This document is collecting input from domain and implementation experts to help HL7 Pharmacy and the Medication Prescription and Dispense(MPD) groups decide whether a **structural change** (potentially breaking) is required. **This must be decided by Monday 10 November.**

Over the years, we had discussions — especially for regimens with **multiple phases, variable timing, or limits per period or lifetime** (e.g., prednisone tapers, chemotherapy cycles, weekday/weekend dosing patterns).

Our goal is to:

- Identify **real-world dosage use cases** that may be difficult or impossible to represent consistently today;
- Determine whether these gaps can be solved with **minor clarifications** or require a **larger redesign** (e.g., nested or grouped dosage segments);
- Capture examples that will inform both the **normative decision** and **future implementation guidance**.

Please add your examples, notes, and comments below — particularly:

- Concrete dosage expressions from real or plausible clinical practice.
- Description of what makes them hard to represent with the current `Dosage` structure.
- Any modeling ideas or prior experience (e.g., extensions, workarounds).

For reference, we have been informed of the Swedish extension that is being used and mimics some “nesting”. More discussion can be found on some meeting minutes and the issue 51540 that contains some rationale and a different structure https://jira.hl7.org/browse/FHIR-51540 in the comments. This “business level” guide provides some examples of the use of the extension: https://samarbetsyta-ehalsomyndigheten-se.translate.goog/handboken/latest/utveckla-mot-e-haelsomyndighetens-tjaenster/information-stoed-och-krav-per-delsystem/nationella-laekemedelslistan-nll/information-nll/dosering-och-doseringsanvisning?_x_tr_sl=sv&_x_tr_tl=en&_x_tr_hl=sv&_x_tr_pto=wapp

Discussion in https://chat.fhir.org/#narrow/channel/179249-Medication/topic/Dosage

Specific Proposals

We make two specific proposals that deal with most of the example cases below.

Proposal 1: No breaking change

This proposal makes no breaking changes to the existing resources (though note that they already have a few in other parts of the resources).

- For all 3 resources (MedicationRequest, MedicationDispense, MedicationStatement), add either a requirement or a best practice constraint that if there's more than one dosageInstruction, they all SHALL/SHOULD have a sequence number (procedurally it probably has to be SHOULD, but the committee could decide it's just so unsafe we will try for SHALL)
- Add a section on the dosage page describing the use of multiple dosages. That section should cover the use of renderedDosageInstruction and effectiveTiming[x] and their relationship with the dosageInstruction(s)
- Move the documentation presently in the comments for MedicationRequest.dosageInstruction to somewhere else where it belongs, since it's about one vs multiple prescriptions
- For all 3 resources, document explicitly on dosageInstruction as to why there are multiple dosageInstructions (refer readers to #2)
- Add a section about dosage limits to the dosage page that documents the proper use of the maxPer* elements, with examples
- Add an examples section with a set of examples - both human presentation of the instruction, and an example of what it looks like as dosageInstruction(s). Use examples from the tables below
- Add an element to all 3 resources as a sibling to dosageInstructions: doseLimits 0..1: Dosage that provides for limits to the overall dose across all dosageInstructions. Add a constraint that it is only used if there is more than one dosageInstruction (this could be an extension for evaluation, but we recommend an actual element because it's a safety issue)
- Add an element to dosage that includes the context* elements from RelativeTime, to express that the dosage is conditional on some event / status. This could be an extension, but that’s kind of complicated with regard to modifier status, and safety, so I prefer an element directly, and the examples below use the element (examples 11/12)
- Define an extension for 'dosageExceeded' action that for now is a text instruction of what to do if the instructions (e.g. PRN) lead to a need to take more than a documented limit
- Define extensions or elements on Timing for the things it doesn't have as used in the examples below and evaluate them (see FHIR-53412)

Proposal 2: Reorganisation

This is the same as Proposal 1, except that we make breaking changes to the resources. Specifically:

- We define a new type DosageDetails (or something - the name isn’t important)
- We replace renderedDoseInstructions, dosageInstructions, and doseLimits (from proposal 1 above) with dosageDetails 0..1 DosageDetails
- We remove sequence from Dosage
- Add condition element to Dosage per proposal 1

- The new type has this content model:

```
DosageDetails
  renderedInstruction 0..1 : markdown
  simple 0..1 Dosage
  step 0..* BackboneElement
    component 0..* Dosage
  doseLimits 0..1 Dosage
```

- I don't feel strongly about these names
- The type has two constraints:
    - simple xor steps
    - doseLimits.timing.exists.not()

Functional Differences between Proposal 1 and 2

- The two proposals are functionally identical
- Proposal 1 is sightly messier in syntax because depending on sequence is indirect
- Proposal 1 is sightly messier in definition because you only need constraints on the type in proposal 2, not on each resource
- Proposal 2 could allow for doseLimits at a per step level - but there's no cases for that (so far?) (but the structure would need an additional container)
- Proposal 2 could allow for even more orchestration between different dose choices - like combinations of conditionality. But doing so would require an additional nesting element, and - more importantly - there's little marginal value here because the conditionality is extremely difficult to make computable.

What don't these proposals achieve?

- They don't address coordination between different medications (there's cases for this below)
- They don't address complex titrations, complex links between dosages and symptoms etc (there's cases for these below as well)

Variant Proposal 2B: Further reorganization to maximum dosage limits

In this proposal, we:

- Remove the elements maxDosePerPeriod, maxDosePerAdministration, and maxDosePerLifetime from Dosage
- Create a new data type DosageSafety
- Remove DosageDetails.doseLimits
- Add DosageDetails.safety 0..* DosageSafety and DosageDetails.step.safety 0..* DosageSafety
- DosageLimits has this structure:

```
DosageSafety
  limit 0..1
    quantity[x] 1..1 Integer | Quantity | Expression  // integer is count of dosage or step
    scope 1..1 code: dosage | period | administration | lifetime
    period 0..1 Duration - mandatory if scope = period, else prohibited
    note 0..1 String
  ifExceeded 0..1 : string // what to do if limits are approached/exceeded by following course (particularly in the case of PRN)
```

Functional scope: this proposal allows additional functionality:

- More kinds of limits, with more expressiveness
- A place to put additional safety concerns later (as elements or extensions) (e.g. we need a dose limits override?)

Examples

Note: examples are shown in YAML(ish) for ease of human reading; they will be included in the pages in json and xml as well
The examples are shown in both proposals 1 and 2 for clarity. 2B is provided as a footnote

Example 1: Nice simple case - a single dosage

Human Description	Take Perindopril, 1 tablet per day, for 3 months	

Proposals	MedicationRequest
	  medication
	  concept
		MedicationRequest
		  medication
		  concept

	coding: Perindopril Arginine, 2.5mg tablets renderedDosageInstruction: 1 tablet per day for 3 months dosageInstruction[0] timing repeat boundsDuration: 3 mo frequency : 1 period: 1 periodUnit: d doseAndRate doseQuantity: 10 mg	coding: Perindopril Arginine, 2.5mg tablets dosageDetails renderedDosageInstruction: 1 tablet per day for 3 months TTTsimple timing repeat boundsDuration: 3 mo frequency : 1 period: 1 periodUnit: d doseAndRate doseQuantity: 10 mg
Notes	none of the following examples will show renderedDosageInstruction - this was just to show how it moves in proposal 2	

Example 2: Variant dosages at different times of the day, with cumulative dose limits

Human Description	Methylphenidate 10 mg tablets — 10 mg at 07:30 and 12:00, 5 mg at 16:00 Mon–Fri; 10 mg at 08:00 Sat–Sun and holidays; 5 mg PRN after 17:00 (max 2×/week); do not exceed 150 mg per week.	
Proposals	MedicationRequest medication concept coding: Methylphenidate 10 mg tablets dosageInstruction[0] sequence: 1 timing repeat dayOfWeek: mon | tue | wed | thu | fri timeOfDay: 07:30 | 12:00 doseAndRate doseQuantity: 10 mg dosageInstruction[1] sequence: 1 timing repeat	MedicationRequest medication concept coding: Methylphenidate 10 mg tablets dosageDetails step component timing repeat dayOfWeek: mon | tue | wed | thu | fri timeOfDay: 07:30 | 12:00 doseAndRate doseQuantity: 10 mg component timing repeat dayOfWeek: mon | tue | wed | thu | fri timeOfDay: 16:00

	dayOfWeek: mon | tue | wed | thu | fri timeOfDay: 16:00 doseAndRate doseQuantity: 5 mg dosageInstruction[2] sequence: 1 timing repeat dayOfWeek: sat | sun timeOfDay: 08:00 doseAndRate doseQuantity: 10 mg dosageInstruction[3] sequence: 1 asNeeded: true timing repeat when: EVE doseAndRate doseQuantity: 5 mg doseLimits maxPerPeriod numerator: 150 mg denominator: 1 week	doseAndRate doseQuantity: 5 mg component timing repeat dayOfWeek: sat | sun timeOfDay: 08:00 doseAndRate doseQuantity: 10 mg component asNeeded: true timing repeat when: EVE doseAndRate doseQuantity: 5 mg doseLimits maxPerPeriod numerator: 150 mg denominator: 1 week 2B variant: (instead of doseLimits): safety limit valueQuantity: 150 mg scope: period period: 1 week
Notes	● What is missing from this structure is ‘and holidays’. Dealing with that would be a change in Timing. ? extension (but holidays is tricky - whose holidays? - at least one implementer is just handling this is text instructions)	

Example 3: Tapered dose, with some interlaced dosages

Human Description	Prednisone 10 mg tablets (oral) # 40 mg (4 × 10 mg) at 08:00 and 20:00 daily for 5 days;

	# then 30 mg at 08:00 and 20 mg at 20:00 for 5 days; # then 20 mg at 08:00 daily for 10 days; # then 10 mg at 08:00 daily for 5 days; # then 5 mg at 08:00 daily for 5 days; # then continue 5 mg at 08:00 every other day for 3 months (or as needed for flare-ups, max two courses per 6 months); then stop.	
Proposals	MedicationRequest medication concept coding: Prednisone 10 mg tablets dosageInstruction[0] sequence: 1 timing repeat boundsDuration: 5 days frequency: 2 period: 1 periodUnit: d timeOfDay: 08:00 | 20:00 doseAndRate doseQuantity: 40 mg dosageInstruction[1] sequence: 2 timing repeat count: 5 period: 1 periodUnit: d timeOfDay: 08:00 doseAndRate doseQuantity: 30 mg dosageInstruction[2] sequence: 2 timing repeat count: 5	MedicationRequest medication concept coding: Prednisone 10 mg tablets dosageDetails step component timing repeat boundsDuration: 5 days frequency: 2 period: 1 periodUnit: d timeOfDay: 08:00 | 20:00 doseAndRate doseQuantity: 40 mg step component timing repeat count: 5 period: 1 periodUnit: d timeOfDay: 08:00 doseAndRate doseQuantity: 30 mg component timing repeat count: 5 period: 1 periodUnit: d

	period: 1 periodUnit: d timeOfDay: 20:00 doseAndRate doseQuantity: 20 mg dosageInstruction[3] sequence: 3 timing repeat count: 10 period: 1 periodUnit: d timeOfDay: 08:00 doseAndRate doseQuantity: 20 mg dosageInstruction[4] sequence: 4 timing repeat count: 5 period: 1 periodUnit: d timeOfDay: 08:00 doseAndRate doseQuantity: 10 mg dosageInstruction[5] sequence: 5 timing repeat count: 5 period: 1 periodUnit: d timeOfDay: 08:00 doseAndRate doseQuantity: 10 mg dosageInstruction[6]	timeOfDay: 20:00 doseAndRate doseQuantity: 20 mg step component timing repeat count: 10 period: 1 periodUnit: d timeOfDay: 08:00 doseAndRate doseQuantity: 20 mg step component timing repeat count: 5 period: 1 periodUnit: d timeOfDay: 08:00 doseAndRate doseQuantity: 10 mg step component timing repeat count: 5 period: 1 periodUnit: d timeOfDay: 08:00 doseAndRate doseQuantity: 10 mg step component timing repeat boundsDuration: 3 m period: 2 periodUnit: d

	sequence: 6 timing repeat boundsDuration: 3 m period: 2 periodUnit: d timeOfDay: 08:00 doseAndRate doseQuantity: 5 mg dosageInstruction[7] sequence: 6 asNeeded : true timing repeat boundsDuration: 3 m doseAndRate doseQuantity: 5 mg	timeOfDay: 08:00 doseAndRate doseQuantity: 5 mg step component asNeeded : true timing repeat boundsDuration: 3 m doseAndRate doseQuantity: 5 mg If proposal 2B, we can code ‘max two courses per 6 months’’: safety limit valueInteger: 2 Period: 2 months
Notes	● Neither of these captures ‘or as needed for flare-ups, max two courses per 6 months’ because that’s inherently hard - what is a ‘course’ that should only happen twice ?- that’s not defined. If we assume (per Jose) that ‘max two courses per 6 months is separate from ‘as needed’, which is simpler, we can code that in proposal 2B	

Example 4: different dosages on different days in a repeating pattern

Human Description	Epirubicin 45 mg/m² IV on Days 1 & 8 every 28 days × 6 cycles; infuse over 20 min at 09:00; do not exceed 90 mg/m² per 28-day cycle or 900 mg/m² lifetime cumulative dose.	
Proposals	MedicationRequest medication concept coding: Epirubicin dosageInstruction[0] sequence: 1 timing repeat	MedicationRequest medication concept coding: Epirubicin dosageDetails step component timing

	count: 6 duration: 20 durationUnit: min period: 28 periodUnit: d timeOfDay: 09:00 doseAndRate rateQuantity: 45 mg/m² dosageInstruction[1] sequence: 1 timing repeat extension[%/timing-start-after].valueQuantity = 8 d count: 6 duration: 20 durationUnit: min period: 28 periodUnit: d timeOfDay: 09:00 doseAndRate rateQuantity: 45 mg/m² doseLimits maxDosePerCourse: 90 mg/m2 maxDosePerLifetime: 900 mg/m²	repeat count: 6 duration: 20 durationUnit: min period: 28 periodUnit: d timeOfDay: 09:00 doseAndRate rateQuantity: 45 mg/m² component timing repeat startOffset = 8 d count: 6 duration: 20 durationUnit: min period: 28 periodUnit: d timeOfDay: 09:00 doseAndRate rateQuantity: 45 mg/m² doseLimits maxDosePerCourse: 90 mg/m2 maxDosePerLifetime: 900 mg/m² In proposal 2B, replace doseLimits with safety limit[0] valueQuantity: 90 mg/m2 scope: dosage limit[1] valueQuantity: 900 mg/m² scope: lifetime
Notes	● structure does not say what /m2 is of - that does not appear to be computable (it's skin surface area for the patient) ● This uses a new element in Timing that says that the occurrences start each period after a delay of specified duration - this allows offset patterns.	

Example 5: Triphase contraceptives

Human Description	Microgynon tab (contraceptives): 1 tablet daily for 21 days, then 7 days off. Then repeat	

Proposals	MedicationRequest
	  medication
	  concept
	  coding: Microgynon tab
	
	  dosageInstruction[0]
	  timing
	  repeat
	  extension[%timing-end-early].valueQuantity = 7 d
	  frequency: 1
	  frequencyUnit: d
	  period: 28
	  periodUnit: d
		MedicationRequest
		  medication
		  concept
		  coding: Microgynon tab
		  dosageDetails
		  simple
		  timing
		  repeat
		  endOffset = 7 d
		  frequency: 1
		  frequencyUnit: d
		  period: 28
		  periodUnit: d
		  doseAndRate
		  doesQuantity: 1 tablet

Notes	• This uses a new element on Timing - which is candidate for elevation to core - that says that the occurrences end a specified duration before the end of the period • Note that retail tri-phase contraceptives don't work like this - they have placebos so that you take a pill every day, and the pills are all day-numbered	

Example 6: Simple case of limited dose

Human Description	Iron sucrose: "Mon/Wed/Fri 09:00 × 5 doses total.	

Proposal 1	MedicationRequest
	  medication
	  concept
	  coding: Iron sucrose
	
	  dosageInstruction[0]
	  timing
		MedicationRequest
		  medication
		  concept
		  coding: Iron sucrose
		
		  dosageDetails
		  simple

	repeat count: 5 period: 1 periodUnit: d dayOfWeek = Mon|Wed|Fri timeOfDay: 09:00	timing repeat count: 5 period: 1 periodUnit: d dayOfWeek = Mon|Wed|Fri timeOfDay: 09:00
Notes		

Example 7: Dual Maximums - per admin, and per day

Human Description	Symbicort (budesonide/formoterol) ● 2 inhalations per day either as 1 in the morning and in the evening; or 2 in either the morning or evening ● 1 additional inhalation as need (PRN) ● Maximum dose in a single administration no more than 6 inhalations (upper limit per administration) ● Maximum daily dose = no more than 12 inhalations (upper limit per day)	
Proposal 1	MedicationRequest medication concept coding: Symbicort dosageInstruction[0] sequence: 1 timing when: MORN | EVE doseAndRate rateQuantity: 2 puffs/day dosageInstruction[0] sequence: 1 asNeeded: true doseLimits: maxDosePerPeriod: 12 puffs maxDosePerAdministration: 6 puffs	MedicationRequest medication concept coding: Symbicort dosageDetails complex step component timing when: MORN | EVE doseAndRate rateQuantity: 2 puffs/day component asNeeded: true doseLimits maxDosePerPeriod: 12 puffs maxDosePerAdministration: 6 puffs

		In Proposal 2B, replace doseLimits with safety limit[0] valueQuantity: 12 puffs scope: period period: 1 day limit[1] valueQuantity: 6 puffs scope: administration
Notes		

Example 8: Pinning to a day of the month

Human Description	Vitamin D 1 vial the first day of each month	
Proposal 1	MedicationRequest medication concept coding: Vitamin D dosageInstruction[0] timing extension[%timing-dayOfMonth].valueInteger: 1 frequency: 1 period: 1 periodUnit: mo	MedicationRequest medication concept coding: Vitamin D dosageDetails simple timing extension[%timing-dayOfMonth].valueInteger: 1 frequency: 1 period: 1 periodUnit: mo
Notes	● This uses the extension http://hl7.org/fhir/StructureDefinition/timing-dayOfMonth to pin the recurrent event to a day of the month (like day of week)	

Example 9: A break in the course

Human Description	1 tablet a day for a week, then 3 days break, then 1 tablet a day for 3 days

Proposal 1	MedicationRequest medication concept coding: Vitamin D dosageInstruction[0] timing count : 7 period: 1 periodUnit: d doseAndDate doseQuantity: 1 tablet dosageInstruction[1] timing count : 3 period: 1 periodUnit: d doseAndDate doseQuantity: 0 tablet dosageInstruction[2] timing count : 3 period: 1 periodUnit: d doseAndDate doseQuantity: 1 tablet	MedicationRequest medication concept coding: Vitamin D dosageDetails step component timing count : 7 period: 1 periodUnit: d doseAndDate doseQuantity: 1 tablet step component timing count : 3 period: 1 periodUnit: d doseAndDate doseQuantity: 0 tablet step component timing count : 3 period: 1 periodUnit: d doseAndDate doseQuantity: 1 tablet
Notes	● You can also use the endOffset element in Timing to give a regular break; this technique is for irregular breaks	

Example 10: Event Dependency

This example and the next few deal with event related time courses & sequences

Human Description	Malaria prophylaxis: start 1 day before start of (event), stop 7 days after end of (event)

Proposal 1	MedicationRequest
	  medication
	  concept
	  coding: Malaria XXX
	
	  dosageInstruction[0]
	  timing
	  repeat
	  extension[%timing-start-event].valueRelativeTime
	  contextCode
	  coding : [event]
	  offsetDuration: -1 d
	  count: 8
	  period: 1
	  periodUnit: d
		MedicationRequest
		  medication
		  concept
		  coding: Malaria XXX
		  dosageDetails
		  complex
		  step
		  start
		  contextCode
		  coding : [start of treatment]
		  offsetDuration: -1 d
		  timing
		  repeat
		  count: 8
		  period: 1
		  periodUnit: d

Notes		

Example 11: Event Dependency in steps

Human Description	PREDNISOLONE 20 mg : 60 mg morning until 3 negative urine strip then 50 mg morning for 1 week, then 40 mg morning for 1 week, then 30 mg morning for 1 week, then 20 mg morning for 1 week, then 10 mg morning for 2 weeks, then see doctor for stopping treatment depending on evolution	

Proposal 1	MedicationRequest
	  medication
	  concept
	  coding: PREDNISOLONE 20 mg
	
	  dosageInstruction[0]
	  sequence: 1
	  timing
	  repeat
	  extension[%timing-end-event].valueRelativeTime
	  contextDefinition: EventDefinition/example
	  period: 1
		MedicationRequest
		  medication
		  concept
		  coding: PREDNISOLONE 20 mg
		
		  dosageDetails
		  complex
		  step
		  end
		  contextDefinition: EventDefinition/example
		  component
		  timing

	periodUnit: d when: MORN doseAndRate doseQuantity: 60mg dosageInstruction[1] sequence: 2 timing repeat boundsDuration: 1 wk period: 1 periodUnit: d when: MORN doseAndRate doseQuantity: 40mg dosageInstruction[2] sequence: 3 timing repeat boundsDuration: 1 wk period: 1 periodUnit: d when: MORN doseAndRate doseQuantity: 30mg # etc	repeat period: 1 periodUnit: d when: MORN doseAndRate doseQuantity: 60mg step component timing repeat boundsDuration: 1 wk period: 1 periodUnit: d when: MORN doseAndRate doseQuantity: 40mg step component timing repeat boundsDuration: 1 wk period: 1 periodUnit: d when: MORN doseAndRate doseQuantity: 30mg # etc
Notes	● The actual event is defined as an EventDefinition (there's now an example in core spec for that) ● Note that the computational space of the events is absolutely massive, so implementations that try to use this extension shouldn't expect the event to actually be understood, just rendered - so marginal utility over just putting it in text	

Example 12: Event Dependency in steps

Human Description	Dovobet ointment: When needed a treatment period of 4 weeks starts. Applied once daily. Treatment period could be repeated if needed. When using calcipotriol containing medicinal products, the maximum daily dose should not exceed 15 g. The body surface area treated with calcipotriol containing medicinal products should not exceed 30 %	

Proposal 1	MedicationRequest
	  medication
	  concept
	  coding: Dovobet ointment
	
	  dosageInstruction[0]
	  sequence: 1
	  timing
	  boundsDuration: 4 wk
	  repeat
	  period: 1
	  periodUnit: d
	  dosageInstruction[1]
	  sequence: 2
	  condition
	  conditionCode: if needed
	  timing
	  repeat
	  boundsDuration: 4 wk
	  period: 1
	  periodUnit: d
	  doseLimits
	  maxDosePerPeriod: 15g/day
	  maxDosePerAdministration: 30%
		MedicationRequest
		  medication
		  concept
		  coding: Dovobet ointment
		
		  dosageDetails
		  complex
		  step
		  component
		  timing
		  boundsDuration: 4 wk
		  repeat
		  period: 1
		  periodUnit: d
		  step
		  component
		  condition
		  conditionCode: if needed
		  timing
		  repeat
		  boundsDuration: 4 wk
		  period: 1
		  periodUnit: d
		  doseLimits
		  maxDosePerPeriod: 15g/day
		  maxDosePerAdministration: 30%{surface area}
		
		In Proposal 2B, replace doseLimits with :
		  safety
		  limit[0]
		  valueQuantity: 15g
		  scope: period
		  period: 1 day
		  limit[1]
		  valueQuantity: 30%{surface area}
		  scope: administration

Notes	● There's a condition on the dosage instruction in this case ● conditionCode = if needed is different to dosage.asNeeded because the latter is 'take a dose if needed', where as the former is 'do this entire dosage if needed' ● There's no hint as to what the 30% is about - 30% of *what*?	

Additional examples to consider elevating to the list above if they have anything not described above

Example

- Medrol 20 × 32 mg – taper schedule: 2 weeks 32 mg daily → 2 weeks 24 mg daily → 2 weeks 16 mg daily → 2 weeks 8 mg daily
- Comments: straightforward tapering dose - 1 dosage for each

Example

- Hukyndra – complex biologic initiation + maintenance: Week 0: 80 mg, Week 2: 40 mg, then 40 mg every 2 weeks
- Comments: straightforward tapering dose - 1 dosage for each

Example

- Oxygen gas: 3 L/min, 18 hours per day, for 1 month
- Comments: straightforward: Timing repeat boundsDuration = 1 month, duration -= 18 hours, frequency = 1/day

Example

- Chloramphenicol eye drops: 1-2 drops in the eye every 1-2 hours for 2-3 days, later every 4-6 hours until 2 days after symptom-free
- Same pattern as example 10 above

Example

- Apocillin (antibiotics): 1 tablet of 1 g × 3-4 for 5 days. Then stop
- Comments: seems straightforward - doseRange = 3-4

Example

- ENOXAPARINE sodique 4 000 UI (40 mg)/0,4 mL (LOVENOX®), 1 syringe once a day Subcutaneous use, start 12 hours before surgery. carry on for 10 days after surgery. (https://ansforge.github.io/interop-ig-fhir-ePrescription/main/ig/Bundle-HAS-28-Presc-LOVENOX.html)
- Same pattern as Example 10

Example: cross-order limits

- Metoprolol tartrate 50 mg tablet — 1 tablet at 08:00 and 20:00 daily. Metoprolol succinate (extended-release) 100 mg tablet — 1 tablet at 08:00 daily. Do not exceed 200 mg metoprolol (total) per day.
- Comments: This kind of orchestration across different medications is beyond what can be achieved at all right now

Example: start dose + max dose + titration up/down dose

> **Medication**: dobutamine 387145002 | Dobutamine (substance)
>
> **start dose**: 215 mcg/min (based on 2.5 mcg/kg/min for 86 kg (patient's body weight))
>
> **max dose**: 1,720 mcg/min (based on 20 mcg/kg/min for 86 kg BW)
>
> **Titrate up/down** by 86 mcg/min (based on 1 mcg/kg/min for 86 kg BW) every 5-10 min
>
> To achieve **therapeutic goals** | **targets** of:
>
> - SBP 85-120 mmHg
> - MAP 60-90 mmHg
> - Cardiac index 2.5 - 4 L/min/m2

- **Comments**: This is beyond what we can achieve. *Just use text.* Start rate 215 mcg/min, max 1 720 mcg/min supported; titration step (+/– 86 mcg/min every 5–10 min) and target-driven adjustment (SBP/MAP/CI) cannot be structured.

Example: Alternating dose

- FLUINDIONE 20 mg: 0,5 tablet on day 1, then 0,75 tablet on day 2. Repeat 2 day cycle for 1 month (https://ansforge.github.io/interop-ig-fhir-ePrescription/main/ig/Bundle-HAS-23-1-Presc-Fluindione.json.html)
- Comments: Same pattern as example 4

.

Example: Conditions on dose:

- NOVORAPID Flexpen® 100 UI / mL : before each meal depending on blood sugar level: 6 UI if blood sugar between 1,5 and 2 g/L, 8 UI if blood sugar between 2 and 2,5 g/L, 10 UI if blood sugar more than 2,5 g/L - https://ansforge.github.io/interop-ig-fhir-ePrescription/main/ig/Bundle-HAS-25-NOVORAPID.json.html
- HYDROCORTISONE 10 mg : 1 tablet morning and noon. In case of fever, strong heat, infection, diarrhea, high stress increase quantity to 2 tablets morning and noon. In case of fever > 40°C increase to 2 tablets morning, noon and at 16:00 with a maximum of 6 tablets per day. - https://ansforge.github.io/interop-ig-fhir-ePrescription/main/ig/Bundle-HAS-30-1-Presc-Hydrocortisone.json.html
- Comments: You could theoretically do these with a combination of the techniques shown in example 10 and 11, but it seems super unlikely this is going to be usefully computable. At beast, these lacks computable thresholds (e.g., 6U if 1.5–2 g/L, 8U if …). Only narrative possible; asNeeded[x] isn't sufficient. conditional increases by context/temperature are missing.

Example

- Concurrent when (morning and evening during meal or at the end of meal while meal should be set as breakfast or diner, they might be mid-morning snack or late time snack for exemple): GLUCOPHAGE® 500 mg : 1 tablet morning and 1 tablet evening, during or at the end of meal - https://ansforge.github.io/interop-ig-fhir-ePrescription/main/ig/Bundle-HAS-27-1-presc-GLUCOPHAGE.json.html
- This would be understood as a standard dosage with when = CM | CV

Example

- Choice between 2 medications METFORMINE ACC 1000MG 0,5 tablet twice a day during meals. In case of digestive intolerance to METFORMINE, GLICLAZIDE ARW 30MG 3 tablets at breakfast - https://ansforge.github.io/interop-ig-fhir-ePrescription/main/ig/Bundle-MultiLine-Presc-METFORMINE-GLICLAZIDE.json.html
- Comments: Articulation between 2 drugs is not possible in the medication requests (other than in text)

Example

- 2 medications that have to be taken at the same time: METHOTREX.ACC 25MG/ML 2 vials and LEDERFOLINE 25MG 2 tablets to be administrated at the same every friday - https://ansforge.github.io/interop-ig-fhir-ePrescription/main/ig/Bundle-MultiLine-Presc-METHOTREXATE-LEDERFOLINE.json.html
- Comments: Articulation between 2 drugs is not possible in the medication requests (other than in text)

Example

- 1 medication that has to be taken 2 hours after another one. Sucralfate 1g 1 hour before breakfast and 1 hour before dinner. Paracetamol oral use 500 mg every 4 hours with a maximum of 3 g par day. Paracetamol has to be taken at least 2 hours after sucralfate - https://ansforge.github.io/interop-ig-fhir-ePrescription/main/ig/Bundle-MultiLine-Presc-Sucralfate-Paracetamol.json.html

- Comments: Articulation between 2 drugs is not possible

Examples
More

Dosage

~~* sequence 0..1 SU integer "The order of the dosage instructions"~~
* condition 0..1 ConditionDetails
* text 0..1 SU string "Free text dosage instructions e.g. SIG"
* additionalInstruction 0..* SU CodeableConcept "Supplemental instruction or warnings to the patient - e.g. \"with meals\", \"may cause drowsiness\""
* additionalInstruction from http://hl7.org/fhir/ValueSet/additional-instruction-codes (example)
* patientInstruction 0..1 SU string "Patient or consumer oriented instructions"
* timing 0..1 SU Timing "When medication should be administered"
* asNeeded 0..1 SU boolean "Take \"as needed\""
* asNeededFor 0..* SU CodeableConcept "Take \"as needed\" (for x)"
* asNeededFor from http://hl7.org/fhir/ValueSet/medication-as-needed-reason (example)
* site 0..1 SU CodeableConcept "Body site to administer to"
* site from http://hl7.org/fhir/ValueSet/approach-site-codes (example)
* route 0..1 SU CodeableConcept "How drug should enter body"
* route from http://hl7.org/fhir/ValueSet/route-codes (example)
* method 0..1 SU CodeableConcept "Technique for administering medication"
* method from http://hl7.org/fhir/ValueSet/administration-method-codes (example)
* doseAndRate 0..* SU Element "Amount of medication administered, to be administered or typical amount to be administered"
  * type 0..1 SU CodeableConcept "The kind of dose or rate specified"
  * type from http://terminology.hl7.org/ValueSet/dose-rate-type (example)
  * dose[x] 0..1 SU Range or SimpleQuantity or Expression "Amount of medication per dose"
  * rate[x] 0..1 SU Ratio or Range or SimpleQuantity or Expression "Amount of medication per unit of time"
~~* maxDosePerPeriod 0..* SU Ratio "Upper limit on medication per unit of time"~~
~~* maxDosePerAdministration 0..1 SU http://hl7.org/fhir/StructureDefinition/SimpleQuantity~~
~~* maxDosePerLifetime 0..1 SU http://hl7.org/fhir/StructureDefinition/SimpleQuantity "Upper limit on medication per lifetime of the patient"~~
* safety 0..1 DosageSafety

DosageDetails

* renderedInstruction 0..1 SU markdown "Test summary of the entire dosage"
* simple 0..1 SU Dosage "Dosage details if it is a simple dose"
* step 0..* SU Element "One step in a sequence of steps that comprise the dosage course"
  * start 0..1 RelativeTime “When the step starts. If not present, the step is assumed to start immediately (or after the previous step)”
  * end 0..1 RelativeTime “When the step ends. If not present, the step is assumed to end when the internal timing schedule terminates”
  * count 0..1 string “How many times to do this step (if not 1) (* = keep repeating)”
  * component 1..* SU Dosage "A dosage details that is part of this step" "A dosage details that is part of this step."
  * safety 0..1 SU DosageSafety "Safety Information about this step of the dose course"
* safety 0..1 SU DosageSafety "Safety Information about the combined dose course"

DosageSafety

* doseLimit 0..* SU Element "A dose limit for safe use of the medication"
  * quantity[x] 1..1 SU integer or Quantity or Expression "Quantiy that is safe to use"
  * scope 1..1 SU code "dosage | period | administration | lifetime - The scope of the dose limitation"
  * scope from http://hl7.org/fhir/ValueSet/dose-limit-scope|6.0.0-ballot3 (required)
  * period 0..1 SU Duration "The period over which the quantity is safe to use (if scope = period)"
  * text 0..1 SU string "Additional notes about the dose limit" "Additional notes about the dose limit."
* ifExceeded 0..1 SU string "What to do if the instructions lead to exceeding the dose limits"