SNOMED DK drug terminology and Decision Support Services

Kell Greibe MD, MI

National Board of eHealth
keg@ssi.dk
Difficult to get an overview of all relevant information

- large amounts of data available about patients and drugs:
  - physiological data, investigations, lab data, disease- and treatment data, guidelines, SPC’s, internet site, interaction databases, commercial databases, terminologies and classifications etc..
- polypharmacy - 10 drugs prescribed at the same time doesn’t make it easier
- many different, generics and analogical, drugs on the market

A busy clinic:

- Lack of time for in-depth investigation of drug side effects, interactions, allergies, contraindications, etc.
- Lack of time for in-depth investigation of interaction between drugs and the patients physiology, diseases, foods, etc.
Decision Support System: base and module components

BASE

- Structured SNOMED DK terminology
- Decision support engine
- Physicians preferences DB
- Mapping table
- Webservices
- Common Drug Database - central medication service
- National Service Platform infrastructure

MODULES

- Allergy register
- Allergy check
- Interaction DB
- MaxDose DB
- Risk situation DB
- Cross allergy
Central Services

- mapping module
- terminology module
- Decision support engine

Vendor system
- medication module
- documentation
- patient administration

webservice

CDS modules
- allergy register
- allergy check
- Interaction check
- Risk situation
- Max Dose
- Cross-Allergy
- Pregnancy and lactation
- Contraindications
- Adverse Reactions
- Visual medication card

Functions
- physician preferences DB
- algorithms
- calculations
- logic
Is there a **local** terminology we can use?

- **Medicin Price (Taksten)**
  - Contains a product ID (DrugID)
  - Published by National Board of Health
  - Covers many other things than substances and drugs
  - Doesn’t covers all drugs on the Danish market
  - Meant for prices and stockhandling
  - 32 data tablets - no attribute relationships
  - Combination drugs strengths give problems doing calculation
  - No substance ID
Is there an **international terminology** we can use?

- **ATC:**
  - Published by WHO
  - Covers only substances in 5 levels
  - Made for statistics on drug consumption in therapeutic areas
  - Mono-hierarchical classification
  - Substances can be represented many places in the ATC hierarchy
  - It's necessary to know indication/diagnosis to know which ATC code to use
  - Many combination drugs can't be properly identified
  - Drug can have different ATC codes in different countries
Why should Denmark have a new drug terminology?

- Problems with combination drugs in ATC
- Same substance can be found several places in ATC
- Different ATC codes in different countries
- Problems with combination drugs strengths in DrugID
- DrugID is local
- No substance ID in DrugID
- No built in knowledge in attributes in DrugID
- A structured terminologii is required to have better handling of CDS

...so how about SNOMED?
A few good reasons to choose SNOMED CT

- structured
- unique ID’s
- customisable
- updated – still needs work
- accessible - workbench

...but first a small lesson in drug terminology – SNOMED style

...so how do we create a SNOMED CT based Danish terminology

- standardiset
1. hierarchy:
pharmaceutical/biological product
  fx: "paracetamol 500 mg tablet (product)"
attributes:
  paracetamol 500 mg tablet (product) has active ingredient paracetamol (substance)
  paracetamol 500 mg tablet (product) has dose form tablet (qualifyer)

2. hierarchy:
substances
  fx: "paracetamol (substance)"
attributes:
  paracetamol 500 mg tablet (product) has active ingredient paracetamol (substance)
  paracetamol allergy (disorder) has causative agent paracetamol (substance)

3. hierarchy:
qualifier
  fx: "tablet (qualifyer)"
attributes:
  paracetamol 500 mg tablet (product) has dose form tablet (qualifyer)
4. Hierarchy

**strength**

fx: "500 (strength)"

attributes:

paracetamol 500 mg tablet (product) **has strength** 500 (strength)

5. **...so back to how to create a SNOMED CT based Danish terminology**

**measurement unit**

fx: "mg (measurement unit)"

6. Hierarchy

**ATC-code**

fx: "N02AA59 (ATC code)"
## Part One: Data extraction and cleaning

### Danish Medicines Database

DrugID; trade name; substances, dose form, strengths, ATC code

### Data sheet

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DrugID</td>
<td>BegrebetDK Kommentar (lett kryd)</td>
<td>Salgsvare</td>
<td>Form</td>
<td>Syrlke 1 (numerisk)</td>
<td>Syrlke 1, enhed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>619</td>
<td>201003756402</td>
<td>Pangaka</td>
<td>kapsler, kade</td>
<td>400 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>20100170955</td>
<td>Paroklin &quot;Recip&quot;</td>
<td>enetergranalud</td>
<td>8 Fl.Eur. enhed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>20100059873</td>
<td>Parodil</td>
<td>filmovertrukne tabletter</td>
<td>500 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>201010518001</td>
<td>Parodil</td>
<td>suppositorer</td>
<td>500 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>20101275066</td>
<td>Parodil</td>
<td>suppositorer</td>
<td>1000 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>20101674094</td>
<td>Parodil</td>
<td>filmovertrukne tabletter</td>
<td>1000 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>201008007616</td>
<td>Parodil Erox</td>
<td>brusetabletter</td>
<td>500 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>20101569234</td>
<td>Parodil Hot</td>
<td>pulver til oral opslagning, freve</td>
<td>500 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>20102092976</td>
<td>Parodil Junior</td>
<td>oral suspension</td>
<td>24 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>20101051280</td>
<td>Parodil Junior</td>
<td>suppositorer</td>
<td>128 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>20101574668</td>
<td>Parodil Junior</td>
<td>suppositorer</td>
<td>151 mg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Base component: SNOMED DK drug terminology
Part Two: Mapping

Data sheet with drug information from the Danish Medicines Agency DB

Automated procedure:
- finds 100% matches
- suggestions on possible matches
- suggestion on missing concepts in SNOMED CT

SNOMED CT database

Base component: SNOMED DK drug terminology
Enhanced data sheet  
...now with SNOMED ID's

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DrugID</td>
<td>Begrebet/ Kommentarer (det kryds)</td>
<td>Sorgetnavn</td>
<td>Form</td>
<td>Sygehus 1 (numerisk)</td>
<td>Sygehus 1, fil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>610</td>
<td>2800059422</td>
<td>Panugro</td>
<td>kaplet, hæde</td>
<td></td>
<td>400 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>611</td>
<td>2800172555</td>
<td>Parkosat &quot;Recap&quot;</td>
<td>entangagul</td>
<td></td>
<td>3 Ph Eur. anteks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>612</td>
<td>2100056873</td>
<td>Pandill</td>
<td>filmkovne tabletter</td>
<td></td>
<td>500 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>612</td>
<td>2100041399</td>
<td>Pandill</td>
<td>suppositorer</td>
<td></td>
<td>500 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>615</td>
<td>2100273666</td>
<td>Pandill</td>
<td>suppositorer</td>
<td></td>
<td>1000 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>616</td>
<td>2100274394</td>
<td>Pandill</td>
<td>filmkovne tabletter</td>
<td></td>
<td>1000 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>2100080756</td>
<td>Pandill/Eks</td>
<td>buksetabletter</td>
<td></td>
<td>500 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>2100013424</td>
<td>Pandill/Het</td>
<td>suppositorer til rectal administration, breve</td>
<td></td>
<td>500 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>2100080756</td>
<td>Pandill Junior</td>
<td>suppositorer</td>
<td></td>
<td>24 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>617</td>
<td>2100342200</td>
<td>Pandill Junior</td>
<td>suppositorer</td>
<td></td>
<td>25 mg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Script

Using the found concept ID as a super concept with IS_A relation

let me illustrate

Adding concept ID’s, attribute relationships, trade name, substances, strengths, dose form, measurement unit, ATC code
let me show you a combination trade name product...

Base component: SNOMED DK drug terminology

Part 3 three: SNOMED DK creation
paracetamol 500 mg + codeine 30 mg tablet (product) has dose form

paracetamol (substance) has active ingredient

codeine (substance) has active ingredient

tablet (dose form) has dose form

DK ID

Kodipar tablet (product)
is a

SCT ID

paracetamol 500 mg + codeine 30 mg tablet (product) has dose form

paracetamol (substance) has active ingredient

codeine (substance) has active ingredient

tablet (dose form) has dose form

SNOMED DK drug terminology

Base component: SNOMED DK drug terminology

Trade name combination product finished
Vendor system
- documentation

Medication Module
- patient administration

Central Services
- mapping module
- Decision support engine
  - terminology module
  - mapping module

CDS modules
- allergy register
- allergy check
- Interaction check
- Risk situation
- Max Dose
- Cross-Allergy
  - Pregnancy and lactation
  - Contraindications
  - Adverse Reactions
  - Visual medication card

Functions
- physician preferences DB
- algorithms
- calculations
- logic

webservices
Decision support component: Allergy register

What information should an allergy register contain?

Sources: Report, HL7, OpenEHR archetypes...

Expert groups and the medical societies will discuss it.

Content

- Allergy: SNOMED coded name
- Reaction type: SNOMED or MeDRA
- Frequency: SNOMED coded qualifyer
- Severity: SNOMED coded qualifyer
- Verification: SNOMED coded qualifyer?

...so how will it work...
### Decision support component: Allergy register

<table>
<thead>
<tr>
<th>Advarsel</th>
<th>Allergi</th>
<th>Reaktion</th>
<th>Alvorlighedsgrad</th>
<th>Reaktionshyppighed</th>
<th>Verifikationsmåde</th>
</tr>
</thead>
<tbody>
<tr>
<td>△</td>
<td>allergi over for NSAID</td>
<td>Hoste</td>
<td>Livstruende</td>
<td>Lejlighedsvis</td>
<td>Priktest</td>
</tr>
<tr>
<td>△</td>
<td>allergi over for paracetamol</td>
<td>Udsløst</td>
<td>Harmful</td>
<td>Hyppig</td>
<td>Patient-oplyst</td>
</tr>
<tr>
<td></td>
<td>allergi over for bredspredte penicilliner</td>
<td>Hoste</td>
<td>Harmful</td>
<td>Lejlighedsvis</td>
<td>Blodprøve</td>
</tr>
<tr>
<td>△</td>
<td></td>
<td>Udsløst</td>
<td>Generende</td>
<td>Hyppig</td>
<td>Patient-oplyst</td>
</tr>
</tbody>
</table>

**Allergy register demo**

- **Cloxacillin**
  - allergi over for antibiotikum lægemiddel
  - allergi over for penicillin
    - allergi over for penicillinaseresistente penicilliner
    - **allergi over for cloxacillin**
      - allergi over for flucloxacillin
      - allergi over for methicillin

![Allergy register demo](image-url)
Central Services

Vendor system
- documentation
- Medication Module
- patient administration

Medication Module

webservice

CDS modules
- allergy register
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- Pregnancy and lactation
- Contraindications
- Adverse Reactions
- Visual medication card

Decision support engine
- terminology module
- mapping module

Functions
- physician preferences DB
- algorithms
- calculations
- logic

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SNOMED CT allergy structure

- 1472 concepts reading “[substance] allergy”
- attribute: “causative agent” pointing to [substance]
- can easily be made into a subset

...so alerts should work rather obviously

Penicillinase-sensitive penicillins allergy (disorder)

is a

Penicillinase-sensitive penicillins (Substance)

Causative agent

Phenoxy methylpenicillin allergy (disorder)

is a

Phenoxy methylpenicillin (Substance)

Causative agent

Pen-V 500 mg tablet (product)

Has active ingredient
Alerts

Allergy to penicillin

Allergy to penicillin (disorder)

Penicillinate-sensitive penicillins allergy (disorder)

Phenoxy methylpenicillin allergy (disorder)

Penicillin

...how about cross allergy

Penicillinase-sensitive penicillins (Substance)

Phenoxy methylpenicillin (Substance)

Pen-V 500 mg tablet (product)

Causative agent

Has active ingredient
### Decision support component: Cross allergy Database

<table>
<thead>
<tr>
<th>Stofnr.</th>
<th>Indholdsstof <em>A</em></th>
<th>ATC <em>A</em></th>
<th>Stofnr.</th>
<th>Indholdsstof <em>B</em></th>
<th>ATC <em>B</em></th>
<th>Referencer</th>
<th>Gruppe navn</th>
<th>Gruppetermin_kun til_ A_</th>
<th>Gruppetermin_A og_B_Adversel</th>
<th>Gruppetermin_A og_B_Rekommendation</th>
<th>Stofspecifik_termin_ikl_ evl_testmetode</th>
</tr>
</thead>
<tbody>
<tr>
<td>169</td>
<td>benzylpenicillin (G. penicillin)</td>
<td>J01CE01</td>
<td>2145</td>
<td>meropenem</td>
<td>J01DH02</td>
<td>1411, 1412, 1413</td>
<td>penicillin</td>
<td>Ved overfølsomhed for #A, bør #B sædvanligvis undgås.</td>
<td>Beta lactamantibiotika bør generelt undgås ved svar overfølsomhed for #A. Ved mindre alvorlige reaktioner, hvor type 1-allergi for #A mistereskes, kan måling af spezifikt IgE, prilk- og intradermaltest med andet beta lactamantibiotika være vejledende (specialiststopgave). Er disse negative, kan behandling med dette stof.</td>
<td>#B har været givet til en større gruppe med analytiske eller ikke-analytiske reaktioner på #A uden problemer.</td>
<td></td>
</tr>
<tr>
<td>836</td>
<td>phenoxymethylpenicillin (N, penicillin)</td>
<td>J01CE02</td>
<td>2145</td>
<td>meropenem</td>
<td>J01DH02</td>
<td>1411, 1412, 1413</td>
<td>penicillin</td>
<td>Ved overfølsomhed for #A, bør #B sædvanligvis undgås.</td>
<td>Beta lactamantibiotika bør generelt undgås ved svar overfølsomhed for #A. Ved mindre alvorlige reaktioner, hvor type 1-allergi for #A mistereskes, kan måling af spezifikt IgE, prilk- og intradermaltest med andet beta lactamantibiotika være vejledende (specialiststopgave). Er disse negative, kan behandling med dette stof.</td>
<td>#B har været givet til en større gruppe med analytiske eller ikke-analytiske reaktioner på #A uden problemer.</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>ampicillin</td>
<td>J01CA01</td>
<td>2145</td>
<td>meropenem</td>
<td>J01DH02</td>
<td>1411, 1412, 1413</td>
<td>penicillin</td>
<td>Ved overfølsomhed for #A, bør #B sædvanligvis undgås.</td>
<td>Beta lactamantibiotika bør generelt undgås ved svar overfølsomhed for #A. Ved mindre alvorlige reaktioner, hvor type 1-allergi for #A mistereskes, kan måling af spezifikt IgE, prilk- og intradermaltest med andet beta lactamantibiotika være vejledende (specialiststopgave). Er disse negative, kan behandling med dette stof.</td>
<td>#B har været givet til en større gruppe med analytiske eller ikke-analytiske reaktioner på #A uden problemer.</td>
<td></td>
</tr>
<tr>
<td>855</td>
<td>pivampicillin</td>
<td>J01CA02</td>
<td>2145</td>
<td>meropenem</td>
<td>J01DH02</td>
<td>1411, 1412, 1413</td>
<td>penicillin</td>
<td>Ved overfølsomhed for #A, bør #B sædvanligvis undgås.</td>
<td>Beta lactamantibiotika bør generelt undgås ved svar overfølsomhed for #A. Ved mindre alvorlige reaktioner, hvor type 1-allergi for #A mistereskes, kan måling af spezifikt IgE, prilk- og intradermaltest med andet beta lactamantibiotika være vejledende (specialiststopgave). Er disse negative, kan behandling med dette stof.</td>
<td>#B har været givet til en større gruppe med analytiske eller ikke-analytiske reaktioner på #A uden problemer.</td>
<td></td>
</tr>
</tbody>
</table>

...let me show you how all this allergy information works together...
Mapping table to SNOMED DK

Information from vendor medication module

Prescribed drug DrugID

SNOMED CT contains this information in the product and substance hierarchies

Allergy and Cross allergy check

Mapping DrugID → SDK

SDK → SCT

Heracillin has active ingredient Flucloxaciline

Route of administration check

SDK has dose form tablet
The allergy structure in **SCT** can match allergy to a substance or a class with the prescribed substance.

**Function**

**Allergy and Cross allergy check**

---

**Allergy register:**

- “allergy to broadspectrum penicillins”

**SCT**

**Allergy check with **SCT** structure**

**SCT : flucloxacilline**

- **Output will be sent back to the medication module if the allergy check is positive**

**Decision Support Module**

- **Crossing drugs is found in the cross allergy table where substances are **SCT** codet**

- **Crossing drugs is checket against the allergy set : “allergy to broadspectrum penicillins” using **SCT** allergy structure**

---

If there is no allergy - cross allergy will be checket

- **If there is cross allergy an alert and specific cross allergy text will be sent back to the medication module**

---

**SCT : flucloxacilline**

**allergy / no allergy**

---

**SCT : flucloxacilline**

- **ampicilline**

---

**Cross allergy**

<table>
<thead>
<tr>
<th><strong>SCT Substance 1</strong></th>
<th><strong>SCT Substance 2</strong></th>
<th><strong>Text</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ampicilline</strong></td>
<td>flucloxacilline</td>
<td><strong>ALERT</strong></td>
</tr>
</tbody>
</table>
Based on the existing service:
The interaction database describes 2,500 interaktions between different drugs based on their substances.
The database contains a short description of all interactions and a recommendation of how the physician can handle the interaction.
Primarily based on published, peer-reviewed, original literature—

...and more technological improvements

- with improved content:
  - Notifications of "not enough information" to deliver a verdict
  - Includes more classspecific effects
  - More interactions included from earlier clinical trials
The Physicians preferences DB

Interactions
• Turn of alerts for certain interaction types (green, yellow, red)
• Turn of alerts with specific dose forms (e.g. topical, eyedrops)
• Turn of alerts for a specific drug combination (don’t tell me again)

Allergies
...back to interactions - let me show you how a check is performed
• Turn of alerts with a specific dose forms (e.g. topical, eyedrops)

Risk situation drugs and Max Dose
• Turn of all alerts
• Turn of alerts for a specific drug (don’t tell me again)
Mapping table to SNOMED DK

Common Drug DB

Previous prescribed drug
DrugID

Information from vendor medication module

New prescribed drug
DrugID

Mapping
DrugID ➔ SDK

SNOMED CT contain this information in the product and substance hierarchies

SDK ➔ SCT
Xefo has active ingredient lornoxicam

SDK ➔ SCT
Marevan has active ingredient warfarin

Interaction control

SDK ➔ SCT
Xefo ➔ SDK
Marevan ➔ SDK
The database checks for interaction.

Interaction control

Output is sent back to the medication module if in accordance with the physician's preference.
Central Services

Vendor system
- documentation
- Medication Module
- patient administration

webservice

Decision support engine
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- Functions
  - physician preferences DB
  - algorithms
  - calculations
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The Patient Safety law in 2004 made it mandatory for health workers in hospitals to report adverse events - anonymously.

September 2010 primary practice was included

From 2011 the National Agency for Patients' Rights and Complaints handles the patient safety database.

WHO’s ICPS-classification is used to classify the risk.

Drugs that have been involved in serious life threatening situations will be evaluated by a group of experts and possibly placed in the Risk Situation Database.

Alerts will be generated when a specific drug in a specific doseform triggers it during prescription.
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  - Adverse Reactions
  - Visual medication card

functions
- physician preferences DB
- algorithms
- calculations
- logic

webservice
The MaxDose CDS will compare the amount of substance a patient is prescribed and the amount already prescribed, with the MaxDose limit to prevent overdosing.

The substance can be in same or differently named drugs, or as part of a combination drug

Categories:

- Adults - oral drugs, nose sprays and powders etc
- Adults - I.V. drugs
- Children
- Patients with reduced kidney function
The function of MaxDose for patients with reduced kidney function require additional information from the vendors system.

### Kidney function

<table>
<thead>
<tr>
<th>Kidney function</th>
<th>GFR (ml/min/1,73 m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal kidney function</td>
<td>&gt; 90</td>
</tr>
<tr>
<td>Mildly reduced kidney function</td>
<td>60-90</td>
</tr>
<tr>
<td>Moderately reduced kidney function</td>
<td>30 - &lt; 60</td>
</tr>
<tr>
<td>Severely reduced kidney function</td>
<td>15 - &lt; 30</td>
</tr>
<tr>
<td>Terminal renal insufficiency</td>
<td>&lt; 15 or dialysis</td>
</tr>
</tbody>
</table>

The lab data required for this function for patients with reduced kidney is placed outside the medication module in the vendor system and requires local implementation.
The SNOMED connection

- Allergy register
  - Allergy
  - Qualifiers

- Max Dose
  - Substance
  - Strength

- Risk situation
  - Substance
  - Dose form

- Interactions
  - Substance
  - Dose form

- Allergy & Cross allergy
  - Substance
  - Dose form

SNOMED CT
SNOMED DK a Danish drug terminology based on SNOMED CT
> a functional, structured drug terminology with built-in knowledge - a tool for decision support.

Features ...

- drug specific hierarchies with structured data
- attributes with useful knowledge - substances, dose form, units, strength, allergies caused by drugs
- Danish drugs linked to generics through SNOMED
- semantic consistent construction of terms
- ISO structured names with trade name, strength and dose form
- unique global ID for all drugs
- unik identification of substances - incl. combinations
- mapped to DrugID with all links to DMA DB preserved
SNOMED DK a Danish drug terminology based on SNOMED CT
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**Possibilities ...**

- central intelligent decision support via websevices
- enhancement of local systems
- dose calculation, control and overview
- overview of the patients, patient group or the departmental use of specific drugs, dose, frequency, indication, diagnosis, results etc
- mapping to ATC for practical or statistical use
- indication mapping to SNOMED CT, ICPC and DKMA indications
- international cooperation with IHTSDO, OpenEHR, WHO, EU epSOS
**SNOMED DK a Danish drug terminology** based on SNOMED CT
> a functional, structured drug terminology with built-in knowledge - a tool for decision support.

**Implementation advantages ...**

<table>
<thead>
<tr>
<th>Section</th>
<th>Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patients</strong></td>
<td>Increased quality and safety, reduces adverse events</td>
</tr>
<tr>
<td><strong>Physicians</strong></td>
<td>Saves time, gives safety and ease of mind</td>
</tr>
<tr>
<td><strong>Medical societies</strong></td>
<td>A good way to get their expert knowledge out to everybody who needs it</td>
</tr>
<tr>
<td><strong>Vendors</strong></td>
<td>Better services to the physicians, better systems, competition</td>
</tr>
<tr>
<td><strong>Regiones counties</strong></td>
<td>Saves money from less errors</td>
</tr>
<tr>
<td></td>
<td>Allergy information does not disappear between sectors</td>
</tr>
<tr>
<td><strong>State</strong></td>
<td>Centrally controlled coherent cross sector service</td>
</tr>
<tr>
<td></td>
<td>Statistics and feedback from use</td>
</tr>
<tr>
<td><strong>Politicians</strong></td>
<td>Increased quality of treatment and lowering of healthcare costs</td>
</tr>
</tbody>
</table>
SNOMED DK drug terminology and Decision Support Services

Thank you – any questions?

Kell Greibe MD, MI

National Board of eHealth
keg@ssi.dk