## Section Four

# RESULTS

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# A-REVIEW 1

### Quality of Post-Acute Rehabilitation: A conceptual framework

### A1) Review Introduction

The US Institute of Medicine (IOM) launched in 2001 a landmark report defining the quality of healthcare as simultaneously effective, efficient, safe, timely, equitable, patient/family-centered. Furthermore, the report also brought wide attention to the need for developing aligned initiatives that, altogether, might be able to fundamentally transform healthcare quality at the systems, services, and healthcare levels [(1)]. Ever since, we have been assisting to a proliferation of quality-initiatives such as the development and implementation of:

- Strategies and priorities for quality aligned among stakeholders [(2; 3)];
- Innovative models of organization and reimbursement for quality and value [(4; 5)];
- Quality-measurement indicators consensually endorsed (e.g., *www.qualityforum.org*);
- Mechanisms of public-reporting of quality-data (e.g., *www.hopitalcompare.hhs.com*);
- Health-services, outcomes, and comparative effectiveness research-agendas informing stakeholders' decisions for quality (*www.ahrq.gov* and *www.pcori.org* as examples of funding bodies);
- Quality-improvement initiatives (e.g., see the 'improvement map' available from *www.ihi.org*), informed by advances of the improvement and implementation science [(6; 7)].

Quality is also a major issue in Postacute (PAC) Rehabilitation. For instance, in the US, the in-developing CARE tool (e.g., *www.pacdemo.rti.org*) will bring uniformity for the data-systems of different PAC Rehabilitation settings/levels (e.g., inpatient rehabilitation, skilled nursing facilities, home healthcare agencies). This upcoming tool might support quality by: collecting uniform data towards determining optimized PAC Rehabilitation care-trajectories and placement decisions; facilitating coordination and seamless transitions across sites; and finally by facilitating a uniform follow-up quality/outcomes-monitoring for the whole PAC Rehabilitation continuum. This uniform monitoring is crucial towards underpinning quality-aligned, site-neutral, payment mechanisms for the PAC Rehabilitation continuum or for the broader acute episodes-of-care [8; 9; 10; 11].

Despite these prospected structural advances, currently the PAC Rehabilitation quality-initiatives are far from being optimal. For instance, existent public-reporting and web-based comparing tools are still settings-specific, undermining cross settings comparisons on alternative PAC Rehabilitation pathways. Moreover, indicators applied seem very narrow, inaccurate, and unspecific toward reflecting a comprehensive level of PAC Rehabilitation quality [12]. Furthermore, these systems have also low perceived meaningfulness and adaptability to consumers' health-literacy levels, thereby bringing low value to the process of consumers' choice for rehabilitation providers [13]. Finally, at the healthcare frontlines, rehabilitation practitioners are increasingly called upon for implementing improvement-initiatives but - except few recently developed approaches [14; 15; 16] – there is a lack of PAC Rehabilitation-specific quality-improvement initiatives. Most existing improvement initiatives address quality-challenges of other healthcare areas (e.g., acute-care). When this kind of improvement-initiatives remains unspecific, and top-down imposed, the rehabilitation practitioners perceive suboptimal value, counter-productiveness, and easily mitigate them. Two major prescriptions can be pointed towards overcoming this 'quality paradox' [17].

First, such as happening within the general healthcare [2; 3], the PAC Rehabilitation quality-initiatives might benefit from plans, strategies, and priorities being aligned and consensually-endorsed by different stakeholders, so cross-stakeholders active-partnerships for quality and its improvement could optimally flourish in the field [18; 19]. Second, PAC Rehabilitation quality-initiatives need to be designed, developed, and

implemented specifically accounting for, and responding, to the unique philosophy, outcomes, care-approaches, and quality-challenges of the PAC Rehabilitation care, as well as the specific needs of their patients and families. However, it seems there are quality misconceptions and a fundamental lack of shared understanding of what PAC Rehabilitation quality specifically means for this specialty, which prevent optimized advances in the field of PAC Rehabilitation quality-initiatives [17].

## A2) Review Objective

At this scenario, we aim to develop a literature-based conceptual-framework of PAC Rehabilitation quality. The framework shall contain and organize the dimensions, constructs, and components that altogether could provide a comprehensive, yet parsimonious, picture and conceptual-understanding of PAC Rehabilitation quality, outlining what quality shall contemplate, or conceptually consist on, for this unique healthcare area. This kind of conceptual-framework, once consensually endorsed by stakeholders, might be able to outline what are the common conceptual targets for PAC Rehabilitation quality-initiatives.

## A3) Synthesis of the Methods

Underpinned by a set of conceptual foundations, we conducted a conceptual literature review supporting the development of our conceptual-framework. The literature review as based on the integration of principles from the scoping [20; 21], realist [22] and integrative [23] review approaches, as in-deep outlined in the section 'Methods'.

Referring to the conceptual foundations, and providing structure to the framework, we applied the parsimonious, intuitive, long lasting, and widely recognized Donabedian's S-P-O quality model (structure, quality, outcomes). Donabedian's model was previously applied by Eldar [24] in the only conceptual-framework we found regarding rehabilitation

quality. Despite useful, we partly build on it, Eldar's framework is dated from 1999, thus it does not account for the posterior empirical, technological, socio-political, and conceptual (e.g., World Health Organization's International Classification of Functioning or ICF [25]) advances observed in both healthcare and PAC Rehabilitation fields. The S-P-O model was previously used in rehabilitation also towards reviewing, organizing quality perspectives, outlining literature gaps, or even supporting health-services research [26; 27; 28; 29]. We build our conceptual-framework development over all these foundations, but further supported, updated, and complemented by information of the following literature.

Referring to the supportive literature review, the process began with exploratory searches in electronic databases, employing and mixing quality and rehabilitation related keywords. Based on these exploratory searches, we conducted a snowballing process (effective towards approaching wide, complex, and ill-defined subject matters [30]), following strategies of citation-tracking, references lists, and recommended references until a qualitative 'saturation' level of information could be reached for each axis, dimension, or construct under review [22]. Information retrieved was preliminary placed into evolving drafts and conceptual-maps of the paper towards being analyzed, organized, aggregated and synthesized. We additionally performed a data selection/reduction and a conceptual integrative synthesis over the information we add towards finally achieving an updated, integrative, comprehensive, but still parsimonious, conceptual-framework of PAC Rehabilitation quality - able to be understandable, organizing, and relevant across stakeholders groups [22; 31].

## A4) Review Results

Figures 2 & 3 overview and illustrate our S-P-O based conceptual-framework applied to the field of PAC Rehabilitation. The constitutive elements of the conceptual-framework, and its organization, are described and supported across the results in a step-wised and backwards fashion. Yet, we first outline the meanings and implications of the central positioning of *patients & families* in the conceptual-framework (fig.2).

### 1- Patient and Family Centrality

Healthcare and PAC Rehabilitation quality fundamentally exists for, is experienced by, and is delivered into active-partnerships and respectful interactions with *patients & families* towards addressing their unique needs This perspective puts *patients & families* (and broader sub-populations served) at the center of the quality framework, with the multiple meanings and implications below depicted.

First, to be considered of quality, any aspect of PAC Rehabilitation services and care needs to be, in some way or to some degree, reflected into positive outcomes of *patients & families*, including their experience in the concept of outcomes [32].

Second, beyond providers-based, quality and quality-initiatives might be patient/family-based. It means that quality might be framed for the level of whole services and care received and experienced by individuals and sub-populations through their healthcare journey (e.g., PAC Rehabilitation continuum or episode-of-care), beyond the discrete quality delivered by specific settings, providers, or interventions [1; 8].

Third, *patients & families* represent a central source for quality-definition (e.g., what quality means, or what elements of quality *patients & families* value the most) [33], for quality-evaluation (e.g., through filling consumers' experience measures, or through being early engaged into the development of patient-reported outcomes measures [34]), and a central source providing directions for quality-improvement (e.g., reporting quality-gaps or suggesting improvements) either directly or through representativeness [35; 36].

Fourth, *patients & families*, as consumers, have a central role for the effectiveness of the quality-movement by means of making quality-informed choice for providers, yet they need to be actively-engaged in the development, evaluation, and re-adjustment of the quality reporting-systems informing this kind of choices [13; 35].

Fifth, *patients & families* might perform active roles and hold a level of empowerment and accountability (e.g., self-management and rehabilitative engagement attitudes/behaviors) for the quality of their own-care and outcomes. Yet systems and

providers are still accountable to facilitate and activate an engagement with these tasks [2; 32; 35].

Sixth, services and care must be respectful with, and responsive to, the values, lived experience, interests, preferences, and finally the holistic needs (both clinical and psychosocial/emotional) of *patients & families*. This last feature completes the meaning of patient/family-centered quality outlined throughout this initial sub-section [1; 37]. However, cautiously, it does not refer to give, passively, all what *patients & families* may ask for soon at the outset, regardless of the value. Rather, it refers to the process of optimally engaging *patients & families* into respectful, emphatic, and caring interactions towards a mutually-informed and truly shared decision-making process, hopefully ending with a bilateral agreement on both meaningful and effective action to take [37; 38]. It is, therefore, a quality property necessarily underpinned by an optimized *interpersonal dimension* of care [39], which is later preliminarily shaped in this review, but further specified in the 1st review – Part B.

### 2- Outcomes Axis

According to the Donabedian's S-P-O model, healthcare processes and structures - to be of quality - need to be ultimately reflected into improved outcomes [32]. Our conceptual-framework of PAC Rehabilitation quality was, therefore, constructed and presented in a backwards or outcomes-based fashion (O-P-S sequence: outcomes, process, structure).

Outcomes refer to the positive effects healthcare produces into outcomes-variables, adjusted for case-mix, meaning clinical and contextual factors interfering with the prognosis [28; 32]. Accounting for the different time-frame of PAC Rehabilitation outcomes [24], the outcomes-axis was *priori* divided into two major categories (fig.2). First, a category of *macro-outcomes*, or delayed outcomes, which refers to the more distal, integrative, and ultimate outcomes of PAC Rehabilitation interest (e.g., taking place in the person's 'real' environment after-discharge). Second, a category of *immediate & intermediate outcomes* which refers to the preceding and smaller outcomes (e.g., occurring along with the length-of-stay) might be able to underpin and mediate the *macro-outcomes* achievement. The *immediate & intermediate outcomes* are, therefore,

those more proximally responding to the PAC Rehabilitation *process*, whereas their continuous monitoring can further inform *process* re-adjustments. This interaction can be represented by a mutually-adjusted and dynamic *continuum of process-outcomes* which might occur along with the whole PAC Rehabilitation length-of-stay [40], as illustrated into figure 2.

2.1 Macro-Outcomes (core-set)

According to these conceptual starting-points, a core-set of PAC Rehabilitation *macro-outcomes* is proposed before their putative determinants (immediate and intermediate outcomes, processes, and structures) can be defined.

Since PAC Rehabilitation is primarily a functional-oriented healthcare area, the ICF-based construct of *functional performance* [41] is the first *macro-outcome* framed [42]. *Functional performance* refers to the extent to which individuals actually execute or perform tasks (*activity*), as well as the extent to which individuals are involved in a life situation or are actively engaged with social roles (*participation*). These levels of *functional performance* are necessarily measured into the own patients' environment, accounting for 'real' environmental influences, particularly relevant for *participation* outcomes [43].

Despite a widely-recognized and endorsed framework, the ICF is however ambiguous on the conceptual and operational distinction among *activity* and *participation*, being particularly challenging to understand when *activity* ends and *participation* begins [44]. Empirics also have difficulties to solve this question. For instance, related sub-domains of these constructs can have stronger relationships among each other than with overall construct score [45]. Nonetheless, it seems that *activity* - despite still subject to preference-sensitiveness on the relevancy of the contained items [46] - has a more straightforward operationalization and gold standard measurement (e.g., FIM™); while advances at these levels are still being made for *participation*, underpinned by a conceptualization that is more comprehensive, multi-dimensional (objective and subjective dimensions), and finally determined at the dynamic intersection among the person-environment-task variables [44; 47; 48].

Beyond *functional performance*, there are other outcomes-variables which can be of ultimate PAC Rehabilitation interest, such as the patient Health-Related Quality of Life (*patient-HRQoL*): an 'umbrella' construct for patient-reported outcomes. *Patient-HRQoL* partly reflects functional-related variables or outcomes [49; 50], but the construct additionally covers other relevant outcomes-dimensions for an optimized disability recovery, such as the physical comfort (e.g. absence/lowered pain, fatigue, or sleep-disturbance), and the present of positive psychosocial adjustment outcomes (e.g., mental health, subjective well-being, or life satisfaction) [51; 52]. Finally, the use of population-specific *HRQoL* instruments can add specificity, meaningfulness, and sensitiveness to the measurement of this broad outcome-dimension which might not be achieved by general measures of *patient-HRQoL* [53; 54].

*Family/caregivers-HRQoL* is a different dimension we include in this core-set of PAC Rehabilitation *macro-outcomes*. It refers to the enhanced or facilitated adjustment of the caregiver and broader family towards the potential systemic impacts (e.g., own emotional impact; family-functioning changes; caregiver burden; or own reduced social functioning) which can result from the primary disability of patients undergoing PAC Rehabilitation care. This is an outcome-dimension increasingly seen as a relevant endpoint of PAC Rehabilitation [8; 55], as for instance addressed by a growing range of specific intervention-programs [56].

Another outcomes-dimension included is the construct *consumers' experience* (including both *patients & families'* experiences), which refers to an outcome increasingly used to assure the patient/family-centeredness of healthcare journeys. Moreover, it is an outcomes-dimension highly valued by consumers when they make quality-informed choices for providers [57]. The construct of *consumers experience* has gained predominance over the construct of consumers' satisfaction due being a more objective-report on key-aspects of optimized healthcare experiences (e.g. interpersonal dimension of care, access, perceived coordination), in contrast to the more subjective, and expectancy dependent, cognitive judgments associated with satisfaction ratings [58]. In the US, the CAPHS-measures (*http://cahps.ahrq.gov*) represent the standard to monitor *consumers experience* as differentiated by settings (e.g., hospitals, nursing homes, home healthcare agencies). Yet, no measure covers the PAC Rehabilitation specificity, nor it addresses its continuum of services, contrasting with envisioned policy for the field [8].

Finally, the final *place of* patient *discharge* (where and with whom) [59] is the last element included in this core-set of *macro-outcomes*. It is a variable often used as measure of rehabilitation effectiveness, for instance considering it might integrate *activity*/autonomy gains with the *environmental outcomes* further addressed. It is also an easy measurable construct and individual and societal relevancy to PAC Rehabilitation can be achieved when the discharge is made for the home or community. However, this is outcome heavily influenced by, and necessarily controlled for, many external-to-care environmental factors such as financial, housing, family, or broader societal constrains [60].

2.2 Immediate & Intermediate Outcomes

According to the ICF [41], the construct of *functional capacity* underpins the *functional performance* and refers to an underlying ability to function into a 'neutral' environment, regardless the facilitative/hindering role of contextual variables. The *functional capacity* outcomes might integrate gains into relevant clusters of *body structures & body functions,* which might be promoted for instance by rehabilitation therapies. In turn, the achievement of these functional outcomes seminally accounts for the successful management of clinical/biomedical variables (*biomedical outcomes*) such as a medical stabilization, prevention/management of disease recurrences, and prevention/management of co-morbid or secondary conditions (e.g., urinary tract infection, pneumonia, skin ulcers, dehydration, contractures, malnutrition, depression, anxiety, apathy, delirium, or pain) [24; 61]. The enhancement of these clinical variables can additionally support the biological ability (e.g., alertness, energy, endurance) towards engaging with rehabilitation therapies [61; 62].

A set of *environmental outcomes*, in addition to *biomedical* and *functional capacity* variables, also contribute towards the achievement of optimized PAC Rehabilitation *macro-outcomes*, as strongly conceptually emphasized [25; 63], but sub-optimally empirically studied [43]. The PAC Rehabilitation *environmental outcomes* can specifically refer to the enhancement of the facilitative, and the mitigation of the hindering, environmental factors. The PAC Rehabilitation *environmental outcomes* can mostly occur at the immediate person's environment, either at the physical or tangible environment (e.g., changed home/work physical environment, architectonic barriers

removed, assistive technologies added and trained), or at the level of attitudes or support (e.g., enhanced instrumental, informational, emotional support) provided by immediate relatives or caregivers [64]. Environmental factors of more societal scope may not be so easily addressed by PAC Rehabilitation care yet these might be still addressed, in case by policy action or community-based rehabilitation initiatives [65; 66].

Finally, a set of psychosocial and behavioral mediating variables (e.g., patient engagement with rehabilitation; patient/family's psychosocial responses towards disability) can influence (moderate or mediate) the achievement of a broad range of PAC Rehabilitation *macro-outcomes*. These variables become mediating *psychosocial & behavioral outcomes* if they influence the *macro-outcomes* achievement and if they are seminally shaped by the PAC Rehabilitation process - particularly its *interpersonal dimension* of care - in a dynamic interaction with personal and contextual variables (fig.2). This is an emergent issue in general healthcare [67], but sub-optimally addressed by the PAC Rehabilitation literature. This awareness gave origin to the development of the 1st review – part B, in which we specifically address this subject matter.

## 3- Process Axis

A process of quality refers to the actions of healthcare practitioners that ultimately result into improved or more relevant outcomes. We organized this process axis into four different, yet complementary, dimensions. The first two are the *technical* and the *interpersonal dimension*, both referring care dimensions, meaning those of direct interface and interaction with *patients & families* [32]; whereas the remaining are the *team-work* and *improvement processes*, both referring to underlying peer-based processes and interactions which are supportive of the previous others. Each dimension will be depicted below.

### 3.1 Technical Dimension of care

The *technical dimension* of care refers to the evocation, reasoning, articulation, application, transmission, and delivery of healthcare, specialized, and evidence-based

knowledge or interventions, tailored to patients/families' individual circumstances. The components for quality of this *technical dimension* can be further organized into the following categories [26; 68] (fig.2).

*Guidelines* refer to systematically developed statements which are built over an evidence-base, best practices, and consensus among experts or stakeholders. These statements point to standardized care directions or pathways addressing similar sub-sets of patients' needs. The on-going and further advancement of the granular knowledge and evidence-base assisted in the field [69; 70; 71] can be further translated into more specific practice *guidelines*, which are the ones that more easily achieve implementation into practice [72].

*Individualization:* Beyond oriented by evidence and guidelines, PAC Rehabilitation needs to be tailored and responsive to the unique set of individual patient/family's circumstances. This *individualization* refers to a complex reflective reasoning [73] which tailors the professional/scientific background, knowledge and typified mental scripts [74] to the unique clinical and holistic needs of patients/families. These latter were to be previously elicited, assessed, and abstracted with the help of the further outlined *interpersonal dimension* of care. Indeed, it is through this *individualization* component that the *interpersonal dimension* of care can directly support the quality of the *technical dimension* of care (fig. 3).

*Amount and Timing*: Initiation, timeliness, frequency, intensity, and duration of interventions (when, how much, and for how long) are increasingly seen as critical active ingredients of the PAC Rehabilitation technical care. For example, some evidence suggests that earlier and more 'aggressive' interventions can result in better functional outcomes for stroke rehabilitation [75]. However, knowledge about optimal *amount and timing* of interventions are far from being optimally known in the field, and are only more recently emerging in a more systematic way [76].

*Coordination of care*: refers to the articulation, combination, and interdependency of care activities which shall produce the whole quality of services and care the patients and families experience and receive, either from the rehabilitation-team as the unit of analysis (in case supported by the later outlined micro-system's *teamwork process*), or

from across the episodes of care, services continuum, or meso-system levels as later mentioned as a broader unit for the *improvement process*.

*Specific interventions* refer to discrete and granular-level of rehabilitation activities, techniques, or interventions. Hoenig and colleagues, through a systematic development approach, came to the following categories of rehabilitation interventions: exercise; adaptive techniques and assistive devices; physical modalities; prosthetics and orthotics; and education [26; 68]. Recently, more granular and discipline-specific intervention taxonomies for different treated conditions [77; 78] were developed as part of practice-based research projects. The aims were to build into the heterogeneity of practices towards finding what specific interventions (also its amount, timing, and their combinations) represent the most active and effective ingredients of the PAC Rehabilitation technical care [71; 79].

## 3.2 Interpersonal Dimension of care

The *interpersonal dimension* of care refers to how well practitioners - embedded into their regular healthcare encounters - relate, communicate, and interact with *patients & families* [32]. The *interpersonal dimension* of care can support a more individualized *technical dimension* (as mentioned), it is often a major determinant or component of *consumers' experience* and patient/family-centeredness [39; 80; 81], and finally it can seminally influence or shape the health-related outcomes of PAC Rehabilitation through mediation on a set of *psychosocial & behavioral outcomes* as depicted into the 1st review –Part B.

A PAC Rehabilitation *interpersonal dimension* of care of quality might hold basically the same categories of the *technical dimension* of care, except the *specific interventions* which is inherently a technical component. Those applied categories are now depicted.

*Guidelines*: In general healthcare, the *interpersonal dimension* of care is guided by several communication models which outline what functions, goals, tasks, or essential elements might be accomplished by an *interpersonal dimension* of care [82; 83]. However, the implementation and effectiveness of these guiding models – such as happening with

technical guidelines - can benefit from an enhanced specificity regarding the healthcare areas of appliance, as particularly illustrated by the conceptual, research, and practice advances in the cancer care communication made over the last decades [84]. Yet, in the PAC Rehabilitation field - which deals with complex as specific communication challenges as well - the advances being assisted are comparatively low and confined to few discrete examples [85; 86]. The 1st review part – B provides some specific preliminary guidance for the key-aspects of the PAC Rehabilitation *interpersonal dimension* of care to be further developed, depicted, assessed, and tested on its effective implementation and on the outcomes impact.

*Individualization*: Despite guided by overarching tasks or key aspects, an optimized interpersonal approach is necessarily adaptive and responsive to the patient's personal factors (e.g., values, lived-experience, culture, health-literacy); its clinical variables (e.g., cognitive/communication damage); and psychosocial variables such as an emotional processing of disability, which is seminally influenced by the providers' sensorial attentiveness, active listening, and further emphatic understanding of patients/families [87; 88].

*Amount and Timing:* At different *timings*, different interpersonal/communication approaches might be employed. For instance, an emphatic understanding, emotionally supportive interactions, and the building of a trusting, knowledgeable, and respectful relationship might precede any attempt to re-frame, or change, any fundamental cognition or behavior. Furthermore, in a matter of *amount*, the chronologic or objective time spent with patients/families generally varies according to *technical* demands. However, the task of spending the 'right' amount of time with patients/families might rather refer to a subjective quality time, measurable into 'units' of full-attentiveness, genuine interest, and emphatic concern [83]. Therefore being interpersonally effective, although requires training [89], does not necessarily require more chronologic time spent in front of patients, but rather a better and more intentional use of the regular healthcare interactions and communications [90].

*Coordination of Care*: The same way technical interventions need to be coordinated to achieve optimized outcomes, the *interpersonal dimension* of care should be articulated as well, so that the explicit content and underlying messages (e.g., about prognosis, expectations, care alternatives, empowering or supportive messages) are congruently

transmitted and reinforced by different attending professionals, rather than being unrelated, incongruent, and opposite to each other in the content and approach. This coordination of the interpersonal dimension of care shall enhance the likelihood of the messages being accurately perceived, assimilated, and further integrated by patients/families. This perspective posits that the ultimate impact of a PAC Rehabilitation *interpersonal dimension* of care might be on the interdisciplinary team-level of appliance [80; 86; 91].

## 3.3 Teamwork Process

PAC Rehabilitation is an ideally interdisciplinary specialty. This means that over and beyond the complementary and cumulative work of multiple disciplines involved (multidisciplinarity), the PAC Rehabilitation process might be also synergic coordinated, and mutually-adjusted among all practitioners (interdisciplinarity) [92; 93]. Therefore an optimized PAC Rehabilitation process also accounts for an underlying inter-professional *teamwork process*, referring to how well rehabilitation practitioners communicate, interact, and articulate with each other towards producing optimizing collective practices that better responds to the whole of patients/families' needs. This *teamwork process* is divisible, measurable, and a potential target for PAC Rehabilitation quality-improvement [15]. For instance, a cluster randomized trial following a sequence of studies was able to improve the functional outcomes for stroke rehabilitation though a teamwork training [94].

An optimized *teamwork process* is underpinned by an underlying team culture, characterized by a philosophy of interdependency, smooth inter-professional relationships, and finally a team leadership and a broader organizational atmosphere that fosters, values, monitors, and develops the team dynamics and team performance as a whole micro-system [92; 93; 95]. Moreover, team practitioners need to effectively communicate with each other towards coordinating their actions [93], which beyond partly accomplished by informal dynamics, might be further promoted by formal communication opportunities and structures such as: regular team meetings, use of uniform taxonomies and standardized clinical-registries [78], or even by the use of structured communication approaches [96].

3.4 Improvement Process

Besides doing care, providers are increasingly called upon to improve, meaning change, their practices and care for higher quality.

First, an *improvement process* can occur at the individual practitioner level, embracing a continuous professional growth, education, or development for an updated discipline-specific knowledge or competence. At this level, practitioners can also need to develop competencies in priority for healthcare quality-improvement in this healthcare era, such as evidence-base skills, quality/safety-improvement competence, systems-based and teamwork skills, or communication/interpersonal competence [2; 97; 98].

Second, an *improvement process* can occur at a micro-system level, referring to frontline healthcare teams producing the small unit of services and care delivered to, and experienced by, the same patient/family or sub-population [95]. This micro-system level, such as functional PAC Rehabilitation units or teams, can be composed of the interdisciplinary clinical staff, its leadership, administrative and ancillary staff. This unit can be empowered to be accountable for the tasks of planning, re-designing, monitoring and improvement the quality of their own level of services and care by the macro-system and their organizational quality-programs/journeys [95; 99].

Finally, the *improvement process* can occur at the level of extended 'service-lines' embedding multiple or sequential micro-systems which provide a continuum of services and care for broader episodes of care. Improved coordination, outcomes, and quality (including efficiency) for the level of whole episodes of care is a major healthcare priority for quality [2], and it can be promoted by prospected bundled payments [10], which might in turn foster the formal establishment of meso-system structures accountable for the leadership, planning/re-design, coordination, quality, and its improvement at the level of these continuums of services and care [100].

## 4- Structure Axis

According to theory [32] and applied evidence [27], the structure can influence outcomes mostly indirectly through mediation on the process of care. The structure, with

standards that can vary across PAC Rehabilitation settings, mostly refers to the underlying suitable conditions for the best PAC Rehabilitation processes can occur. These underlying structural conditions and attributes are below depicted [26; 68].

## 4.1 Personnel

PAC Rehabilitation settings might hold an adequate quantity and variety (interdisciplinarity) of licensed rehabilitation *personnel*. These professionals might hold and develop clusters of competencies we organized accordingly the previous process dimensions they might be able to underpin. We specifically refer to the:

- Technical competence: discipline-specific knowledge; evidence-based skills, assessment and technical reflective reasoning skills, as well as the intervention and execution skills [70; 73; 97];
- Interpersonal competence: communication, relationship, and interpersonal skills applied to the practitioners-patient/family's interface - including rapport, active listening, empathy, and applied partnership skills [82; 83; 88];
- Teamwork competence: inter-professional relationship and collaborative skills, interdisciplinary systems-based philosophy, teamwork culture, attitudes and behaviors, and finally teamwork leadership, activation, and integrative skills from the part of the team leader [92; 93; 94].
- Improvement competence: Readiness and ability towards systematically questioning, evaluating, comparing, and continuously engaging into the process of changing sub-optimal individual and collective habits/practices for the aims of continuously improving the patient/families' journey, experience, and outcomes [98]. From micro-system leaders, beyond the subject matter, the applied knowledge and skills from the fields of improvement and implementation process and science would be required as well [95].

## 4.2 Facilities & equipment

In addition to licensed and highly-competent *personnel*, rehabilitation processes also require or can benefit from the availability of state-of-the-science *facilities & equipment*

such as: simulated home-environments (e.g., adapted apartments, kitchens or bathrooms); facilitative architectonical design; material for rehabilitation activities/therapies; or advanced technological equipment for interventions (e.g., robotic equipments) [68; 101]. An optimized care process can further benefit of electronic infrastructures and software supporting an evidence-based decision-making, external consulting, networking, care coordination, or the timely register and access to clinical and intervention. Secondarily, this practice data, particularly when electronic-based, can be used also for quality-monitoring or practice-based research purposes [71; 102; 103; 104].

## 4.3 Organizational Management

Finally, the macro-system or organizational management might support quality to happen, or to be improved, at the healthcare frontlines through the development of organizational quality journeys or programs which can consist of [4; 95; 99; 105]:

- Investing in health information infrastructures and in the creation of a rich information environment.
- Building or sub-contracting quality and improvement expertise or resources towards supporting and enabling the development and implementation of internal quality and improvement initiatives.
- Applying quality-management approaches to the organization such as the total quality management; plan-do-study-act cycles; systems re-design, six-sigma, lean thinking management approaches, or mostly a blend of these and other quality and value enhancement approaches tailored to the organization context.
- Promoting functional-based organizational designs and decentralizing quality-accountability for the level of micro-systems or meso-systems structures meanwhile formally established, empowered, and enabled.
- Developing and implementing quality-aligned human-resources policies, including the creation of opportunities for the development of competencies or processes in need for improvement. It can also include the development and implementation of quality-aligned rewarding mechanisms.
- Developing a broader quality culture across the organization through actions that both explicitly and implicitly bring value to healthcare quality and its

improvement. This is primarily fostered through a committed organizational leadership for quality.

It is finally worth noting to mention that all these continuous and mostly transformational changes for quality would only optimally and widely occur if the external activity of policy, payment, accreditation, suppliers, research, and education, and other external-based systems come to align their incentives, culture, and support for healthcare quality and its improvement on a broader systems perspective [1; 2].

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