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Leading health innovation through data

Implementing the new SNOMED CT Medicinal Product Concept Model through Mapping to an existing in use Medicinal Product Terminology

Irish Pharmacy Union Presentation


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Credits

IPU Staff who have made this happen

- Fiona Hannigan, IPU Product File Manager
- Ger Gehan and Tara Kelly, Medicines Information Pharmacists for the IPU Product File
- Jerry O'Sullivan and Toni Urena – IT and database experts at the IPU
- Alan Reilly, Head of Information and Technology at the IPU




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Overview

The IPU PF, VMPs and SNOMED Project

- Background – the IPU and its Product File
- The “VMP Project”
 - Rationale, process, results
- The “SNOMED Mapping Project”
 - Rationale
 - Process
 - Results
 - Discussion and Learning




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Background

The Irish Pharmacy Union (IPU) and their Product File (IPU PF)

- Representative organisation for community pharmacists
- Developed and maintains a medicinal product database as a service to their members
 - Originally as a paper price list
 - Then as a uniform set of product identifiers and descriptions
 - Used in dispensing systems and
 - For product ordering (supply chain)
 - Also contains some supporting professional information (e.g. labelling and counselling information)



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Background

IPU Product File (IPU PF) Use

- Medicinal Product database (the “IPU Product File” (IPU PF)) is distributed under licence to
 - Pharmacists
 - Hospitals
 - Various Government Services
 - Systems
- The IPU PF is maintained by a dedicated team of specialists including pharmacists and has ISO 9001 and ISO 27001 accreditation



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Developing the IPU PF : Why?

- In 2009 the Irish Government announced plans to introduce **Generic Substitution and Reference Pricing** to help reduce the state’s spend on medicines
- This meant substantial changes for everyone involved in using medicines healthcare
- Initial analysis showed a requirement for a concept similar to the UK NHS dm+d’s “VMP” so....



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IPU PF VMP Project : What

- The IPU embarked on a “VMP Project” to ensure that the IPU PF could support
 - The legislation for Generic Substitution and Reference Pricing
 - Generic prescribing of medicines (*interface use*)
- The IPU liaised closely with all system vendors and developers that implement the IPU PF to keep them up to date on the proposed changes and improvements



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IPU PF VMP Project : How

- Developed the data model and editorial guidelines
- Undertook a **HUGE** data cleaning exercise on the existing IPU PF content to get it ready for creation of VMPs
- Iterative development
 - IT personnel developed database scripts and queries
 - Editorial staff reviewed these
 - Scripts and data were updated



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IPU PF VMP Project : Result

Success!

- Large number of actual medicinal products in the Product File being linked to a generated VMP
- Not linked (and not required to be linked to a VMP)
 - Multi-ingredient products with more than 3 active ingredient substances
 - Medical devices
 - Sundries etc.



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IPU Product File Screen : VMP

The screenshot shows a web application interface for product management. The top section, labeled 'IPU Product', contains fields for Product ID (Z200242002), Reference Price, Product Code, Product Type (Complex), VET Rules (CASH VET), CHECK CAC (DIS), CHECK CUP (LAW), and RFP Start Date (30/03/16). The bottom section, labeled 'IPU VMP', contains fields for Legal Class (N1), Form (Tablet), Strength (500mg), and Strength Unit (mg). The interface includes navigation tabs like 'Product Detail', 'Substance File', 'Covering/Writing', 'Ingredients', 'Trade AZM', 'Comments', 'Product Group', 'Medicine Shoppings', 'Discontinued List', and 'Audit Trail'. A search bar for product duplicates is also visible.

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SNOMED CT Mapping Project : Why?

- News that the Irish Government was about to purchase a SNOMED CT licence triggered the setup of the IPU's SNOMED CT Mapping Project (2016)
- Preparation phase of this project involved extensive research of SNOMED Preparation for SNOMED
 - What it is
 - What it is it for
 - Who uses it
 - How it handles pharmaceutical products
 - SNOMED's extensive guidelines for the implementation of SNOMED CT



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SNOMED CT Mapping Project : What?

- Quickly became clear that the IPU's VMP equates broadly speaking to SNOMED's Clinical Drug concept
- Therefore, the project was able to piggy-back on all the work done on VMPs (particularly the data cleaning). VMPs are described using
 - Precise active ingredient substance(s)
 - Basis of strength substance(s) with their strength as a ratio of value + unit of measure
 - Standard dose form concepts (EDQM-based)
 - Usual route of administration



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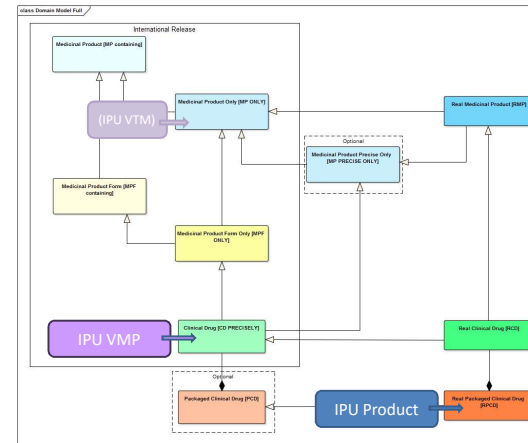
SNOMED CT Mapping Project : How?

- IT team loaded the SNOMED data into the IPU's Oracle database
 - Updating each international release, including the most recent SNOMED data set from July-2019
- A set of scripts were developed to try to map the IPU VMPs to a SNOMED Concept Id using
 - An IPU-EDQM dose form to SNOMED **dose form map**
 - An IPU-substance to SNOMED substance map (text match)
- This was an iterative process and all results were scrutinised extensively by the IPU PF team



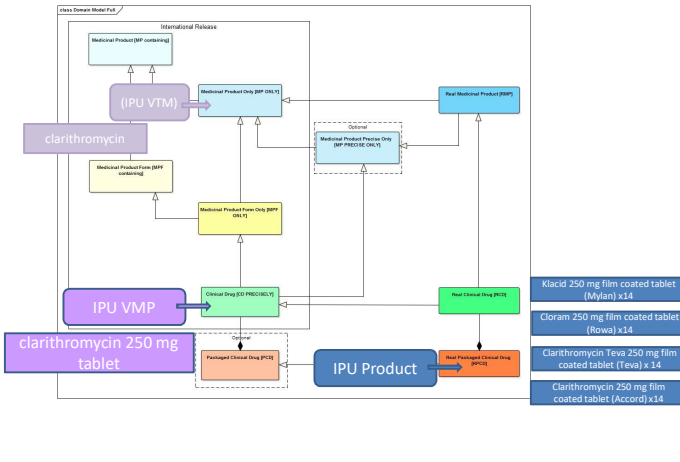
13

SNOMED CT Product Model : IPU PF



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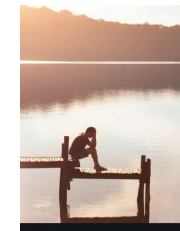
SNOMED CT Product Model : IPU PF



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SNOMED CT Mapping Project : Result?

- Despite our best efforts our matching success rate is only about 40%
 - And less for multi-ingredient products



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SNOMED Mapping Issue Categories

- VMP not in SNOMED
- VMP – Not in July-2019 Release
- Dose Form Mismatch
- BOSS/Precise Active Ingredient Substance Mismatch
- Different Strength Description Conventions
- Inconsistent Strength Descriptions



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IPU VMP not present as SNOMED Clinical Drug (I)

Drynol 20 mg tablet [Menarini] – a non-sedating antihistamine
IPU PF VMP = bilastine 20 mg (oral) tablet

An MP-only is present, but no MPF or CD



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IPU VMP not present as SNOMED Clinical Drug (II)

Alunbrig 30 mg and 90 mg tablet [Ariad] – a protein kinase inhibitor antineoplastic agent
IPU PF VMPs = brigatinib 30 mg (oral) tablet; brigatinib 90 mg (oral) tablet

An MPF-only is present, but no CDs



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IPU VMP not present as SNOMED Clinical Drug (III)

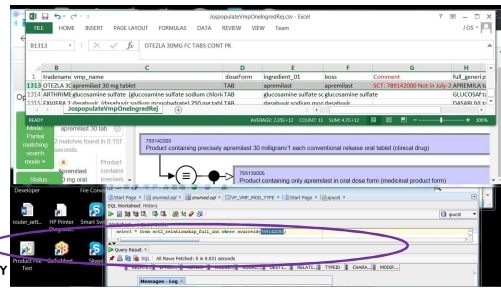
Pradaxa 75 mg, 110 mg and 150 mg capsule [Boehringer Ingelheim] – an oral antithrombotic (direct thrombin inhibitor)
IPU PF VMPs = dabigatran etexilate (as dabigatran etexilate mesilate) 75 mg (oral) capsule; and 110 mg and 150 mg



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Clinical Drug not present in July-2019 Release

Otezla 30 mg tablet [Celgene] – a PDE4 inhibitor immunosuppressant used to treat RA and psoriasis
IPU PF VMP: apremilast 30 mg tablet



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Dose Form Mismatch (I)

Ranexa 375 and 500 mg prolonged release tablet [Menarini] – treatment for stable angina pectoris
IPU PF VMPs = Ranolazine 375 mg prolonged release tablet (and 500 mg)

Only a conventional release oral tablet CD is present (and only 500 mg)

Product containing only ranolazine in oral dose form (medicinal product form)
 SCDID: 700240000

Count of base of active ingredient → 1
 Has manufactured dose form → Oral dose form
 Has active ingredient → Ranolazine

700240003 | Product containing only ranolazine in oral dose form (medicinal product form)
 on Product containing only ranolazine in oral dose form (medicinal product form)
 on Ranolazine only product in oral dose form

Children (1)
 Product containing precisely ranolazine 500 milligram/1 each conventional release oral tablet (clinical drug)

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Dose Form Mismatch (II)

Distaclor 125 mg / 5 mL Granules for Oral Suspension [Flynn] – cefalosporin antibiotic
IPU PF VMP = Cefaclor (cefaclor monohydrate) 125 mg / 5 mL granules for oral suspension

Granules versus oral suspension

Product containing precisely cefaclor (as cefaclor monohydrate) 25 milligram/1 milliliter conventional release oral suspension (clinical drug)
 SCDID: 323782004

323782004 | Product containing precisely cefaclor (as cefaclor monohydrate) 25 milligram/1 milliliter conventional release oral suspension (clinical drug) |
 on Cefaclor (as cefaclor monohydrate) 25 mg/ml, oral suspension
 on Product containing precisely cefaclor (as cefaclor monohydrate) 25 milligram/1 milliliter conventional release oral suspension (clinical drug)

Count of base of active ingredient → 1
 Plays role → Antibacterial therapeutic role
 Has manufactured dose form → Conventional release oral suspension
 Has concentration strength denominator value → 1
 Has concentration strength numerator value → 25
 Has basis of strength substance → Cefaclor
 Has precise active ingredient → Cefaclor monohydrate
 Has concentration strength denominator unit → Milliliter
 Has concentration strength numerator unit → milligram

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BOSS/Precise Active Ingredient Substance Mismatch (I)

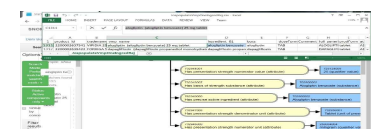
Vipidia 12.5 mg tablet [Takeda] – DPP-4 inhibitor for treatment of type 2 diabetes mellitus
IPU PF VMP = alogliptin (alogliptin benzoate) 12.5 mg (oral) tablet

BoSS not the same as in SNOMED CT

Product containing precisely alogliptin benzoate 12.5 milligram/1 each conventional release oral tablet (clinical drug)
 SCDID: 703671009

703671009 | Product containing precisely alogliptin benzoate 12.5 milligram/1 each conventional release oral tablet (clinical drug) |
 on Alogliptin benzoate 12.5 mg oral tablet
 on Product containing precisely alogliptin benzoate 12.5 milligram/1 each conventional release oral tablet (clinical drug)

Count of base of active ingredient → 1
 Has manufactured dose form → Conventional release oral tablet
 Has unit of presentation → Tablet
 Has presentation strength denominator value → 1
 Has presentation strength numerator value → 12.5
 Has precise active ingredient → Alogliptin benzoate
 Has basis of strength substance → Alogliptin benzoate
 Has presentation strength denominator unit → Tablet
 Has presentation strength numerator unit → milligram



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BOSS/Precise Active Ingredient Substance Mismatch (II)

Coversyl 5 mg tablet [Servier] – ACE inhibitor used to treat hypertension (and 2.5 mg tablet)
IPU PF VMPs = perindopril arginine 5 mg (oral) tablet (and 2.5 mg)

PAI and BoSS not the same as in SNOMED CT

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BOSS/Precise Active Ingredient Substance Mismatch (III)

Azithromycin 250mg tablet [generic] – macrolide antibiotic
IPU PF VMP = azithromycin (azithromycin dihydrate) 250 mg (oral) tablet

BoSS not the same as in SNOMED CT

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Despite the oral capsule CD being correct:

BOSS/Precise Active Ingredient Substance Mismatch (IV)

Nurofen Pain Relief [Reckitt Benckiser] – NSAID analgesic
IPU PF VMP = ibuprofen (ibuprofen sodium dihydrate) 200 mg (oral) tablet

PAI not the same as in SNOMED CT, but is present in Substance hierarchy

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Different Strength Description Conventions (I)

Ropinirole 0.25 mg tablet [McDermott] – dopamine agonist for treatment of Parkinson's disease
IPU PF VMP = ropinirole (ropinirole hydrochloride) 0.25 mg (oral) tablet

SNOMED CT has 250 mcg as per Editorial Guidelines

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Different Strength Description Conventions (II)

Crinone 8 % vaginal gel [PCO] – hormone replacement therapy

IPU PF VMP = progesterone 8 % vaginal gel

SNOMED CT has 80 mcg per 1. mg as per Editorial Guidelines

<p>Product containing precisely progesterone 80 microgram/1 milligram conventional release vaginal gel (clinical drug)</p> <p>325627896 Product containing precisely progesterone 80 microgram/1 milligram conventional release vaginal gel (clinical drug)</p> <p>en Product containing precisely progesterone 80 microgram/1 milligram conventional release vaginal gel (clinical drug)</p> <p>en Progesterone 80 microgram/1 milligram vaginal gel</p>	<p>Count of base of active ingredient → 1</p> <p>Has manufactured dose form → Conventional release vaginal gel</p> <p>Has concentration strength denominator value → 1</p> <p>Has concentration strength numerator value → 80</p> <p>Has precise active ingredient → Progesterone</p> <p>Has basis of strength substance → Progesterone</p> <p>Has concentration strength numerator unit → microgram</p> <p>Has concentration strength denominator unit → milligram</p>
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Different Strength Description Conventions (III)

Clonazepam 2 mg / 5mL oral solution [generic] – benzodiazepine anti-epileptic

IPU PF VMP = clonazepam 2 mg/5 mL oral solution

SNOMED CT has a unitary strength (400 mcg per 1 mL) as per Editorial Guidelines

<p>Product containing precisely clonazepam 400 microgram/1 milliliter conventional release oral solution (clinical drug)</p> <p>766469004 Product containing precisely clonazepam 400 microgram/1 milliliter conventional release oral solution (clinical drug)</p> <p>en Product containing precisely clonazepam 400 microgram/1 milliliter conventional release oral solution (clinical drug)</p> <p>en Clonazepam 400 microgram/1 milliliter oral solution</p>	<p>Count of base of active ingredient → 1</p> <p>Has manufactured dose form → Conventional release oral solution</p> <p>Has concentration strength denominator value → 1</p> <p>Has concentration strength numerator value → 400</p> <p>Has precise active ingredient → Clonazepam</p> <p>Has basis of strength substance → Clonazepam</p> <p>Has concentration strength denominator unit → Milliliter</p> <p>Has concentration strength numerator unit → microgram</p>
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Different Strength Description Conventions (IV)

Clexane 20 mg / 0.2 mL solution for injection [Sanofi Aventis] – LMW heparin antithrombotic/anticoagulant

IPU PF VMP = enoxaparin sodium 20 mg/0.2 ml solution for injection

SNOMED CT has a unitary strength (100 mg per 1 mL) as per Editorial Guidelines

<p>Product containing precisely enoxaparin sodium 100 milligram/1 milliliter conventional release solution for injection (clinical drug)</p> <p>781857007 Product containing precisely enoxaparin sodium 100 milligram/1 milliliter conventional release solution for injection (clinical drug)</p> <p>en Enoxaparin sodium 100 mg/mL solution for injection</p> <p>en Product containing precisely enoxaparin sodium 100 milligram/1 milliliter conventional release solution for injection (clinical drug)</p>	<p>Count of base of active ingredient → 1</p> <p>Physio role → Anticoagulant therapeutic role</p> <p>Has manufactured dose form → Conventional release solution for injection</p> <p>Has concentration strength denominator value → 1</p> <p>Has concentration strength numerator value → 100</p> <p>Has precise active ingredient → Enoxaparin sodium</p> <p>Has basis of strength substance → Enoxaparin sodium</p> <p>Has concentration strength denominator unit → Milliliter</p> <p>Has concentration strength numerator unit → milligram</p>
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5 VMPs – 1 Clinical Drug in the international release:

Examples:

IPU VMP: enoxaparin sodium 20 mg/0.2 ml solution for injection

IPU VMP: enoxaparin sodium 40 mg/0.4 ml solution for injection

IPU VMP: enoxaparin sodium 60 mg/0.6 ml solution for injection

IPU VMP: enoxaparin sodium 80 mg/0.8 ml solution for injection

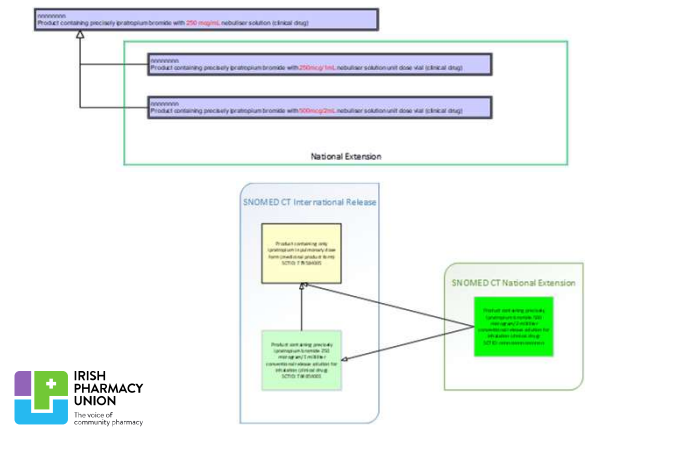
IPU VMP: enoxaparin sodium 100 mg/1 ml solution for injection

SNOMED: 781857007 – Strength defined as 100 milligram/1 milliliter



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Known issue, addressed in model



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Inconsistent Strength Descriptions (I)

Deponit 5 mg / 24 hour transdermal patch [Merus] – vasodilator for angina pectoris
IPU PF VMP = glyceryl trinitrate 5 mg/24 hour transdermal patch

SNOMED CT has a “unitary” strength (208.333 mcg per 1 hour) as per Editorial Guidelines

The screenshot shows search results for 'Product containing precisely glyceryl trinitrate 208.333 microgram/1 hour prolonged-release transdermal patch (clinical drug)'. It includes a table of properties such as 'Count of base of active ingredient' (1), 'Has manufactured dose form' (Prolonged-release transdermal patch), and 'Has concentration strength denominator value' (1). It also lists several SNOMED CT codes and their corresponding strength descriptions.

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Inconsistent Strength Descriptions (II)

Kentera 3.9 mg / 24 hour transdermal patch [Orion] – ACH antagonist for urinary frequency
IPU PF VMP = oxybutynin 3.9 mg/24 hour transdermal patch

SNOMED CT has a “unitary” strength (162 mcg per 1 hour) as per Editorial Guidelines but this gives 3.888 mcg / 24 hour....should this be 162.5 mcg / 1 hour?

The screenshot shows search results for 'Product containing precisely oxybutynin 162 microgram/1 hour prolonged-release transdermal patch (clinical drug)'. It includes a table of properties and a list of SNOMED CT codes with their strength descriptions.

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SNOMED CT Mapping Project : Summary

- A small country like Ireland without the extensive resources has achieved repeatable mapping process from their medicinal product database to SNOMED CT core CD concepts
- BUT this is currently only giving 40% mapping, despite having VMPs structured such that there is a good fit with the SNOMED CT model and editorial guidelines
- The mismatches have various categories; it would be good to know how these can be addressed going forward



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Implementing the new SNOMED CT
Medicinal Product Concept Model through
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Irish Pharmacy Union Presentation

Questions?

Thank you

