction	Acute myocardial infarction FI: [ICD10:I21*][ICD10:I22*][ICPC:K75] NO: SE: GB: [ICD10:I21*][ICD10:I22*] US: [ICD9CM:410*]	EHIS – ICD10 EHIF – ICD10 EGC – ICD10 Hospital Information Systems – ICD10
BetaBlockers	All drugs that contain beta-blockers BE: FI: NO: GB: [ATC:C07*] US: [RxN:437395][RxN:376163][RxN:370738][RxN:437142][RxN:446671][RxN:437140][RxN:377207][RxN:370505][RxN:437138][RxN:370737][RxN:379257][RxN:437781][RxN:385565][RxN:440424][RxN:370958][RxN:370620][RxN:628544][RxN:393276][RxN:370961][RxN:376172][RxN:656126][RxN:370960][RxN:370959][RxN:370619][RxN:376171][RxN:371065][RxN:371103][RxN:371104][RxN:437995][RxN:438113][RxN:377103][RxN:371295][RxN:664767][RxN:371296][RxN:372553][RxN:628903][RxN:378652][RxN:377107][RxN:372554][RxN:446303][RxN:439007][RxN:439004][RxN:372879][RxN:372880][RxN:628544][RxN:446468][RxN:379254][RxN:439560][RxN:440425][RxN:372890][RxN:372889][RxN:446677][RxN:378660][RxN:376261][RxN:372891][RxN:372977][RxN:372978][RxN:393308][RxN:440427][RxN:373182][RxN:373181][RxN:373186][RxN:373185][EHIF – ATC EGC – ATC EHIS – As a part of CDA document in narrative text.

	RxN:439008][RxN:373184][RxN:373183][RxN:379442][RxN:450545][RxN:373254][RxN:373255][RxN:373461][RxN:373459][RxN:450803][RxN:450800][RxN:378147][RxN:450805][RxN:373460][RxN:385228][RxN:373656][RxN:373655][RxN:373657][RxN:439011][RxN:373650][RxN:373651][RxN:450465][RxN:373652][RxN:375929][RxN:377113][RxN:393497][RxN:373653][RxN:373654][RxN:379253][RxN:371344][RxN:379255][RxN:376365][RxN:373937][RxN:451886][RxN:451884][RxN:451997][RxN:379256][RxN:374136][RxN:597143][RxN:377452][RxN:374419][RxN:392928][RxN:374137][RxN:376542][RxN:374134][RxN:374135]	
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Statins for the secondary prevention of cardiovascular disease

Aim

The aim of this script is to enhance treatment of dyslipidemia and secondary prevention in patients who have already suffered a cardiovascular event.

Context

All adult patients who have had a cardiovascular event, primary care and specialised care.

Method

If a patient aged 18-80 years has a diagnosis or procedure implying an atherosclerotic disease, but is not on statin or fibrate medication and has no previously recorded adverse effects related to statins, a reminder is given asking whether the patient is eligible for statin medication. If creatine kinase (CK) has been markedly elevated (>4000) during the last 5 years, the user is notified. If an LDL value can be found it is shown in the long reminder. If the LDL value is missing from patient's EHR, reminder about the missing LDL measurement is given.

Parameters

Name	Definition	Source
Age	The age (in years) of a patient AT: BE: EE: FI: DE: IN: NL: NO: SE: GB: US: [Function:AgeInYears(Birthdate)]	Birthdate is part of Estonian personal ID. Information about age and sex is available in all Estonian healthcare databases where data is not depersonalized.
ArterialAtheroscleroticDisease	Any arterial atherosclerotic disease BE: [ICPC:K74][ICPC:K75][ICPC:K76][ICPC:K90][ICPC:K91][ICPC:K92][ICD10:I20*][ICD10:I21*][ICD10:I22*][ICD10:I23*][ICD10:I24*][ICD10:I25*][ICD10:I63*][ICD10:I65*][ICD10:I66*][ICD10:I69.3*][ICD10:I70*] FI: NO: SE: [ICD10:I20*][ICD10:I21*][ICD10:I22*][ICD10:I23*][ICD10:I24*][ICD10:I25*][ICD10:I63*][ICD10:I65*][ICD10:I66*][ICD10:I69.3*][ICD10:I70*][ICD10:G45*][ICPC:K74][ICPC:K75][ICPC:K76][ICPC:K89][ICPC:K90][ICPC:K91][ICPC:K92]	EHIS – ICD10 EHIF – ICD10 EGC – ICD10 Hospitals Information Systems – ICD10

	<p>GB: [ICD10UK:I20*][ICD10UK:I21*][ICD10UK:I22*][ICD10UK:I23*][ICD10UK:I24*][ICD10UK:I25*][ICD10UK:I63*][ICD10UK:I65*][ICD10UK:I66*][ICD10UK:I693*][ICD10UK:I70*]</p> <p>US: [ICD9CM:410*][ICD9CM:411*][ICD9CM:412*][ICD9CM:413*][ICD9CM:414*][ICD9CM:434.01*][ICD9CM:434.11*][ICD9CM:434.91*][ICD9CM:440*]</p>	
BypassCoronaryArterialGraft	<p>Coronary bypass using free arterial graft</p> <p>FI: [NCSP:FNE*]</p>	<p>EHIS – NCSP EHIF – NCSP; Health Insurance Fund coding list Hospital Information Systems – NCSP;</p>
Cholesterol	<p>Serum or plasma: total cholesterol concentration measurement [mmol/l] BE: [HO:0234][SSM:57131A.B]</p> <p>DK: [NPU:NPU01566]</p> <p>FI: [KL:4515][KL:2095][KL:45546][KL2:fP-Kol][KL2:fS-Kol][KL2:P-Kol][KL2:S-Kol]</p> <p>IT: [SISS:0090143][MELD:2075]</p> <p>GB: [READ:44PH.][KL:4515][KL:2095]</p> <p>US: [LOINC:2093-3]</p>	<p>EGC – numeric EHIS – Until 2015 as a part of CDA document in narrative form. Hospital Informations Systems – in some cases in LOINC. This structure is copied to EHIS CDA as a narrative text.</p>
CholesterolHDL	<p>Serum or plasma: HDL cholesterol concentration measurement [mmol/l] BE: [HO:0235][SSM:57133A.B]</p> <p>DK: [NPU:NPU01567]</p> <p>FI: [KL:4516][KL:2097][KL:45548][KL2:fP-Kol-HDL][KL2:fS-Kol-HDL][KL2:P-Kol-HDL][KL2:S-Kol-HDL]</p> <p>IT: [SISS:0090141][MELD:2078]</p> <p>GB: [READ:44P5.][KL:4516][KL:2097]</p> <p>US: [LOINC:2085-9][LOINC:2086-7][LOINC:9832-7][LOINC:9833-5]</p>	<p>EGC – numeric EHIS – Until 2015 as a part of CDA document in narrative form. Hospital Informations Systems – in some cases in LOINC. This structure is copied to EHIS CDA as a narrative text.</p>
CoronaryPtcaOrStentingDg	<p>FI: [ICD10:Z95.5]</p>	<p>EHIS – NCSP EHIF – NCSP;</p>
DrugInducedMyopathy	<p>Myopathy induced by drugs</p> <p>BE: FI: GB: [ICD10:G72.0]</p>	<p>EHIS – ICD10 EHIF – ICD10 EGC – ICD10 Hospitals Information Systems – ICD10</p>
Fibrates	<p>Fibrates</p>	<p>EHIF – ATC</p>

	FI: [ATC:C10AB*]	EGC – ATC EHIS – As a part of CDA document in narrative text.
LDLCalculated	The LDL concentration calculated according to Friedewald [mmol/l] BE: FI: GB: US: [Function:LDL(Cholesterol, CholesterolHDL, Triglycerides)]	EGC – numeric EHIS – Until 2015 as a part of CDA document in narrative form. Hospital Informations Systems – in some cases in LOINC. This structure is copied to EHIS CDA as a narrative text.
P-CreatineKinase	Serum or plasma creatine kinase concentration measurement [U/l] DK: [NPU:NPU19656] FI: [KL:4517][KL2:P-CK]	EHIS – Until 2015 as a part of CDA document in narrative form. Hospital Informations Systems – in some cases in LOINC. This structure is copied to EHIS CDA as a narrative text.
PTCACoronary	Endovascular dilatation of coronary arteries (PTCA) FI: [NCSP:FN1AT][NCSP:FN1BT]	EHIS – NCSP EHIF – NCSP; Health Insurance Fund coding list Hospital Information Systems – NCSP;
PeripheralPTCA	FI: [NCSP:PFH*][NCSP:PFQ26][NCSP:PFQ99]	EHIS – NCSP EHIF – NCSP; Health Insurance Fund coding list Hospital Information Systems – NCSP;
StatinInducedMyopathy	Myopathy from a statin FI: [ICD10:G72.0#C01AA*]	EHIS – ICD10 EHIF – ICD10 EGC – ICD10 Hospitals Information Systems – ICD10
Triglycerides	Serum or plasma: triglyceride concentration measurement [mmol/l] BE: [HO:0233][SSM:57227A.B] DK: [NPU:NPU04094] FI: [KL:4568][KL:2770][KL:45549][KL2:fP-Trigly][KL2:fS-Trigly] IT: [SISS:0090432][MELD:2080] GB: [READ:44Q.][KL:4530][KL:2770] US: [LOINC:2571-8]	EGC – numeric EHIS – Until 2015 as a part of CDA document in narrative form. Hospital Informations Systems – in some cases in LOINC. This structure is copied to EHIS CDA as a narrative text.
fS-LDL-Chol	Serum or plasma: LDL cholesterol concentration measurement [mmol/l] BE: [HO:0265][SSM:57133B.B] DK: [NPU:NPU01568] FI: [KL:2099][KL:4599][KL:45547][KL2:fP-	EGC – numeric EHIS – Until 2015 as a part of CDA document in narrative form. Hospital Informations Systems – in some cases in LOINC. This structure is copied to EHIS CDA as a narrative text.

	Kol-LDL][KL2:fS-Kol-LDL][KL2:P-Kol-LDL][KL2:P-SLDL][KL2:S-Kol-LDL][KL2:S-SLDL] IT: [SISS:009013C][MELD:2077] GB: [READ:44PI][KL:2099] US: [LOINC:2089-1][LOINC:18262-6]	
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Metformin is the first choice oral hypoglycaemic agent in type 2 diabetes

Aim

Type 2 diabetics should be on metformin if no contraindications exist.

Context

Type 2 diabetics in primary and secondary care

Method

The script is launched if the diagnosis is type 2 diabetes and the patient is either under 65 years old or between 65-74 years. First, for patients under 65 years the script checks whether the drug list contains metformin and whether HbA1c is below 7.5% (58 mmol/mol). If not, the script checks for the plasma/serum creatinine value. If the GFR is in the normal range, reminder 1 is shown. For patients between 65-74 years the script checks whether the drug list contains metformin and whether HbA1c is below 8.0% (64 mmol/mol). If not, the script checks for the plasma/serum creatinine value. If GFR is 50 - 60 ml/min, reminder 2 is shown. If GFR is missing or not fresh enough, reminder 3 is shown.

Parameters

Name	Definition	Source
Age	The age (in years) of a patient AT: BE: EE: FI: DE: IN: NL: NO: SE: GB: US: [Function:AgeInYears(Birthdate)]	Birthdate is part of Estonian personal ID. Information about age and sex is available in all Estonian healthcare databases where data is not depersonalized.
GFR	The glomerular filtration rate (function) [ml/min] AT: BE: EE: FI: DE: IN: NO: SE: GB: US: [Function:GFR(Age, Gender, S/P-Creatinine)]	EHIS – Until 2015 as a part of CDA document in narrative form. Hospital Informations Systems – in some cases in LOINC. This structure is copied to EHIS CDA as a narrative text.
Gender	Patient: the gender (sex) of a patient. Only EBMeDS internal codes allowed: 1 = male, 2 = female, 9 = not possible to determine (newborn babies with severe malformations), 0 = unknown AT: BE: EE: DE: IN: NO: SE: GB: US: [ISO 5218:XY] FI: [SFS 4182:XY]	Information about age and sex is available in all Estonian healthcare databases where data is not depersonalized.
HbA1c	Blood: glycosylated haemoglobin A1c measurement (in % or mmol/mol) BE: [HO:064B][SSM:57183A.B]	EHIS – Until 2015 as a part of CDA document in narrative form. Hospital Informations Systems – in some cases in LOINC. This structure is

	<p>DK: [NPU:DNK35249][NPU:AAB00061][NPU:NPU27300]</p> <p>FI: [KL:1560][KL:6128][KL:8514][KL:14124][KL:45376][KL:45789][KL2:B-Hb-A1C][KL2:B-Hb-A1c][KL2:B-HbA1c][KL2:B-HbA1C][KL2:B-GHbA1c][KL2:B-GHbA1C][KL2:B-GHbA1c][KL2:B-GHbA1C][KL2:B-GHb-A1C][KL2:B-GHb-A1c][KL2:B-HbA1cmmol][KL2:B-HbA1c(%)][KL2:B-Hb-A1C/][KL2:B-HbA1c/]</p> <p>IN: [LOINC:4548-4][LOINC:41995-2]</p> <p>IT: [SISS:0090281][MELD:10251]</p> <p>GB: [READ:42W5.][KL:1560]</p> <p>US: [LOINC:4548-4][LOINC:41995-2][LOINC:59261-8]</p>	<p>copied to EHS CDA as a narrative text.</p>
Metformin	<p>BE: [ATC:A10BA02][ATC:A10BD02][ATC:A10BD10][ATC:A10BD11][ATC:A10BD13][ATC:A10BD03][ATC:A10BD05][ATC:A10BD07][ATC:A10BD08]</p> <p>FI: [ATC:A10BA02][ATC:A10BD03][ATC:A10BD05][ATC:A10BD07][ATC:A10BD08]</p> <p>IN: [RxN:372804][RxN:406082][RxN:372803]</p> <p>NL: NO: SE: [ATC:A10BA02][ATC:A10BD03]</p> <p>GB: [READ:f4...][SCT:109081006][ATC:A10BA02][ATC:A10BD03]</p> <p>US: [RxN:372804][RxN:406082][RxN:372803]</p>	<p>EHIF – ATC EHIS – As a part of CDA document in narrative text.</p>
S/P-Creatinine	<p>Serum or plasma: creatinine concentration [umol/l]</p> <p>BE: [HO:0221][SSM:57139A.B]</p> <p>DK: [NPU:NPU18016]</p> <p>FI: [KL:2143][KL:4600][KL:2142][KL:45050][KL:45319][KL:0601][KL2:fS-Krea][KL2:P-Krea][KL2:fP-Krea][KL2:S-Krea]</p> <p>IN: [LOINC:2160-0]</p> <p>IT: [SISS:0090163.01][MELD:2070]</p>	<p>EHIS – Until 2015 as a part of CDA document in narrative form. Hospital Informations Systems – in some cases in LOINC. This structure is copied to EHS CDA as a narrative text.</p>

	<p>GB: [READ:44]3.[SCT:70901006]</p> <p>US: [LOINC:2160-0]</p>	
T2D	<p>Type 2 diabetes</p> <p>BE: FI: NO: SE: [ICPC:T90][ICD10:E11*]</p> <p>IN: [ICD10:E11*]</p> <p>GB: [READ:C10F.][ICD10UK:E11*][ICPC:T90]</p> <p>US: [ICD9CM:250.00][ICD9CM:250.02][ICD9CM:250.20][ICD9CM:250.22][ICD9CM:250.10][ICD9CM:250.12][ICD9CM:250.60][ICD9CM:250.62][ICD9CM:250.50][ICD9CM:250.52][ICD9CM:250.30][ICD9CM:250.32][ICD9CM:250.80][ICD9CM:250.82][ICD9CM:250.70][ICD9CM:250.72][ICD9CM:250.40][ICD9CM:250.42][ICD9CM:250.90][ICD9CM:250.92][SCT:44054006][SCT:199230006][SCT:190392008][SCT:190390000][SCT:314904008][SCT:190389009][SCT:313436004]</p>	<p>EHIS – ICD10</p> <p>EHIF – ICD10</p> <p>EGC – ICD10</p> <p>Hospitals Information Systems – ICD10</p>