

New concept proposal

Fluid Input Output

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Dataset release	2024.1	Consulted expert	ICU expert, PSSS/IICU, others

1 Rationale

This concept describes the individual elements that are taken into account when calculating the fluid balance. This concept shows all fluid in- and outputs over a period of time or at a single point of time by substance and quantity. For fluid output, lost urine, fluid lost by drainage or dialysis, blood loss, vomiting, or any other body fluid loss are taken into account. For fluid intake, drinking, transfusions, crystalloid, colloid, drug (liquid part, solution), or any other fluid the patient was consuming are taken into account. The information is not only important to calculate fluid balance, but also to calculate intake and output by substance. Examples are blood loss or transfusions or the amount of urine a patient produces within a certain time period to monitor acute kidney failure.

2 Comparison to other standards/data models

2.1 FHIR

Resource NutritionIntake (<https://build.fhir.org/nutritionintake.html>)

This FHIR resource is limited to fluid or nutrition intake events. It is not used for parenteral fluid intake and does not cover, for example, body fluid loss.

2.2 OpenEHR

Two separate archetypes for fluid input and output exist:

Fluid Input: <https://ckm.openehr.org/ckm/archetypes/1013.1.1671>

Fluid Output: <https://ckm.openehr.org/ckm/archetypes/1013.1.1683>

In comparison to the proposed concept, the OpenEHR archetype also includes an attribute showing the route of application.

Registries or mandatory data deliveries hospital: None

3 Concept information

3.1 Fluid Input Output

Concept or concept compositions or inherited	General concept name	General description	Contextualized concept name	Contextualized description	Type	Standard	Value set or subset	Meaning binding	Cardinality for composedOf
Concept	Fluid Input Output	gain or loss of fluid that impacts the fluid balance	Fluid Input Output	gain or loss of fluid that impacts the fluid balance					
composedOf	substance	substance associated to the concept	substance	substance and amount of fluid input or output	Substance	SNOMED CT	code restricted to: descendant of: 33463005 Liquid substance (substance)		1:1
composedOf	start datetime	datetime at which the concept started	start datetime	start date time of fluid input or output	temporal				1:1
composedOf	end datetime	datetime at which the concept ended	end datetime	end date time of fluid input or output	temporal				1:1

General concept name	Cardinality for concept to Administrative Case	Cardinality for concept to Data Provider	Cardinality for concept to Subject Pseudo Identifier	Cardinality for concept to Source System
Fluid Input Output	0:1	1:1	1:1	1:1

4 Impact on the SPHN dataset

None.

5 Discussion

The quantity of the substance is covered by the SPHN concept 'Substance' where 'quantity' is an optional composedOf. For the current concept, it will be important that quantity is provided as its **sign** will be **used to indicate if we are dealing with fluid input or output**. For **fluid output**, the quantity will be **negative**.

This allows direct use of the quantity, e.g. to calculate a fluid balance. The necessity to have the quantity information delivered must be indicated in the specifications of the data transfer request.

Some fluid input/output events have a start and an end time point. An example would be the start and end of an infusion. Other events have only a single time point. In these cases, the two mandatory fields start datetime and end datetime should be set to the same value.

We have explored the idea of including Time Series as an optional "composedOf" which would allow linking a file containing various fluid input/output events. However, we have decided against this for now, as the Time Series concept is still under development. Also, it is preferable to have as much data as possible in the RDF graph.

6 Example

6.1 Example of fluid output (→ negative sign of Substance-quantity)

Fluid Input Output

substance:
 code:
 identifier: 78014005
 name: Urine
 coding system and version: SNOMED CT 20221231
 generic name: urine
 quantity:
 value: -120
 unit:
 identifier: ml
 name: milliliter
 coding system and version: UCUM 2.1 (20171121)
 start datetime: 2023-06-07T14:30:00+01:00
 end datetime: 2023-06-07T14:30:00+01:00

6.2 Example of fluid input

Fluid Input Output

substance:
 code:
 identifier: 226478004
 name: Herbal tea
 coding system and version: SNOMED CT 20221231
 generic name: herbal tea
 quantity:
 value: 250
 unit:
 identifier: ml
 name: milliliter
 coding system and version: UCUM 2.1 (20171121)
 start datetime: 2023-06-07T15:30:00+01:00
 end datetime: 2023-06-07T15:55:00+01:00