

Extended Text2Story Annotation Manual

Preface

The production and organisation of temporal information in clinical narratives is essential for advancing the management and analysis of health data. The ability to identify, annotate, and structure temporal elements in clinical texts not only promotes diagnostic and therapeutic accuracy but also facilitates medical research, the development of computational systems, and interoperability across technological platforms. It was with this motivation that the present manual was created, aimed at guiding professionals, researchers, and students in the complex task of temporal annotation in clinical texts.

This manual describes a temporal annotation schema that combines theoretical and practical approaches, with a specific integration of knowledge from the medical field. The schema presented here was developed on solid foundations, namely the Text2Story annotation framework (Silvano 2021, 2023, 2024; Leal 2022) and the standards established by the international ISO 24617-1:2012 norm: Language resource management—Semantic annotation framework (SemAF)—Part 1: Time and events (SemAF-Time, ISO-TimeML), which ensure uniformity and consistency in temporal annotation processes.

An innovative feature of this schema is its dimension of medical specialisation, based on robust conceptual and terminological sources such as the UMLS Metathesaurus. The definition of medical labels was further grounded in the work of Leite (2024), which explored the use of ontologies for extracting and organizing information in clinical texts. Such an approach enriched the schema with specific categories, promoting a more precise and contextualised representation of the events described in clinical narratives. This annotation framework encompasses a comprehensive set of events, supported by various tags and attributes, enabling the extraction of morphosyntactic, grammatical, and clinical information, as well as temporal expressions and temporal links.

Sources

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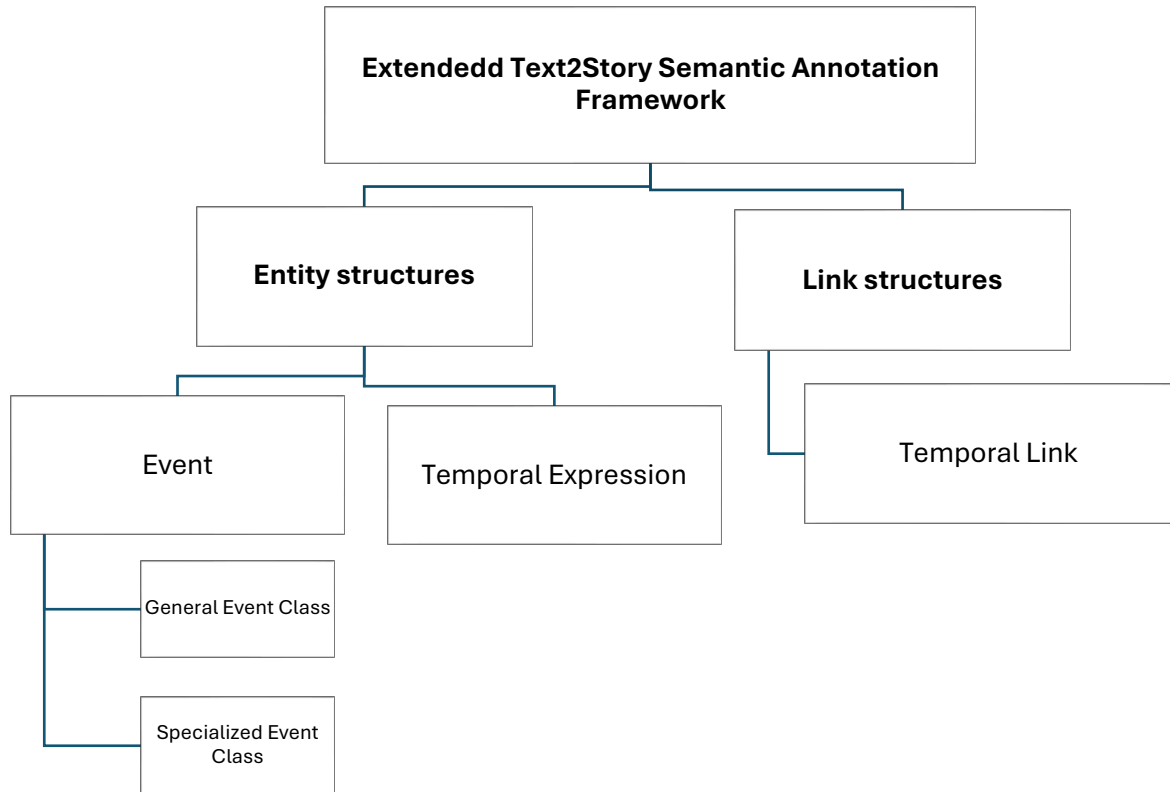
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I. Extended Semantic Annotation Framework



II. Stages of the annotation process

Steps	Annotation of events with general class
	Annotation of events with specialized class
	Annotation of temporal expressions
	Annotation of temporal links

Text2Story Guidelines – Medical Domain

Entity Structures

A.1. Event

Definition:

Eventuality that happens or occurs, or a state/circumstance that is temporally relevant, i.e., directly related to a temporal expression or change throughout the text. Events can be nouns, pronouns, verbs, or even adjectives.

Tag Span (Markable):

General Rules

- Verbs denotation events
 - Mark only main verbs, not auxiliary verbs

Ex. *O aspirado medular mostrou 46% de blastos de fenótico monocitoide.*

→ O <event>aspirado medular</event> <event>mostrou</event>
48% de blastos de fenótipo monocitoide.

Ex. *No cariótipo foi identificada uma translocação (16;16).* → No

<event>cariótipo</event> foi <event>identificada</event>
uma translocação (16;16).

Notes:

1. The classification refers to the compound's tense.

2. Aspectual verbs:

- Mark and link to the main verb using an aspectual link (please note that aspectual links will not be used at this stage of annotation).

3. Predicative construction:

- Leave the copular verb unmarked and mark the complement (adjective/noun/prepositional), identifying the PoS (part of speech) as an adjective, noun, or preposition but assigning the values of the tags TENSE/ASPECT according to the information from the verb.

Ex. *O FLT3 foi positivo.* → O <event>FLT3</event> foi
<event>positivo</event>.

- If the copula verb is followed by a prepositional or adverbial phrase with an interpretation of spatial or temporal location, mark only the verb.

Ex. *O doente está no hospital X.* → *O doente <event>está</event> no hospital X.*

Ex. *Foi para o IPO, onde fez exames.* → *<event>Foi</event> para o IPO, onde <event>fez</event> <event>exames</event>.*

4. (Semi) lexicalized expression: Mark that expression as the predicator.

Ex. *O doente ficou em observação.* → *O doente ficou <event>em observação</event>.*

Ex. *O doente está em estado grave.* → *O doente está <event>em estado grave</event>.*

Note: The events represented by prepositions receive the same classification, for the remaining attributes, as their antecedent.

5. Verb combinations *ir* + V-infinitive:

- If verbs are adjacent: mark only the main verb.

Ex. *O doente vai fazer alotransplante de medula óssea, se dador HLA compatível.* → *O doente vai <event>fazer</event>. <event>alotransplante</event> de medula óssea, se dador HLA <event>compatível</event>.*

- If verbs are not adjacent: mark both as autonomous markables.

Ex. *Foi ao hospital da sua residência realizar os exames complementares de diagnóstico.* → *<event>Foi</event> ao hospital da sua residência <event>realizar</event> os <event>exames complementares de diagnóstico</event>.*

6. Nouns denoting events:

- Nouns are marked without specifiers, complements and modifiers.

Ex. *O hemograma mostrou anemia e leucopenia.* → *<event>hemograma</event> <event>mostrou</event> <event>anemia</event> e <event>leucitopenia</event>.*

- **Polysemous nominalizations:** Do not mark if the nominalization does not convey an interpretation of an event.

Ex. *O FLT3 foi positivo.* (“FLT3” would be marked because the relevant meaning of “FLT3” is the test performed for its detection.) →
O <event>FLT3</event> foi <event>positivo</event>.

Ex. *Foi detetada uma mutação no FLT3.* (“FLT3” would not be marked as an event but rather as a participant because the relevant meaning is the gene FLT3.) → *Foi <event>detetada</event> uma <event>mutação</event> n <participant>o FLT3</participant>.*

7. **Nouns with adjectival modifiers:** Mark the whole expression in the case of nouns that represent events and are followed by adjectival modifiers or are followed by an adjective and form a (semi)lexicalized expression.

Ex. *Instalou-se um quadro de dores abdominais.* →
<event>Instalou-se</event> um <event>quadro</event> de <event>dores abdominais</event>.

Ex. *Condicionando uma ureterohidronefrose bilateral.* →
<event>Condicionando</event> uma <event>ureterohidronefrose bilateral</event>.

Ex. *Doente sem antecedentes relevantes.* → *Doente sem <event>antecedentes relevantes</event>.*

8. **Nouns in prepositional phrases:** Mark the noun phrase head, that is, the noun.

Ex. *Quadro clínico e analítico compatível com Leucemia Mieloide Aguda, com envolvimento do SNC.* → *<event>Quadro clínico e analítico</event> <event>compatível</event> com <event>Leucemia Mieloide Aguda</event>, com <event>envolvimento</event> do SNC.*

9. Adjectives without complements and modifiers: Mark adjectives denoting events.

Ex. *O doente, estável até ontem, faleceu durante a noite no de choque sético.* → *O doente, **<event>estável</event>** até ontem, **<event>faleceu</event>** durante a noite no **<event>contexto</event>** de **<event>choque sético</event>**.*

Attributes

A. General Event Class

Events represented by **nouns, adjectives, prepositions, or pronouns** only receive the attributes of **Part of Speech** and **Polarity**. The other attributes are applied to events represented by verbs only.

1. Class:

- **Occurrence:** A situation that happens or occurs.

Ex. *Em fevereiro, realizou exames complementares.* → *Em fevereiro, **<event class='occurrence'>realizou</event>** **<event>exames complementares</event>**.*

- **State:** A situation in which something obtains or holds true and that is temporally relevant, that is,
 - i. a state that changes over the text, or
 - ii. related to temporal expressions, or
 - iii. a state that is introduced by I-action, I-state or reporting class, or
 - iv. predicative states that are still valid, considering the document creation time.

Ex. *O hemograma mostrou anemia.* → *O **<event>hemograma</event>** **<event class='state'>mostrou</event>** **<event>anemia</event>**.*

- **Reporting:** An action of a person/ organization involving declarations, narrations, or information-sharing.
 - Common verbs: *declarar, dizer, explicar, relatar*

Ex. *O paciente relatou astenia, hipersudorese e, mais recentemente, cefaleias.* → *O paciente* **<event class='reporting'>relatou</event>** *<event>astenia</event>, <event>hipersudorese</event> e, mais recentemente, <event>cefaleias</event>.*

- **Perception:** A situation involving physical perception of another situation.

- Common verbs: *ver, ouvir*

Ex. *O doente ouviu a explicação do tratamento e aceitou.* → *O doente* **<event class='perception'>ouviu</event>** *a <event>explicação</event> do <event>tratamento</event> e <event>aceitou</event>.*

- **Aspectual:** A situation that focuses on a different part of another situation.

- Common verbs: *começar, continuar, terminar*

Ex. *O doente começou a apresentar sintomas em janeiro de 2014.* → *o doente* **<event class='aspectual'>começou</event>** *a <event>apresentar</event> <event>sintomas</event> em janeiro de 2014.*

- **I-action (Intensional action):** An event that introduces another event as an argument in an intensional context.

- Common verbs: *tentar, adiar, evitar, cancelar, pedir, ordenar, autorizar, prometer, oferecer, propor, decidir, concordar, nomear, sugerir, alegar*

Ex. *Decide-se propor o doente para tratamento de quimioterapia.* → **<event class='I-action'>Decide-se</event>** **<event class='I-action'>propor</event>** *o doente para <event>tratamento</event> de <event>quimioterapia</event>.*

- **I-state (Intensional state):** A state that introduces events as an argument in an intensional context.

- Common verbs: *acreditar, pensar, imaginar, querer, esperar, odiar, preocupar-se, exigir, estar preparado/ pronto/ ansioso*

Ex. *O paciente acredita que a dor está relacionada com a prática de esforço físico.* → *O paciente* **<event class='I-state'>acredita</event>**

que a <event>dor</event> está <event>relacionada</event> com a <event>prática</event> de <event>exercício físico</event>.

2. Type:

- **State:** A situation in which something obtains or holds true.
Ex. *O hemograma mostrou a presença de anemia e leucocitose.*
Ex. *O doente apresentava anemia macrocítica.*
Ex. *É um doente com história de múltiplas neoplasias, que se encontrava em tratamento de leucemia mieloide aguda.*
- **Process:** A situation that is dynamic and atelic, with duration.
Ex. *O doente dormiu bem durante a primeira noite.*
- **Transition:** A dynamic situation, with duration and consequent state. It subsumes accomplishments and achievements.
Ex. *Decide-se propor o doente para tratamento de quimioterapia.*

3. PoS (Part of Speech): Category to which a word belongs based on its role and function within a sentence.

- **Verb**
- **Noun**
- **Adjective**
- **Preposition**
- **Pronoun**

Ex. *Por esse motivo [noun] fez um hemograma [noun] que [pronoun] mostrou [verb] anemia [noun] e leucocitose [noun].*

Ex. *O doente, estável [adjective] até ontem, recebeu alta.*

Ex. *O doente está em estado grave [preposition].*

Note: The events represented by prepositions receive the same classification for the remaining attributes as their antecedent.

4. **Tense:** Category that expresses the time at which an action, event, or state described by a verb occurs. We only make this classification for verbs, even when the markable is a predicative selected by copular verbs.

- **Present:** Locates a situation at the present time, in the near future, or in a time interval that starts in the past and still holds in the present. It can also depict habitual situations.

Ex. *Atualmente, apresenta presença imagiológica de metastização óssea difusa.*

Ex. *Neste momento, o doente está clínica e hematologicamente estável.*

- **Past:** Locates situations in the past.

Ex. *O hemograma mostrou anemia e leucocitose.*

- **Future:** Locates situations in the future.

Ex. *O doente fará os tratamentos no hospital de origem.*

5. **Aspect:** The grammatical category that expresses the way an event is structured internally and unfolds over time (over an interval or in a moment), taking into account whether its duration is indeterminate or whether it has boundaries.

- **Progressive:** Ongoing or continuous situation.

Ex. *O doente está a ser acompanhado no hospital de origem.*

- **Perfective:** Situation that ended.

Ex. *O doente fez os exames no hospital de origem.*

Ex. *O hemograma mostrou anemia.*

- **Imperfective:** Ongoing, habitual, or repeated situation in the past.

Ex. *O doente encontrava-se em remissão completa a 5.9.2013.*

- **Perfective-progressive:** A combination of the meanings of progressive and perfective.

Ex. *O doente esteve a fazer tratamento de quimioterapia com Citarabina e Idarrubicina.*

- **Imperfective-progressive:** Combination of the meanings of progressive and imperfective.

Ex. *O doente estava a ser seguido no hospital de origem quando foi reencaminhado para o IPO.*

6. Vform (Verb Form):

- **Gerundive**

Ex. *Diagnóstico prévio de adenocarcinoma, tratando-se de um estadio III-A.*

- **Infinitive**

Ex. *É de referir que o FLT3 foi positivo.*

- **Participle**

Ex. *Diagnóstico de uma Leucemia Mieloide Aguda associada a mutação do gene FLT3.*

7. Mood:

- **Subjunctive**

Ex. *É pedido ao doente que faça antibioterapia oral.*

- **Conditional**

Ex. *O paciente informou que aceitaria realizar o tratamento.*

Ex. *O doente faria alotransplante, se dador HLA compatível.*

- **Future**

Ex. *O doente estará em remissão.*

8. Modality: Attributes values of epistemic and deontic modality to situations represented by the following modal verbs:

- **Dever**

Ex. *Durante o período da quimioterapia e cerca de 3 meses após o seu término está sujeita a um risco significativo de intercorrências infecciosas decorrente da aplasia iatrogénica pelo que deve cumprir todos os cuidados inerentes ao doente neutropénico.*

- **Poder**

Ex. *Medula óssea hiperclular; cujas alterações podem ser enquadráveis dentro do contexto da mielofibrose previamente diagnosticada*

- **Ter de**

Ex. *Foi informado o doente de que tem de deixar de fumar.*

- **Ser capaz de**

Ex. *O doente tem alguma autonomia, sendo capaz de fazer pequenas caminhadas.*

Note: The markable is always the main verb.

9. Polarity – Attribute marks whether an event is positive or negative. Each event must be either POS (positive) or NEG (negative).

- **POS (positive):** It signs that the event is not negated.

Ex. *Doente com antecedentes de hipertensão arterial.*

- **NEG (negative):** It signs that the event is negated by words such as “não”, “sem”, “nem”, etc.

Ex. *Doente sem antecedentes relevantes.*

B. Specialized Even Class

1. Medical Domain

- **Sign or Symptom:** Clinical manifestations observed by the doctor (objective) or reported by the patient (subjective).

- Examples: *febre, dor, enjoo, obstipação, tumefação, mancha, hipersudorese, cefaleias*

Ex. *Doente de 25 anos, sem antecedentes relevantes, e um quando recente caracterizado por hipersudorese, infecções de repetição e mais recentemente cefaleias.*

- **Personal History:** Information about the patient's medical, personal, and family history, including **past** illnesses, comorbidities, hospitalizations, surgeries, allergies, gynecologic and obstetric history, personal habits (e.g., alcohol and drug use), etc.

- Examples: *Acidente de viação, depressão, mastectomia, cancro prévio, radioterapia* (in the context of past illnesses), *alergia, dislipidemia, divertículos, gastrite crónica*

Ex. *Doente de 77 anos de idade, antecedentes de síndrome depressivo, e carcinoma da mama em 2014, altura em que fez tratamento cirúrgico, quimioterapia, radioterapia e hormonoterapia.*

- **Attributes of Personal History:**

- a. **Past Medical History:** Information about the patient's medical, personal, and family history that includes other major illnesses **not present at the moment**.

- Examples: *depressão* (that does not remain present), *mastectomia, carcinoma* (that does not remain present), *radioterapia* (in the context of past illnesses), *alergia* (in the past), *gastrite crónica* (that does not remain present)

Ex. *Doente de 77 anos de idade, antecedentes de síndrome depressivo, dislipidemia e carcinoma da mama em 2014, altura em que fez tratamento cirúrgico, quimioterapia, radioterapia e hormonoterapia.*

b. Comorbidity: Coexisting medical condition or additional disease to the main diagnosis that:

- Was present **before** the principal diagnosis;
- **Exists at the moment** but is not related to the principal diagnosis.

Includes physical illnesses, mental health disorders, and chronic diseases that the patient already had at the time of the principal diagnosis.

- Examples: *hipertensão arterial, diabetes mellitus, hiperplasia benigna da próstata, depressão* (that remains present), *gastrite crónica* (that remains present)

Ex. *Doente de 77 anos de idade, antecedentes de síndrome depressivo, dislipidemia e carcinoma da mama em 2014, altura em que fez tratamento cirúrgico, quimioterapia, radioterapia e hormonoterapia.*

c. Undefined: Information about the patient's personal history for which it is **unclear** whether it is currently present.

- Examples: *Depressão* (that we do not know if it is present now), *gastrite crónica* (that we do not know if it is present now), *litíase renal* (that we do not know if it is present now)

Ex. *Doente de 77 anos de idade, antecedentes de síndrome depressivo, dislipidemia e carcinoma da mama em 2014, altura em que fez tratamento cirúrgico, quimioterapia, radioterapia e hormonoterapia.*

Notes:

1. The word “antecedentes” (e.g. *Doente com antecedentes de hipertensão arterial*) is annotated with the tag “Personal History” without any attribute of Personal History, and with positive polarity.
2. In cases where “sem antecedentes relevantes” appears in the medical report, annotate “antecedentes relevantes” with the tag

“Personal History” without any attribute of Personal History, and with negative polarity.

- **Intercurrence:** A condition or event that **occurs unexpectedly** during treatment or hospitalization for the principal diagnosis but was **not initially present**.

Intercurrence can be:

- Concurrent Illness – another illness that develops while a patient already suffers from an existing condition.
 - Examples: *infecção urinária, pneumonia, neutropenia febril, queda*
- Complications – issues that arise as a direct result of the primary disease.
 - Examples: *alterações cutâneas*
- Treatment-Related Events – side effects or reactions related to treatments administered for the primary condition.
 - Examples: *alergia (à penicilina)*

Ex. *Doente com Leucemia Mielóide Aguda, foi internada a 25/09/2015 por quadro de tosse com expetoração mucopurulenta, dispneia para pequenos esforços e febre, associado a hipotensão arterial.*

Notes:

1. The word “intercorrência” (e.g. *Teve como intercorrência febre*) is annotated with the tag “Intercurrence” and with positive polarity.
2. In cases where “sem intercorrência” appears in the medical report, annotate “intercorrência” with the tag “Intercurrence” with negative polarity.

- **Examination:** Tests and procedures aimed at diagnosing specific conditions.

- Examples: *hemograma, TAC, Rx, cariótipo, FLT3, aspirado medular*

Ex. *O aspirado medular mostrou 48% de blastos de fenótipo monocitoide.*

Ex. É de referir ainda que o FLT3 foi positivo e que uma punção lombar mostrou envolvimento do sistema nervoso central pela leucemia.

- **Examination Result:** The result or interpretation of the examination (does not include numerical results).
 - Examples: *anemia, leucocitose, trombocitopenia*
Ex. O hemograma mostrou anemia, leucocitopenia e trombocitopenia.
Ex. É de referir ainda que o FLT3 foi positivo e que uma punção lombar mostrou envolvimento do sistema nervoso central pela leucemia. (notice that here “envolvimento” is the examination result of “punção lombar”)
- **Principal Diagnosis:** The most significant diagnosis in terms of influencing the treatment plan and management of the patient’s care.
 - Examples: *leucemia mieloide aguda, linfoma não Hodgkin*
Ex. Quadro clínico e analítico compatível com o diagnóstico de uma Leucemia Mielóide Aguda com envolvimento do sistema nervoso central.
Ex. Trata-se de um Linfoma não Hodgkin difuso de grandes células B, estadio [sic] IV, IPI de 5.
- **Characterization of the Disease:** Information that characterizes a disease in terms of its severity or prognosis.
 - Ex. Quadro clínico e analítico compatível com o diagnóstico de uma *leucemia mieloide aguda* com envolvimento do sistema nervoso central.
 - Ex. Trata-se de um *linfoma não Hodgkin* difuso de grandes células B, estadio [sic] IV, IPI de 5.
- **Medical Procedure:** Clinical interventions performed that are not aimed at assessing the patient’s condition or treating the disease.
 - Ex. Solicita-se criopreservação de esperma.
- **Treatment:** Interventions that are applied to improve or cure the medical condition.

- Examples: *alotransplante, quimioterapia, paliativo (sintomático), ensaio clínico/protocolo*

Ex. *Proposto para tratamento com Idarrubicina e Citarabina associado a tratamento intratecal, e posteriormente a alotransplante para progenitores hematopoéticos em 1ª remissão, se dador compatível.*

Note: The word “tratamento” (e.g. *Proposto para tratamento com Idarrubicina*) is annotated with the tag “Treatment” and with positive polarity.

- **Drug Administration Route:** Route through which a medication or other chemicals are introduced into the body.

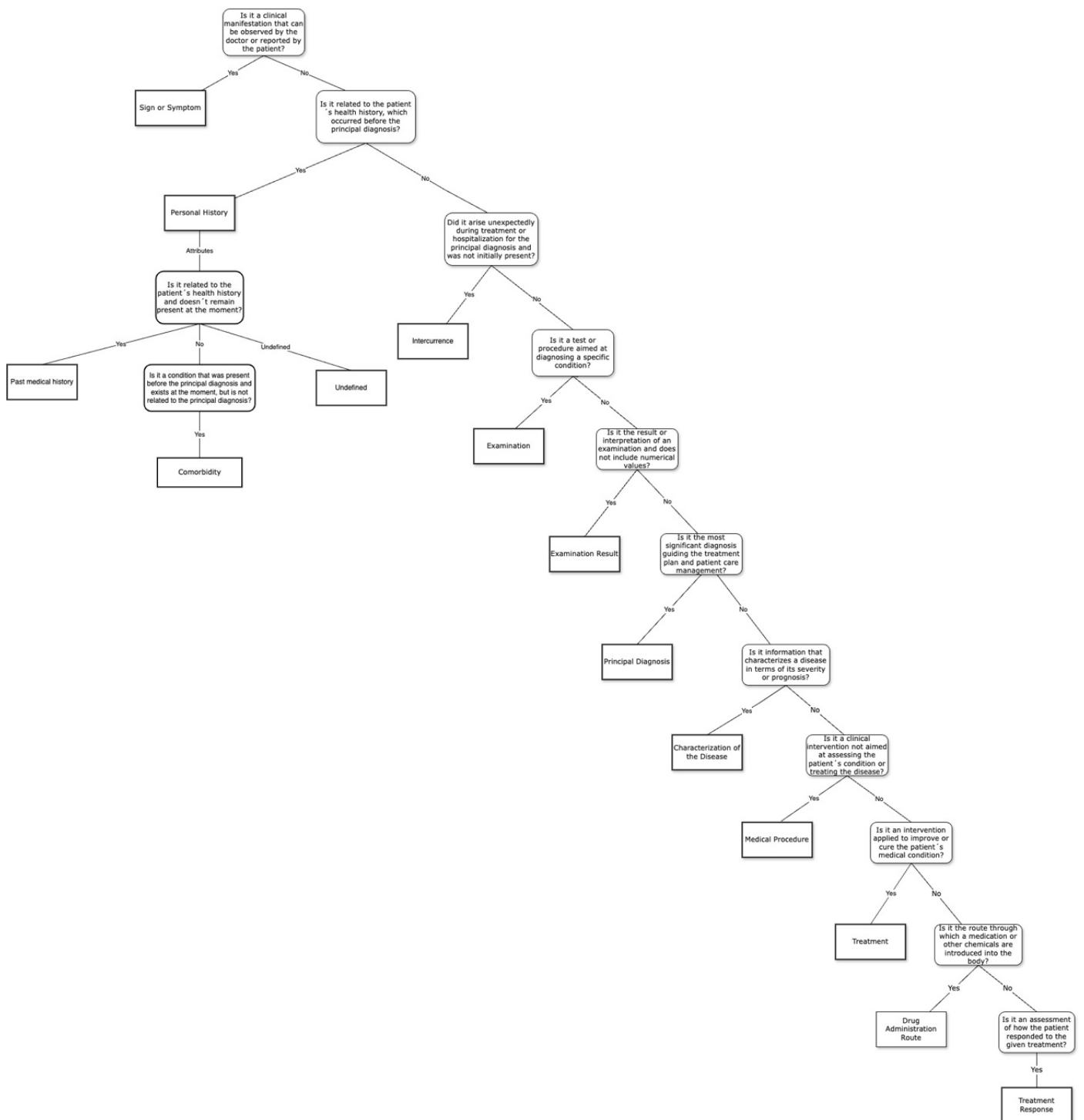
Ex. *Proposto para tratamento com Idarrubicina e Citarabina associado a tratamento intratecal.*

- **Treatment Response:** Assessment of how the patient responded to the given treatment.

- Examples: *remissão completa, ausência de resposta*

Ex. *Proposto para tratamento com Idarrubicina e Citarabina associado a tratamento intratecal, e posteriormente a alotransplante para progenitores hematopoéticos em 1.ª remissão, se dador compatível.*

Decision Tree 1 Specialized Classes - Medical Domain



A.2. Times (TIMEX3)

Definition:

Temporal expressions that represent time units' classification, that can be:

- **t<day**: Temporal units smaller than a day (e.g. *duas horas, manhã*).
- **t=day**: Specific days (e.g. *quarta-feira, 2 de janeiro, dia de Natal*).
- **t<year**: Temporal units smaller than a year (e.g. *mês, semestre, janeiro, verão*).
- **t=year**: Specific year (e.g. *2021, próximo ano*).
- **t>year**: Temporal units greater than a day (e.g. *século passado*).

Tag Span (Markable):

General Rules

- **NP (Noun Phrases)**: Temporal expressions with noun phrases (e.g. *o verão passado, tarde*).
 - **Notes**:
 - In temporal expressions preceded by a preposition, the preposition is **not** part of the tag.
 - If a temporal clause has a clausal modifier, the tag only includes the temporal expression.
 - Example: *cinco dias depois de ter saído* → `<time>cinco dias</time> depois de <event>ter saído</event>`
- **AdvP (Adverbial Phrase)**: Temporal expressions with adverbial phrases (e.g. *ontem, recentemente*).

Special Cases

1. Specification Relation

- Two temporal expressions in a specification relation, that is, one is further specifying other, are marked as a **single tag**.
 - Conditions for being in a specification relation:
 - Both expressions belong to the **same classe** (ex. *terça-feira, dia 21*).

- Both belong to the **same syntactic constituent** (ex. às 11 horas, 13 de Janeiro, 2023).

2. Anchoring Relation

- Two temporal expressions in an anchoring relation, that is, one of which is ordered relative to the other, are marked generally as two **independent tags**.
 - **Note:** Cases denoting daytime (ex. dez minutos para as 15 horas) are annotated as a **single span**.
 - But expressions like *duas semanas a partir da próxima semana* → `<time>duas semanas</time> a partir d <time>a próxima semana</time>` with a temporal link established between them (begins).

3. Conjunction/Disjunction Relation

- Temporal expressions in a conjunction or disjunction relation are always marked as **two different tags**.
 - Example: *seis meses ou um ano* → `<time>seis meses</time> ou <time>um ano</time>`

Non-markables:

The following are not marked as temporal expression:

- Prepositions and subordinating conjunctions (ex. *quando, enquanto, durante*).
- Sequencing and ordering expressions (ex. *entretanto, antes*).
- Expressions of non-quantifiable duration (ex. *permanentemente, temporariamente*).
- References to non-existent times (ex. *nenhum data, nenhum tempo*).
- Temporal expressions referring to eventualities or occasions (ex. *Este tempo é complicado*).
- Temporal expressions used as proper names (ex. *25 de Abril*).
- Bare frequency expressions (ex. *uma vez, frequente, raramente, nunca, usualmente*).

Attributes

1. Type

Specifies the type of temporal expression:

- **Date:** Calendar time (e.g. *ontem*, *21 de março*, *o verão de 2000*, *5.4.2017*).
- **Time:** Time of the day (e.g. *cinco horas*, *a manhã de 21 de março*, *ontem à noite*).
- **Duration:** Duration (*dois meses*, *3 horas*, *toda a noite*).
- **Set:** Set of times (e.g. *duas vezes por semana*, *cada dois dias*).

2. Value

Specifies the value according to the type:

- *4 p.m.* → value=T16:00
- *durante dois meses* → value=P2M
- For **SET**:
 - Use `freq` and `quant` to specify sets.
 - *Duas vezes por semana* → value=P1W freq=2X
 - *diariamente* → value=P1D quant=EVERY

3. FunctionInDocument

Indicates the function of a time expression in providing a temporal anchor for other temporal expressions in the document:

- **DOCTIME:** Refers to the time the medical report was created.
- **AnchorTime:** Specifies the time that serves as reference point:

Ex. *Doente com diagnóstico de Leucemia Mieloide Aguda a 23.8.2017. Nesse dia, foi-lhe proposto o tratamento de quimioterapia com Idarrubicina e Citarabina.*

- *O dia 23* must be marked as the `AnchorTime` of *nesse dia*.

B.1. Temporal link

Definition

Links that establish different temporal relationships (simultaneous, after, before) between two events, two temporal expressions, or between an event and a temporal expression.

- **Directionality:**
 - **Two events/two temporal expressions:** From the last to the previous one in the linear order of discourse.
 - **Event + temporal expression:** From the event to the temporal expression (irrespective of linear order).

Attributes

2. BEFORE

A situation/time expression occurs before another one.

Ex. *É de referir, ainda, que o FLT3 foi positivo.*

positivo - BEFORE - *referir*

3. AFTER

A situation/time expression occurs after another one.

Ex. *O aspirado medular mostrou 48% de blastos de fenótipo monocitoide.*

mostrou - AFTER - *aspirado medular*

4. BEFORE_OVERLAP

A situation/time expression starts before another but continues into the timeframe of the second situation/time expression.

Ex. *Doente iniciou tratamento a 2.4.23, sendo já ativamente seguido pelo médico da instituição.*

seguido - BEFORE_OVERLAP - *2.4.23*

5. AFTER_OVERLAP

A situation/time expression starts after another but begins within the timeframe of the first situation/time expression.

Ex. *Quadro caracterizado por febre, vômitos e mais recentemente cefaleias.*

cefaleias - SIMULTANEOUS - *recentemente*
cefaleias - AFTER_OVERLAP - *vómitos*

6. INCLUDES

A situation/time expression includes another one.

Ex. *Uma punção lombar mostrou envolvimento do SNS.*

envolvimento - INCLUDES - *mostrou*

7. IS_INCLUDED

A situation/time expression is included in another one.

Ex. *O doente tinha iniciado antibioterapia no dia anterior.*

antibioterapia - BEGUN BY - *iniciado*

iniciado - IS_INCLUDED - *o dia anterior*

Ex. *Quadro caracterizado por hipersudorese e infeções de respiração.*

Por esse motivo fez um hemograma.

caracterizado - IDENTITY - *quadro*

hipersudorese - IS_INCLUDED - *caracterizado*

fez - IS_INCLUDED - *motivo*

hemograma - IS_INCLUDED - *motivo*

motivo - IDENTITY - *quadro*

hemograma - IDENTITY - *fez*

8. DURING

A situation/time expression occurs during another one.

Ex. *Durante o exame físico, o doente referiu dores intensas.*

dores intensas - DURING - *exame físico*

9. SIMULTANEOUS

A situation/time expression occurs at the same time as another one.

Ex. *Quadro caracterizado por hipersudorese e infeções de respiração.*

infeções de repetição - SIMULTANEOUS - *hipersudorese*

10. IDENTITY

Two situations/time expressions are the same.

Ex. *Quadro caracterizado por hipersudorese e infeções de respiração.*

caracterizado - IDENTITY - *quadro*

Ex. *O doente fez um hemograma que mostrou anemia.*

que - IDENTITY - *hemograma*

- **Causative constructions:** Triggered by verbs *like* *causar, induzir, produzir, conduzir*.

Ex. *A infecção causou aumento da temperatura corporal.*

causou - IDENTITY - *infecção*

aumento - AFTER - *causou*

- **Light verb constructions:**

Ex. *O paciente deu entrada no hospital.*

entrada - IDENTITY - *deu*

Ex. *O doente teve alta a 2.3.2017.*

alta - IS INCLUDED - *2.3.2017*

alta - IDENTITY - *teve*

- **Reporting events:**

Ex. *O doente disse ter feito paracetamol às 7h30. Referiu ainda mialgias difusas.*

referiu - IDENTITY - *disse*

11. BEGINS

A situation/time expression begins another one.

Ex. *O paciente apresenta sintoma de dor abdominal desde abril de 2014.*

dor abdominal - BEGINS - *abril de 2014*

12. ENDS

A situation/time expression ends another one.

Ex. *Glasdegib termina a 5.6.2012.*

termina - ENDS - *5.6.2012*

Ex. *O doente teve o primeiro internamento de abril a maio de 2017.*

internamento - BEGINS - *abril*

internamento - ENDS - *maio de 2017.*

13. **BEGUN_BY**

A situation/time expression is begun by another one.

Ex. *Em janeiro de 2014, inicia queixas de dor pélvica.*

queixas - BEGUN_BY - *inicia*

inicia - BEGUN_BY - *janeiro de 2014*

14. **BENDED_BY**

A situation/ time expression is ended by another one.

Ex. *Em abril de 2013, terminou o tratamento de quimioterapia.*

tratamento - ENDED_BY - *terminou*

terminou - ENDED_BY - *abril de 2013*

Ex. *De abril a maior de 2017, o doente esteve internado.*

internado - BEGUN_BY - *abril*

internado - ENDED_BY - *maio de 2017.*