Table 1. *Strategic processes defined for the CODE.CLINIC PRM*

Process G.01. Creation or Selection, implementation, and maintenance of standards, best practices, norms, guidelines, and policies.

Activities:

- AG01.1. To select and define the best coding practices for different medical areas (*actors involved: AMACC, clinical coding office managers, medical coders and researchers*)
- AG01.2. To assign episodes to medical coders according to pre-defined rules (*actors involved: hospital manager for clinical coding*)
- AG01.3. To list and define the most important norms and regulations regarding data protection/security, quality and access/use, in order to comply with the General Data Protection Regulation (EU GDPR) (*actors involved: ACSS, IT staff*)
- AG01.4. To define norms regarding standard reference books, supporting instruments and clinical coding guidelines (*actors involved: Order of Physicians of Portugal, AMACC, clinical coding office managers, medical coder*)
- AG01.5. To define patient documentation sources to be considered for clinical coding (*actors involved: ACSS*)
- AG01.6. To ensure continuous awareness, training and preparation on clinical terminologies and DRG grouper updates (*actors involved: Order of Physicians of Portugal, AMACC*)
- AG01.7. To define norms and standards regarding software and hardware resources to be used within the clinical coding lifecycle (*actors involved: ACSS, IT staff*)

Purpose of the process: The main goal of this process is to set up the organization environment required to execute the coding clinical processes according to the capabilities of the hospitals and following the recommendation of the authorized organization at a national level.

Outcomes:

- Updated list of best practices in clinical coding for different medical areas.
- Updated list of standard reference books and guidelines to be adopted.
- Updated list of clinical coding data policies recommendations.
- Updated list of information systems and software applications to be used.
- Updated list on periodic training/courses/workshops.

Work Products:

- Unified Web-portal to propagate up-to-date recommendations, policies, norms, decisions and training options.
- National Web-tool to track the implementation of recommendations, policies, norms and decisions, including by means of key-performance indicators (KPIs).

Process G.02. Development of policies

Activities:

- AG02.1. To define norms on deadlines and requisites for coding episodes (*actors involved: ACSS*)
- AG02.2. To define norms on courses and periodic training (*actors involved: ACSS*)
- AG02.3. To define norms and standards for auditing health records (*actors involved: ACSS*)

- AG02.4. To define norms and standards for auditing coded data (*actors involved: ACSS*)
- AG02.5. To define norms for timeliness coder-physician queries (*actors involved: ACSS*)
- AG02.6. To define norms regarding data access by universities and research centers, including protection requirements, timing, responsibilities and duties (*actors involved: ACSS*)

Purpose of the process: The main aim of this process is to develop the policies that rule every detail of the Coding Clinical Process

Outcomes:

- Policies for deadlines, rules and requirements for clinical coding activity.
- Policies for education and training.
- Policies for timeliness coder-physician queries (regarding unclear/insufficient medical documentation).
- Policies for access to the data from patient documentation sources.
- Policies for access to the data for research.
- Policies for clinical terminology and Diagnosis-Related Groups (DRG) transition, awareness and training.
- Policies and clearly defined processes for auditing of health records.
- Policies and clearly defined processes for auditing of coded data.

Work Products:

- Unified Web-portal to propagate up-to-date policies, norms and decisions.
- Periodic meetings/assemblies with medical coders, hospital managers and ACSS.

Process G.03. Organizational Structure Management

Activities:

- AG03.1. To define norms regarding the appropriateness and validity of episodes for clinical coding (*actors involved: hospital managers*)
- AG03.2. To define requisites and required certification and licensed for clinical coding practices (*actors involved: ACSS*)

Purpose of the process: This process is aimed to maintain a supportive organization for the coding clinical data processes, identifying roles and responsibilities and to define the competences and skills that should be mandatory

Outcomes:

- List of ACSS rules regarding episodes validity for coding.
- List of updated and revised roles and responsibilities at hospital level.
- List of updated and required license and periodic certifications for conducting clinical coding activities.

Work Products:

- Unified Web-portal to propagate ACSS rules regarding episodes validity for coding.
- RACI Matrix (to be used internally).

Process G.04. Stakeholders' skills and competences management

Activities:

- AG04.1. To provide course for enabling clinical coding practice (*actors involved: ACSS*)
- AG04.2. To organize periodic training, courses and workshops (*actors involved: ACSS, Order of Physicians of Portugal, AMACC, clinical coding office managers*)
- AG04.3. To ensure capabilities and certification of medical coders (*actors involved: ACSS, Order of Physicians of Portugal, AMACC, clinical coding office managers*)

Purpose of the process: The process is aimed at maintaining a catalogue of the training required for assuring that different workers can achieve the associated competences and skills required to do their job.

Outcomes:

- Definition of mandatory course for acquiring license for clinical coding.
- Catalogue of mandatory follow-up courses/training at national level, including their definition.
- Catalogue of follow-up courses/training at hospital level, including their definition.

Work Products:

- Unified web-portal on mandatory and follow-up courses, at national or hospital level, with their definitions.
- Personal account with education and training information for medical coders at the Unified web-portal.

Table 2. *Main processes defined for the CODE.CLINIC PRM*

Process M.01. Data acquisition

Activities:

- AM01.1. To list and identify all patient documentation sources to be used for clinical coding (*actors involved: hospital manager for clinical coding, clinical coding office managers, medical coder*)
- AM01.2. To access patient documentation sources for clinical coding (*actors involved: medical coder*)
- AM01.3. To ensure that all medical coders have access to all patient documentation sources for clinical coding (*actors involved: hospital manager for clinical coding*)

Purpose of the process: This process is aimed at selecting and acquiring the required data from the typical data sources (e.g., health records both paper based or electronically)

Outcomes:

- Document concerning all pieces of information from patient documentation that should be considered for clinical coding, including the description of these sources and instructions to access and edit the information.
- Reports on the levels of quality of the acquired patient documentation.

Work Products:

- Patient Documentation repository.
- Software application with login credentials for the access and coding of patient documentation by medical coders.

Process M.02. Data Integration (internal)

Activities:

- AM02.1. To define norms for internal data integration, including the definition of sources, files and mandatory fields to be integrated. (*actors involved: ACSS*)
- AM02.2. To provide means for internally integrating data from patient encounters. (*actors involved: IT staff, hospital manager for clinical coding, medical coder*)
- AM02.3. To validate the integration process and ensure the quality of the integrated data. *(actors involved: IT staff, hospital manager for clinical coding, medical coder)*

Purpose of the process: In this process, the integration coming from the various data sources should be achieved to create a solid basis for the clinical coding process.

Outcomes:

- Instrument providing integrated documentation (in several hospitals, a PDF is generated by a software application)

Work Products:

- Integrated data repository.
- Software to perform data integration.

Process M.03. Data Coding

Activities:

- AM03.1. To read all patient documentation sources and search for key and necessary information for proper clinical coding (*actors involved: medical coder*)
- AM03.2. To classify patient encounter information into ICD codes (*actors involved: medical coder*)
- AM03.3. To perform the first validation of the chosen code and perform corrections whenever is necessary (*actors involved: medical coder*)

Purpose of the process: This process is aimed at properly coding the data.

Outcomes:

- Clinically code data to be billed and stored at the National Database (SIMH).

Work Products:

- Inpatient documentation instruments

Process M.04. Submission of clinically coded data to the national repository

Activities:

- AM04.1. To submit coded data to SIMH (*actors involved: medical coder*)
- AM04.2. To retrieve coded data from SIMH to perform corrections (*actors involved: medical coder*)

Purpose of the process: This process covers the exportation of the results of the coding of the data corresponding to the episodes towards the considered destinations.

Outcomes:

- Reports on the exportation of the data.
- Reports on data exportation, including indicators on the amount of episodes returned for correction.

Work Products:

- SIMH (Sistema de Informação para a Morbilidade Hospitalar)
- Web-services for data exportation
- National Database.

Process M.05. Incorporation of Coded Data to APR-DRG (DRG grouper software)

Activities:

- AM05.1. To group coded data submitted to SIMH into APR-DRG version 31 (*actors involved: ACSS, SPMS*)
- AM05.2. To send grouped data back to hospitals for billing (*actors involved: ACSS, SPMS*)
- AM05.3. To define all norms regarding the Diagnosis-Related Groups usage, including the version to be adopted, prices, relative weights and length of stay intervals (*actors involved: ACSS*)

Purpose of the process: The purpose of this process is to incorporate the coded data into the APR-DRG.

Outcomes:

- Periodically updated document with norms regarding the Diagnosis-Related Groups (DRG) version to be adopted, national and DRG-individual prices, relative weights and length of stay intervals, methods for the number of equivalent patients' calculation and case-mix index calculation.
- Clinical terminology mapping from ICD-9-CM to ICD-10-CM (General Equivalence Mappings – GEMs)
- Coded data grouped into APR-DRG.

Work Products:

- SIMH (Sistema de Informação para a Morbilidade Hospitalar)
- Web-services for data exportation
- Report with billing statistics.

Process M.06. Data exploitation for hospital management, financing (billing), and public health

Activities:

- AM06.1. To retrieve data from the national database for billing and case-mix and hospital production estimation (*actors involved: ACSS*)

- AM06.2. To produce hospital-specific annual contracts for financing, including quality indicators to be monitored, penalizations and expected production (*actors involved: ACSS*)
- AM06.3. To produce Public health and national/regional/local health authorities' reports and publishing (*actors involved: ACSS, public health authorities*)
- AM06.4. To maintain the Hospital Benchmarking webtool (*actors involved: ACSS*)

Purpose of the process: The objective of this process is to support all the necessary operations for hospital management, billing and public health.

Outcomes:

- Reports with hospital funding information.
- Reports on hospital activity.
- Epidemiology and Public Health Reports.
- Quality, volume and efficiency indicators (ACSS Benchmarking tool)
- Hospital Care Cost indicators (Transparency portal)

Work Products:

- ACSS Benchmarking tool - https://benchmarking-acss.min-saude.pt/manutencao/
- National Health Service Transparency portal - https://www.sns.gov.pt/transparencia/

Process M.07. Data exploitation for clinical and epidemiologic research

Activities:

- AM07.1. To grant data access by universities and research centers (*actors involved: ACSS*)
- AM07.2. To ensure the compliance with data protection requirements, timing and other responsibilities and duties (*actors involved: ACSS, SPMS, IT staff, hospital manager for clinical coding, clinical coding office managers, medical coder, researchers*)
- AM07.3. To promote and support clinical, epidemiological and health services research (*actors involved: researchers*)

Purpose of the process: The main purpose of this process is to produce research reports on clinical aspects.

Outcomes:

- Document with clearly defined processes for access to data for research.
- National Database Catalogue.

Work Products:

- Scientific dissemination channels.

Table 3. *Support processes defined for the CODE.CLINIC PRM*

Process S.01. Data quality management of patient documentation

Activities:

- AS01.1. Identify the most relevant data quality characteristics/dimensions for health records (*actors involved: AMACC, clinical coding office managers, medical coder, researchers*)
- AS01.2. Define measurement methods to assess the levels of quality of health records (*actors involved: AMACC, clinical coding office managers, medical coder, researchers*)
- AS01.3. Analyze the root causes of inadequate levels of quality (*actors involved: AMACC, clinical coding office managers, medical coder, researchers*)
- AS01.4. To perform internal auditing of health records (*actors involved: clinical coding office managers*)
- AS01.5. Analyze the root causes of inadequate levels of quality (*actors involved: AMACC, clinical coding office managers, medical coder, researchers*)
- AS01.6. Improve the levels of quality of health records (*actors involved: hospital manager for clinical coding, clinical coding office managers, medical coder*)
- AS01.7. Generate data quality management reports for health records, with learnt lessons (*actors involved: clinical coding office managers*)
- AS01.8. To define standard auditing controls and processes for coded data (*actors involved: ACSS*)

Purpose of the process: The main aim of this process is to evaluate the level of the quality of the Health Record Documents.

Outcomes:

- Document with clearly defined audit process at national level for health records (ACSS).
- Document with clearly defined audit process at hospital level for health records (internal).
- Indicators/metrics to guide the evaluation of the quality of health records.
- Periodic health records auditing by national authorities (ACSS).
- Period health records auditing by local hospital authorities (internal).
- Reports on national health records auditing, including learnt lessons.
- Reports on local hospital health records auditing, including learnt lessons.

Work Products:

- Unified web-portal to monitor indicators/metrics of quality of health records and reports on national and local hospital health records audits.

Process S.02. Data quality management in coded data

Activities:

- AS02.1. To perform internal auditing of coded data according to established norms (*actors involved: clinical coding office managers*)
- AS02.2. To retrieve episodes with coding issues from SIMH (*actors involved: medical coder)*
- AS02.3. To correct (recode) and resubmit the episodes to SIMH (*actors involved: medical coder*)

- AS02.4. To define standard auditing controls and processes for coded data (*actors involved: ACSS*)

Purpose of the process: Once produced the data, the main aim of this process is to evaluate the quality of the resulting clinical coded data.

Outcomes:

- Document with clearly defined audit process at national level for coded data (ACSS).
- Document with clearly defined audit process at hospital level for coded data (internal).
- Indicators/metrics to guide the evaluation of the quality of coded data.
- Software applications to conduct internal auditing of coded data.
- Periodic coded data auditing by national authorities (ACSS).
- Period coded data auditing by local hospital authorities (internal).
- Reports on national coded data auditing, including learnt lessons.
- Reports on local coded data auditing, including learnt lessons.

Work Products:

- Unified web-portal to monitor indicators/metrics of quality of coded data and reports on national and local coded data audits.

Process S.03. Reference Data Management

Activities:

- AS03.1. To promote the regular dissemination of information on updates in ICD rules and guidelines, DRG grouping and other issues affecting daily clinical coding practices (*actors involved: Order of Physicians of Portugal, AMACC, hospital manager for clinical coding, clinical coding office managers*)
- AS03.2. To provide access to reference books, guidelines and other supporting materials for clinical coding (*actors involved: ACSS, hospital manager for clinical coding, clinical coding office managers*)

Purpose of the process: This process is aimed at maintaining the various reference data involved in the codification of the clinical data (e.g., ICD-10).

Outcomes:

- National Document on terminology transition, reference books, guidelines and supporting materials for clinical coding.
- Regular workshops/conferences to disseminate updated information on terminology transition, reference books, guidelines and supporting materials for clinical coding.

Work Products:

- Unified web-portal to search and access reference books, guidelines and supporting materials.

Process S.04. Technological Infrastructure Management

Activities:

- AS04.1. To manage and maintain all software and hardware resources that are used in every process within the clinical coding lifecycle (*actors involved: ACSS, SPMS, hospital managers, IT staff*)

Purpose of the process: The process is aimed at maintaining a catalogue of the training required for assuring that different workers can achieve the associated competences and skills required to do their job.

Outcomes:

- Document with information on the required software resources for clinical coding activities at hospital level.
- Document explaining the Information Systems and underlying architecture for implementing the required information flow.
- Document with hardware infrastructure requirements.

Work Products:

- Local hospital hardware infrastructure.
- Implemented Information Systems and underlying architecture.
- SClinico software application.
- Department level software applications.
- Internal auditing software applications.
- SIMH interface.
- National Database.

Other processes defined for the CODE.CLINIC PRM

Process O1. Healthcare taking process

Activities:

AO01.1. To report accurate and complete information in the admission note (e.g., symptoms, comorbidities), following the patient's admission (*actors involved: healthcare provider, IT staff, medical coder*)
AO01.2. To report accurate and complete information in the discharge notes (e.g., patient's diagnoses, treatment and disease progression), following the end of the episode (*actors involved: healthcare provider, IT staff, medical coder*)
AO01.3. To report accurate and complete information in the anesthesia report (*actors involved: healthcare provider, IT staff, medical coder*)
AO01.4. To report accurate and complete information in the surgical report (*actors involved: healthcare provider, IT staff, medical coder*)
AO01.5. To report accurate and complete information in the pathology report (*actors involved: healthcare provider, IT staff, medical coder*)
AO01.6. To report accurate and complete information in the nursing records (*actors involved: healthcare provider, IT staff, medical coder*)
AO01.5. To report accurate and complete information in the psychology reports (*actors involved: healthcare provider, IT staff, medical coder*)
AO01.6. To report accurate and complete information in the social services reports (*actors involved: healthcare provider, IT staff, medical coder*)

Purpose of the process: To generate administrative, clinical and demographic information that composes the origin of the coded data lifecycle.

Outcomes:

- admission note;
- Discharge notes;
- Anesthesia report;
- Surgical report;
- Pathology report;
- Nursing records;
- Psychology reports;
- Social services reports.

Work Products:

- Paper-based and electronic health records
- Department and services systems
- Sclinico software application
