

D6.1 THE CATALAN DIGITALLY SUPPORTED INTEGRATED CARE SERVICES APPROACH ORIGINAL GOOD PRACTICE AND TRANSFER PROCESS

Annex document

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Table of abbreviations

B	Block
CF	Core Feature
DPO	Data protection Officer
EC	European Commission
EU	European Union
GDPR	General Data Protection Regulation
I(C)T	Information (and Communication) Technology
JA	Joint Action
LAP	Local Action Plan
LCF	Local Core Feature
LGP	Local Good Practice
NA	Next Adopter
NAWG	Next Adopter Working Group
OECD	Organization for Economic Co-operation and Development
oGP	Original Good Practice
PDSA	Plan Do Study Act
SIA	Strategic Intervention Areas
SMART	Specific Measurable Achievable Relevant Time-bound
SWOT	Strengths, Weaknesses, Opportunities, and Threats
WHO	World Health Organization

Annex 1A: Implementation reporting documentation of NAs

The Appendix 1A includes the reporting documentation of the four NAs of the Catalan Good Practice for the three phases of the implementation process:

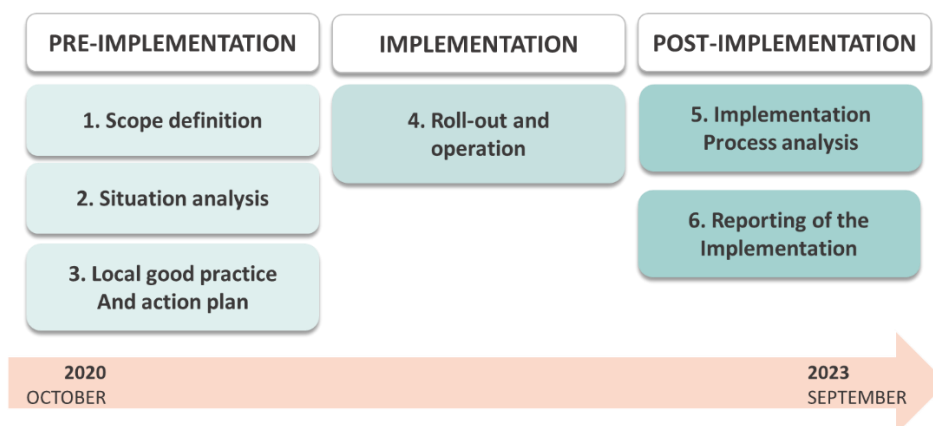


Figure 1: JADECARE three step Implementation Strategy

Pre-implementation

The objective of this phase is to elaborate the LGPs and the LAPs to be followed during the implementation by means of three activities:

- **Scope definition:** that implies selecting the CFs of the oGP(s) to be implemented and integrated in routine practice in each NA site. For this means, the NAs assessed the relevance and feasibility of the CFs of the oGP(s) in a four points scale, where 0=Not at all and 4= Extremely, and selected those to be implemented at the local site.
- **Situation analysis:** whose purpose is to analyse the organizational position of the NAs within the environment by conducting a SWOT analysis to then define its Strategic Intervention Areas (SIAs).
- **Definition of the LGPs and LAPs:** including the detail of the intervention designed: name of the good practice, target population, setting, main aim, general description, needed inputs, main components and expected outcomes and the concrete actions to be taken to deploy it, including each SMART objective, specific activities, actors, resources, settings(s), timeline and KPIs.

Implementation

It consisted on the execution and monitoring of the implementation by means of 2 Plan-Do-Study-Act (PDSA) Cycles, where the report of each step includes:

- **Plan:** a detail of the activities broken down into actions, actors, timeline and information on KPIs to assess them (target value and who/when and how will the data be collected).
- **Do:** information on the actual value of the KPIs compared to the planned target value, a summary of what was actually implemented and description of deviations, problems or unexpected findings, if any, as well as the implementation progress achieved until the moment.
- **Study:** the reasons for the deviations, mitigation actions implemented and their impact, considering the planned and actual KPI values.
- **Act:** the decision to maintain, adapt or abandon each activity as well any new proposed action for the future.

Post-implementation

The whole implementation was reported by each NA by means of the SQUIRE 2.0 adapted guidelines. It contains SQUIRE 2.0 contains 18 items to respond 2 general sections and 4 key questions: title and abstract, why did you start?, what did you do? , what did you find?, what does it mean? and other information

Marche Region, I (MARCHE)

Pre-implementation

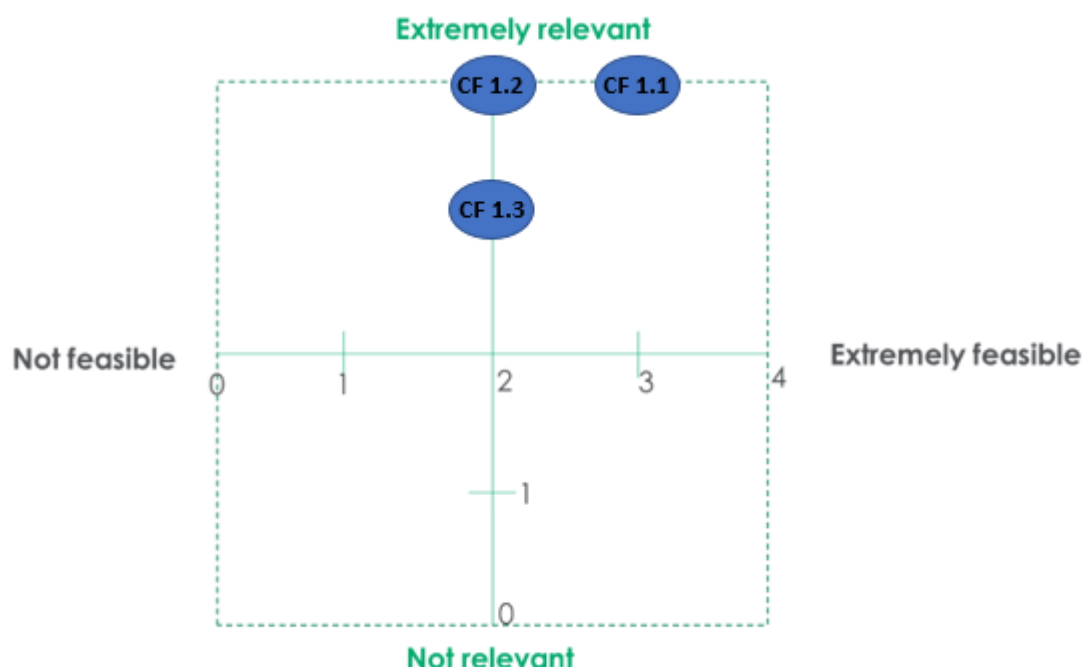
Scope definition

Identified and prioritized needs

Block	Prioritized needs
Block 1 - Health risk assessment: population-based and enhanced clinical decision making	Elaborate the health risk strata pyramid of the general population of Marche Region.
	Support decisions on healthcare services and policies.
	Identify subsets of patients with high risk of undesirable events that may require preventive interventions.

Assessment of Core Features

Core feature	Relevance	Feasibility
CF1.1 Assessment of transferability, and identification of steps for adoption, according to intellectual property rules, of the Catalan population-based risk stratification tool (AMG) into the ecosystem of the next adopter.	4	3
CF1.2 Health data management strategies	4	2
CF1.3 Development of enhanced risk prediction modelling for health policy purposes and/or clinical risk prediction	3	2



Final Core Features selected

CF1.1 Assessment of transferability, and identification of steps for adoption, according to intellectual property rules, of the Catalan population-based risk stratification tool (AMG) into the ecosystem of the next adopter.

CF1.2 Health data management strategies

CF1.3 Development of enhanced risk prediction modelling for health policy purposes and/or clinical risk prediction

Situation analysis

	Strengths	Weaknesses
Internal	<ul style="list-style-type: none"> Elaborating the health risk strata pyramid of the population is a target of interest at regional level. Chronicity analysis is a priority aspect at regional level (there are ongoing projects and initiatives on the same topic). The earthquake that Marche Region recently suffered and then COVID-19 pandemic situation gave a stimulus to further developments in digital healthcare, so there is a fully awareness of these aspects at regional level. Availability and accessibility of health data-flows will provide data potentially relevant for health risk assessment. Availability of a regional digital infrastructure for healthcare purposes. 	<ul style="list-style-type: none"> Lack of a health surveillance system already fitted for providing the data required for stratification and mainly based on primary care data. Lack of connection with primary care data. Heterogeneity of the devices and systems provided to professionals. Difficulty in the integration of the different healthcare information systems and heterogeneity of the data to be collected and processed. Difficulty in technology use due to limited specific skill in some professionals.
	Opportunities	Threats
External	<ul style="list-style-type: none"> Health risk assessment is an international and national challenge. Possibility to compare with other national and regional scenarios. Several ongoing projects and initiatives for the implementation of the recommendation provided by the Italian Recovery and Resilience Plan. Good practices implemented at regional level on the same topic. Cooperate to monitoring system implemented at national level based on some specific parameters. 	<ul style="list-style-type: none"> Regional healthcare system is under pressure due to the pandemic situation. Lack of national standards for the devices used by professionals. Bureaucracy complicates organizational processes. Privacy restrictions complicate data management and their sharing. Lack of training courses on new digital health issues.

Strategic Intervention Areas

Strategic intervention area	Priority	Ranking
Need to focus on the information available from our health information systems to understand which data are relevant as potential input for stratification	3	1
Need to arrange the information available from our health information systems, e.g., to focus on how we can obtain ICD-9 and ICD-10 codes	3	1
Need to manage the heterogeneity of the different healthcare information systems for data collection	2	2
Future evaluation of the possibility of setting up a collaboration with the primary care structure for data sharing	1	3

Definition of the LGP and LAP

Local Good Practice

Local Good Practice	A stratification tool for an effective management of chronic diseases in the Marche region	
Target population	The entire population of Marche region (~1,500,000 habitants)	Setting(s) The Regional Health System
Main aim		
To apply a population stratification tool to improve the efficiency of the Regional Health System and the quality of life of citizens by providing services that meet their needs.		
Outcomes	Local Core Features and their Components	Inputs
<ul style="list-style-type: none"> • Providing an in-depth analysis of the health status of the Marche population • Guaranteeing continuity of care throughout the region • Reorganising services based on the health needs of people suffering from chronic diseases. • Assessing the economic impact of the reorganisation of services for chronic diseases. 	<p>Implement a risk stratification tool based on adjusted morbidity groups (LCF1)</p> <ul style="list-style-type: none"> • criteria for local stratification model • data extraction and processing mechanisms • definition of care programs for each of the strata <p>Build a map/dashboard of citizens' health/risk and available services (LCF2)</p> <ul style="list-style-type: none"> • City/village/district indicators based on the GMA and/or chronic diseases. • Map available services in each area • dashboard for data visualization 	<ul style="list-style-type: none"> • Data • Staff • IT system • Funding • Decision-makers • Technical assistance
General description		
The intervention consists of setting up and testing a stratification tool for planning and decision-making purposes.		
Local Core Feature 1		
Component 1 is represented by the Catalan GMA population stratification algorithm, suitably adapted to the regional context and available health data. This tool will focus on chronic diseases and will make it possible to assess the population of the Marche Region placed in the higher sections of the Kaiser pyramid.		
Local Core Feature 2		
Component 2 envisages displaying on Marche region map the aggregated data from the stratification (and other indicators related to chronic diseases) as well as the available services to facilitate analysis and planning activities.		

Local Action Plan

Local Good Practice	A stratification tool for an effective management of chronic diseases in the Marche region	
Target population	The entire population of Marche region (~1,500,000 habitants)	Setting The Regional Health System

Main aim					
To apply a population stratification tool to improve the efficiency of the Regional Health System and the quality of life of citizens by providing services that meet their needs.					
General description					
The intervention consists of setting up and testing a stratification tool for planning and decision-making purposes.					
Related oGPs and CFs	Catalan Open Innovation Hub on ICT				
	Block 1: Health Risk Assessment:				
	CF1.1 Assessment of transferability, and identification of steps for adoption, according to intellectual property rules, of the Catalan population-based risk stratification tool (AMG) into the ecosystem of the next adopter.				
	CF1.2 Health data management strategies				
	CF1.3 Development of enhanced risk prediction modelling for health policy purposes and/or clinical risk prediction.				
Local Core Feature 1		Implement a risk stratification tool based on adjusted morbidity groups (AMG)			
SMART objective					
In the framework of JADECARE, Marche Region will set up a risk stratification tool based on GMA, which will support healthcare services programming, with a focus on chronic diseases.					
Activities	Actors	Resources	Setting(s)	Timeline	KPIs
Identify criteria for local stratification model	-Healthcare professionals -IT experts -Data scientists	Catalan GMA	Marche Region/Regional Health Agency	3 months (December 2021-February 2022)	List of criteria (Y/N)
Implement data extraction and processing mechanisms	-Healthcare professionals -IT experts -Data scientists	-Health data -IT infrastructure -Software	Marche Region/Regional Health Agency	6 months (March-August 2022)	-Database with required health data (Y/N) -Availability of IT infrastructure (Y/N) -% of data processed
Define care programs and services for each of the strata	-Healthcare professionals -Marche/ARS staff	NA	Marche Region/Regional Health Agency	4 months (July-September 2022)	Short report on care programs and services
Local Core Feature 2		Build a map/dashboard of citizens' health/risk and available services			
SMART objective					
In the framework of JADECARE, Marche Region will develop a map/dashboard allowing in-depth analysis of stratification data and available services for policy- and decision-making processes					
Activities	Actors	Resources	Setting(s)	Timeline	KPIs
Definition of indicators on stratification	-Healthcare professionals	NA	Marche Region/Regional	2 months (September-	List of indicators (Y/N)

and/or chronic diseases	<ul style="list-style-type: none"> -IT experts -Data scientists -Marche/ARS staff 		Health Agency	October 2022)	
Mapping of available services for chronic diseases in Marche Region	<ul style="list-style-type: none"> -Healthcare professionals -Marche/ARS staff 	Data on available services	Marche Region/Regional Health Agency	2 months (September-October 2022)	List of services (Y/N)
Set up of the dashboard for data visualization	<ul style="list-style-type: none"> -Healthcare professionals -IT experts -Data scientists -Marche/ARS staff 	Subcontract for the dashboard	Marche Region/Regional Health Agency	6 months (June-November 2022)	Availability of the dashboard (Y/N)
Identification of policies and interventions at regional level to support implementation and sustainability of the LGP	<ul style="list-style-type: none"> -Project manager -Marche/ARS staff -Regional policy representatives 	NA	Marche Region/Regional Health Agency	2022-2023	List of policies and interventions (Y/N)

Implementation

1st PDSA Cycle

Plan

LCF1	Implement a risk stratification tool based on adjusted morbidity groups (AMG)							
Activities	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Identify criteria for local stratification model	Define the cohort study based on chronicity, comorbidities and vulnerability	-Computer specialist -IT experts -Healthcare professional -Data scientists	1/12/21 to 31/03/22	List of criteria used for the stratification (Y/N)	Project Manager	31/03/22	Utilising information technology systems	Yes
	Define sources of stratification criteria:						Monitoring during the monthly follow-up meetings	
	1. ICD-9CM and ICD-10CM, from administrative health databases: Drugs, Hospital admission, Emergency and Urgency, Homecare, Exemption, Mortality registry.							
	2. National and regional criteria of extremely frail and vulnerable patients, in Covid-vaccination booking							
Activity 2: Implement data	Analysis of algorithm's preliminary results (strings' control and data validation)	-Computer specialist	01/03/22 to 30/04/22	-Database with required health data (Y/N)	Project manager	30/04/22	Utilising information technology systems	Yes
	Standardize variables format based on algorithm for stratification							

extraction and processing mechanisms	Automating the data extraction and validation process	-IT experts	01/05/22 to 31/07/22	-Availability of IT infrastructure (Y/N)		31/07/22	Monitoring during the monthly follow-up meetings	
	Implement algorithm tool	-Healthcare professional	01/08/22 to 31/08/22	-% of data processed		31/08/22		
Activity 3: Define care programs and services for each of the strata	Elaborate population management strategies for GMA 1,2,3,4, starting with health promotion, to case management strategy, focusing on chronic diseases management	-Healthcare professional -Marche/ARS staff	31/07/22 to 30/09/22	Short report on care programs and services (Y/N)	Project manager	30/09/22	Relying on specific evaluation and guide from healthcare professionals Monitoring during the monthly follow-up meetings	Yes

Do

Cycle number (1 or 2)	1	
Activity	KPI	Actual value
LCF 1 – Activity 1: Identify criteria for local stratification model	List of criteria used for the stratification (Y/N)	Yes
LCF 1 – Activity 2: Implement data extraction and processing mechanisms	Database with required health data (Y/N)	No
	Availability of IT infrastructure (Y/N)	N.A. (Expected during PDSA 2)
	% of data processed	N.A. (Expected during PDSA 2)
LCF 1 – Activity 3: Define care programs and services for each of the strata	Short report on care programs and services (Y/N)	N.A. (Expected during PDSA 2)

QUESTIONS		ANSWERS		
What was actually implemented? Any deviation from the planned actions		Main achievements of PDSA1 are: <ul style="list-style-type: none">- identification of data sources as input for the GMA- evaluation of the quality of the health data of Marche region- evaluation of the applicability of the GMA in Marche Region- preliminary analysis of the health status of Marche citizens.		
		Some deviations occurred: there were some delays due to the internal reorganisation and administrative procedures for personnel recruitment. Transfer of the algorithm and related documentation took more time than expected due to authorization procedures at the oGP site. The order of actions under Activity 2 changed after technical evaluations.		
Problems? Unexpected findings? Please describe		Some problems/challenges occurred due to the internal reorganisation and the overburdened personnel. Access and management of the administrative health databases is challenging due to privacy restrictions, authorizations, IT issues. However, these issues are constantly monitored and partially solved.		
		Main barrier to the full implementation of the tool is the GDPR application in Italy.		
		As regards unexpected findings, we can acknowledge the great results obtained during the pilot test with the GMA.		
IMPLEMENTATION PROGRESS OF THE LOCAL GOOD PRACTICE				
0-25%		25-50%	50-75%	75-100%

	x		
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Study

Cycle number (1or 2)		1				
Activity	KPI	Target value	Actual value	Reasons for the deviations	Mitigation actions implemented	Impact of mitigation actions
LCF 1 – Activity 1: Identify the criteria for local stratification model	List of criteria used for the stratification (Y/N)	Yes	Yes			
LCF 1 – Activity 2: Implement data extraction and processing mechanisms	Database with required health data (Y/N)	Yes	No	Some delay due to the internal reorganisation and administrative procedures for personnel recruitment. Transfer of the algorithm and related documentation took more time than expected due to authorization procedures at the oGP site. The order of actions under Activity 2 changed after technical evaluations	Monitoring of the recruitment procedures and collaboration with the administrative offices to speed up the process. Reorder of the activities while waiting the algorithm.	Personnel was successfully re-recruited. The new order of the activities increased the efficiency of the plan.
	Availability of IT infrastructure (Y/N)	Yes	N.A. (Expected during PDSA 2)			
	% of data processed	100%	N.A. (Expected during PDSA 2)			
LCF 1 – Activity 3: Define care programs and services for each of the strata	Short report on care programs and services (Y/N)	Yes	N.A. (Expected during PDSA 2)	Not yet started		

Act

Cycle number (1 or 2)	1		
Activity	Maintain	Adapt	Abandon

LCF 1 – Activity 1: Identify criteria for local stratification model	X		
LCF 1 – Activity 2: Implement data extraction and processing mechanisms		X - The order of the actions needs to be changed due to technical	
LCF 1 – Activity 3: Define care programs and services for each of the strata		X - Timing of the actions needs to be extended. Alignment with National/regional guidelines currently in progress is needed.	

QUESTIONS	ANSWERS
Any new proposed action for the future?	Pilot testing of GMA implementation

2nd PDSA Cycle

Plan

LCF1	Implement a risk stratification tool based on adjusted morbidity group (GMA)							
Activities (from the LAP)	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Implement data extraction and processing mechanisms	Automating the data extraction and validation process	-Data analysts -IT experts	01/04/22 to 31/08/22	1.Database with re-quired health data (Y/N)	Project manager Data Analyst	31/08/2022	Utilising infor-mation technol-ogy systems	1.Yes
	Standardize variables format based on algorithm for stratification	-Technicians Healthcare professionals		2.Short report on quality check (Y/N)		30/09/2022	Monitoring during the weekly/monthly follow-up meetings	2.Yes
	Pilot test of algorithm			3.Procedure for data extraction (Y/N)		30/11/2022		3.Yes
	Implement algorithm tool			4. Short report on pi-lot test results (Y/N)		31/01/2023		4.Yes
				5.Integration of the tool in the regional IT infrastructure (Y/N)				5.Yes
Activity 2: Define care programs and services for each of the strata	Elaborate population management strategies for GMA strata, starting with health promotion, to case management strategy, focusing on	-Healthcare professionals -Marche/ARS staff	01/09/22 to 30/11/22	Guidelines on population management strategies (Y/N)	Project manager	30/11/22	Relying on spe-cific evaluation and guidance from healthcare professionals Monitoring during the	Yes

	chronic diseases management						monthly follow-up meetings	
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LCF2	Build a map/dashboard of citizens' health/risk and available services							
Activities (from the LAP)	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Definition of indicators on stratification and/or chronic diseases	Mapping of relevant indicators at National/Regional levels	-Healthcare professionals -Data analysts	01/09/22 to 30/09/22	List of indicators (Y/N)	Project manager	30/09/22 31/10/22	Monitoring during the weekly/monthly follow-up meetings	Yes
	Development of new/revision of existing indicators	-IT experts -Marche/ARS staff	01/10/22 to 31/10/22					
Activity 2: Mapping of available services for chronic diseases in Marche Region	Collection of databases/registries of health and social care facilities/services (e.g. community services, hospitals, residential and semi-residential facilities), including info on sources, timing of updates, classification and users	Marche/ARS staff	01/09/22 to 30/11/22	List of facilities/services (Y/N)	Project manager	30/11/22	Monitoring during the weekly/monthly follow-up meetings	Yes

Activity 3: Set up of the dashboard for data visualization	Revision of available platforms and definition of technical requirements	-Marche/ARS staff -Healthcare professionals	01/07/22 to 30/09/22	Availability of the dashboard (Y/N)	Project manager	31/12/22	Monitoring during the weekly/monthly follow-up meetings	Yes
	Implementation of the dashboard	-Data analysts -IT experts	01/10/22 to 31/12/22					
Activity 4: Identification of policies and interventions at regional level to support implementation and sustainability of the LGP	Monitoring and analysis of relevant National/Regional guidelines, laws, plans	-Marche/ARS staff -Healthcare professionals	01/04/22 to 30/09/23	Sustainability plan (Y/N)	Project manager	31/12/22	Monitoring during the monthly follow-up meetings	Yes
	Definition of a sustainability plan for the integration of the tool in the decision-making process	-Data analysts -Regional policy representatives	01/09/22 to 31/12/22					

Do

Cycle number (1 or 2)	2	
Activity	KPI	Actual value
LCF 1 - Activity 1: Implement data extraction and processing mechanisms	Database with required health data (Y/N)	Yes
	Short report on quality check (Y/N)	Yes
	Procedure for data extraction (Y/N)	Yes
	Short report on pilot test results (Y/N)	Yes
	Integration of the tool in the regional IT infrastructure (Y/N)	Yes (partially)
LCF 1 - Activity 2: Define care programs and services for each of the strata	Guidelines on population management strategies (Y/N)	Yes
LCF 2 - Activity 1: Definition of indicators on stratification and/or chronic diseases	List of indicators (Y/N)	Yes
LCF 2 - Activity 2: Mapping of available services for chronic diseases in Marche Region	List of facilities/services (Y/N)	Yes
LCF 2 - Activity 3: Set up of the dashboard for data visualization	Availability of the dashboard (Y/N)	No (Ongoing, preliminary structure of the dashboard available)
LCF 2 - Activity 4: Identification of policies and interventions at regional level to support implementation and sustainability of the LGP	Sustainability plan (Y/N)	Yes

QUESTIONS	ANSWERS
What was actually implemented? Any deviation from the planned actions	<p>Main achievements of PDSA2 are:</p> <ul style="list-style-type: none"> - complete database of regional population, through the linkage of administrative health databases (Hospital discharges, Emergency & Urgency, Home care, Exemptions, population registry) - quality evaluation of health data with identification of improvement actions (through quality reports and experts' opinion) - report on population stratification, gained through GMA's first application. - structure of a dashboard for indicators and data visualization - guidelines of population management's strategies, through new National/Regional regulations

	<p>Some deviations occurred: there were some delays due to the complexity of the data preparation phase. Administrative health care databases' analysis and linkage took more time than expected due to their complexity and to the need of conducting data quality evaluation with health databases' experts. For this reason, the integration with the Regional IT system was delayed but partially achieved (completion expected in one month). Ongoing reorganisation of the regional healthcare system had an impact on some tasks due to overburdened personnel and for the ongoing changes in the IT systems.</p> <p>The setting up of dashboard is complex, in terms of statistical computing and clinical relevance. Previous plans on reusing internal tools were abandoned (for the time being) because of changes in the organisation and time restrictions. Dashboard and indicators are being defined, also with the support of the oGP but the implementation is still ongoing, and it will continue during the post-implementation phase.</p>
Problems? Unexpected findings? Please describe	<p>Some challenges occurred due to the data complexity. Indeed, the management of the administrative health databases is challenging due to privacy restrictions, authorizations, IT issues. However, these issues are constantly monitored and partially solved. Main barrier to the full implementation of the tool is the GDPR application in Italy, still under debate.</p> <p>As regards unexpected findings, we can acknowledge the great interest of healthcare managers in the project and their fruitful collaboration during the quality check and indicators/dashboard development phases. Indeed, quality data evaluation showed the need to conduct further analysis and insights of healthcare databases. Moreover, the fruitful discussions enhanced the identification of relevant aspects for healthcare services programming which will be considered in the next implementation period.</p> <p>The data preparation phase was very challenging but, in the end, the results achieved confirmed the great potential of the tool. Moreover, we succeed to include the preliminary results of the algorithm in a Regional Deliberation on the adoption of the new National standards of community healthcare services, as a part of the regional implementation of the Recovery and Resilience Plan.</p>

IMPLEMENTATION PROGRESS OF THE LOCAL GOOD PRACTICE			
0-25%	25-50%	50-75%	75-100%
			x

Study

Cycle number		2				
Activity	KPI	Target value	Actual value	Reasons for the deviations	Mitigation actions implemented	Impact of mitigation actions
LCF 1 - Activity 1: Implement	Database with required health data (Y/N)	Yes	Yes			

data extraction and processing mechanisms						
	Short report on quality check (Y/N)	Yes	Yes			
	Procedure for data extraction (Y/N)	Yes	Yes			
	Short report on pilot test results (Y/N)	Yes	Yes			
	Integration of the tool in the regional IT infrastructure (Y/N)	Yes	Yes (partially)	Delay due to longer time needed to complete previous activities and overburdened personnel	Reorganization of the activities	Gain time to set up the server
LCF 1 - Activity 2: Define care programs and services for each of the strata	Guidelines on population management strategies (Y/N)	Yes	Yes			
LCF 2 - Activity 1: Definition of indicators on stratification and/or chronic diseases	List of indicators (Y/N)	Yes	Yes			
LCF 2 - Activity 2: Mapping of available services for chronic diseases in Marche Region	List of facilities/services (Y/N)	Yes	Yes			
LCF 2 - Activity 3: Set up of the dashboard	Availability of the dashboard (Y/N)	Yes	No (Ongoing, preliminary structure)	Delays in the data preparation phase; need to revise	New option under development	Enhancing implementation of the activity

for data visualization			of the dashboard available)	previously planned plans		
LCF 2 - Activity 4: Identification of policies and interventions at regional level to support implementation and sustainability of the LGP	Sustainability plan (Y/N)	Yes	Yes			

Act

Cycle number (1 or 2)	2		
Activity	Maintain	Adapt	Abandon
LCF 1 - Activity 1: Implement data extraction and processing mechanisms		X - Additional activities are foreseen in the following months to: revise and simplify data preparation procedure; complete integration into IT system	
LCF 1 - Activity 2: Define care programs and services for each of the strata	X - Activity completed. Need to be monitored according to reorganization of the healthcare system and new regulations on healthcare services.		
LCF 2 - Activity 1: Definition of indicators on stratification and/or chronic diseases	X - Activity completed. Need to be monitored to address new needs of healthcare managers and policymakers according to National requirements and reorganization of the Regional healthcare system.		
LCF 2 - Activity 2: Mapping of available services for chronic diseases in Marche Region	X - Activity completed. Need to be monitored according to reorganization of the healthcare system and new regulations on healthcare services.		

LCF 2 - Activity 3: Set up of the dashboard for data visualization		X - Timing of the actions needs to be extended, to analyse in detail different options of data visualization and find the most suitable solution for our context. It is foreseen the prosecution of the activity in the following months.	
LCF 2 - Activity 4: Identification of policies and interventions at regional level to support implementation and sustainability of the LGP	X - Activity continuously progressing.		

QUESTIONS	ANSWERS
Any new proposed action for the future?	<p>TECHNICAL/OPERATIVE ACTIONS:</p> <ul style="list-style-type: none"> • <u>Improvements in technical and graphic part of the dashboard</u>, also through development of maps to visualize healthcare services that will be activated based on recent social and health planning regulations (at national and regional level). • <u>Revision of Indicators in alignment with the needs of experts in the various healthcare sectors, e.g. through regular updating</u>, and evaluation of their presentation modality at a higher level of detail (if possible, according to GDPR regulation). • <u>Addition of further healthcare databases for AMG and indicators' computing (e.g.: hospice database)</u>, to make the data more accurate and to add information potentially relevant. • <u>Make it a useful tool for regional and clinical managers</u> for close monitoring of population's health status and resources consumption, with possible comparison and benchmarking activities. • Implementing of the dashboard in order to comply with the requirements of recent national and regional regulations regarding the <u>stratification mandate</u>. <p>SUSTAINABILITY ACTIONS:</p> <ul style="list-style-type: none"> • Enhancing and maximising AMG and dashboard's potential through <u>definition of a roadmap</u> to enhance its use as a tool for regional and clinical managers, e.g., for programming and implementing healthcare policies and services, process of budget and resources application, supporting investment in prevention and continuity of care (such as territorial operative centres, community hospitals and houses, home care, family nursing, palliative care, and telemedicine) • Defining further analysis and actions to improve the quality and completeness of healthcare data. <p>Disseminating data culture in institutions, raising awareness of the health care professionals on proper reporting of information</p>

Post-implementation

ITEM	ANSWER
Title and abstract	
Title	A stratification tool for an effective management of chronic diseases in the Marche region
Abstract	<p>The intervention consists of setting up and testing a stratification tool for planning and decision-making purposes and includes 2 components.</p> <p>Component 1, namely Local Core feature 1 (LCF1), is represented by the Catalan AMG population stratification algorithm, suitably adapted to the regional context and available health data. This tool will focus on chronic diseases and will make it possible to assess the population of the Marche Region placed in the higher sections of the Kaiser pyramid, aimed at supporting healthcare services programming.</p> <p>Component 2, namely Local Core feature 2 (LCF2), envisages displaying on Marche region dashboard the aggregated data from the stratification (and other indicators related to chronic diseases) as well as the available services. This tool will facilitate in-depth analysis of stratification data and available services for policy- and decision-making processes.</p> <p>These LCFs are conducted over two successive cycles of activity, composed each one of 4 different phases, namely Plan-Do-Study-Act (PDSA1 and 2).</p>
Why did you start?	
Problem description	<p>The local problems that led Marche Region to study and implement the selected Local Good Practice (LGP) are: high burden of non-communicable diseases (NCDs) and the need to manage more efficiently patients affected by them; the presence of remote areas, some of them strongly affected by the earthquake, where a high prevalence of older people lives; the need to identify subsets of patients with high risk of undesirable events; the necessity of supporting decision-making activity on healthcare services and policies; the need of analysing the use of healthcare resources. These necessities are linked to the obligations to be fulfilled, consistent with national regulations (the National Plan for Chronicity, the Italian Recovery and Resilience Plan and related regional laws), according to which population stratification is a prerequisite for healthcare planning.</p>
Available knowledge	<p>NCDs are the most relevant cause of disease burden, accounting for the largest part of countries' healthcare expenditures (representing 0.8% of Gross Domestic Product every year (OECD/EU 2016)) and are responsible for approximately 86% of premature deaths worldwide (WHO, 2014). NCDs also entail other societal costs, such as loss of productivity, loss of workforce, loss of informal care, costs of social insurance and social care (Public Health, 2022).</p> <p>In Italy, NCDs represent the 90.6% of causes of death in 2019, especially in relation to ischemic heart diseases, stroke, Alzheimer's disease, and cancer (WHO, 2020).</p> <p>NCDs are highly represented in the Marche region: 41.5% of citizens is affected by at least one NCD, and 22% of population suffers of multimorbidity. NCDs especially afflict older people, with 60.4% being affected by at least one NCD in and 23.7% suffering of multimorbidity (Health profiles Marche Region, 2021). In the Marche region, the most prevalent NCDs are hypertension (18.3%), arthritis/arthritis (16.7%), allergic diseases (9.9%), osteoporosis (8.2%), chronic bronchitis and bronchial asthma (6.7%) and diabetes (5.8%) (surveillance data referred to 2019) (Health profiles Marche Region, 2021).</p>

	<p>An effective NCDs management, implemented nowadays worldwide and in Italy (Ferrara et al. 2022), includes: community health centre-based primary care, enhancement of General Practitioner's role supported by digital system of data collection; a facilitated journey of multimorbid patients among healthcare organizations through integrated care models (such as transitional care models, discharge management models, and nurse transition models), integrated care pathways and telemedicine. The identification of social health needs, models of care, the planning of healthcare services', an efficient management of health resources and the development of a monitoring system, especially for the most complex and older patients, could be met through population stratification activity (Barrio-Cortes BMC 2021).</p> <p>At international level, the most implemented tools for population stratification are the Charlson index (Huntley et al. 2012), the number of CDs (HUCUP 1-2020) (HCUP 2-2020), the Clinical Risk Groups (CRG) (Hughes et al 2004), and the AMG (Adjusted Morbidity Groups) (Dueñas-Espín et al. 2016) (Monteverde et al. 2020). In Italy, some regions started to develop and implement these tools taking advantage of the ICD-9/ICD-10 codes (WHO, 1992), obtained from the administrative healthcare databases (Abraha et al., 2014) (HADs, e.g. population registry, hospital discharge records, drug prescriptions, exemption from healthcare co-payment, ambulatory care-services, emergency department). During the last ten years, HADs, which routinely collect patient-level information on healthcare services provided by the Italian universal healthcare system, have been increasingly used for epidemiological purposes (Dalla Zuanna et al., 2019), measuring diseases prevalence and occurrence. Veneto (Corti, 2017), Lombardia (Andreoni & Russo, 2017), Emilia-Romagna (Emilia Romagna Health Agency, 2018) and Toscana (Tuscany Regional Health Agency, 2019) carried out relevant experiences in the elaboration or adoption of stratification tools based on HADs (Canova et al. 2019).</p> <p>However, the above experiences are not yet fully implemented in practice because of privacy issues raised by the National Regulatory Body, currently under discussion at National level with the Ministry of Health</p>
Rationale	<p>Dynamic health-risk assessment through individual health-risk predictive models, allowing optimal patient allocation in healthcare system, should be addressed to improve health outcomes (Baltaxe et al. 2019), to support healthcare policy decisions and allow a monitoring program at population level (Di Domenicantonio et al. 2019). The application of holistic strategies for subject-specific stratification, incorporating multilevel determinants of health (e.g., socioeconomic, lifestyle, behavioural, clinical, physiological, cellular, and omics information), properly pave the way toward personalized medicine for complex chronic patients (Baltaxe et al. 2019), to a greater extent than approaches based only on demographics (Monterde et al. 2020), and on patients' referred data (Wallace et al., 2014). Healthcare administrative data (HADs) are a relevant source of information for these purposes (Di Domenicantonio et al. 2019). In details, Italian HADs have the potential to address relevant questions about quality performance and health services research (Colais 2013) and epidemiology (Gini et al. 2013), with a potentially high impact on public health policy and health care spending (Abraha et al. 2014).</p> <p>Marche region has a consolidated digital infrastructure to collect HADs and, in recent years, implemented devoted actions to improve quality of the data, according to National recommendations. However, unlike other national and regional contexts, a stratification tool is not yet implemented in Marche Region, where decisions in healthcare services' programming are nowadays based on fragmented data derived from HADs, not linked one to another, limiting HAD's potential.</p>

	<p>Between the available tools, literature has shown the validity of AMG in stratification of chronic patients into different risk levels in the general population (Monteverde et al., 2016; Barrio-Cortes BMC 2021), representing a part of the strategies of care for patients with NCDs (Ministry of Health-Spain, 2018). In fact, comparisons among the different multimorbidity measures indicate that AMG provided better discrimination and predictive power than other multimorbidity measures, also showing a higher applicability (Monterde et al. 2020), because of its flexibility and transferability (Dueñas et al 2016). The AMG, a population classification case-mix tool, allows grouping of chronic patients according to their morbidity and complexity into mutually exclusive categories on the basis of their level of risk, following the Kaiser Permanente pyramid model (chronic patients with high risk, medium risk, low risk, and without relevant chronic pathology) (González et al., 2017). According to AMG risk levels, primary care health professionals determine the care plan to implement, offering (Barrio-Cortes et al. 2021) an optimal and personalised management of patients' health care needs. The AMG tool is a publicly owned algorithm, described as highly flexible and already implemented in almost all Spanish regions. Moreover, the Spanish Healthcare System has some similarities with the Italian one, facilitating the adoption of the tool in our context.</p> <p>The above conditions/aspects triggered the decision of Marche Region to choose the Catalan oGP and to develop the intervention.</p> <p>In details, Marche Region has a tangible possibility to develop risk assessment strategies, because of the availability of regional HADs and a proper digital infrastructure, that make it possible to invest and apply the methodology for the transfer of the LGP, relevant for supporting decisions on healthcare services and policies (Barbabella et al. 2017). Moreover, analysis and management of administrative health databases is a strategic intervention area for Marche Region.</p>
Specific aims	To apply a population stratification tool to improve the efficiency of the Regional Health System and the quality of life of citizens by providing services that meet their needs . The intervention focuses on the management of chronic diseases .
What did you do?	
Context	<p><i>The EU and Italian</i> contextual elements that encourage the applicability of the good practice are the followings: health risk assessment as an EU and national challenge; the possibility to compare with other national and regional scenarios; the coexistence of several ongoing projects related to the intervention (e.g. the Italian Recovery and Resilience Plan); the coexistence of good practices implemented at regional level on the same topic; the need to cooperate to monitoring system implemented at national level based on some specific parameters (LEAs). At <i>regional</i> level, the aspects that could positively influence the implementation of the LGP are the interest in adopting population health management tools; the ongoing projects/initiatives on management of chronic diseases; the recent developments in digital healthcare, also due to the 2016 earthquakes and the COVID-19 pandemic; the availability and accessibility of administrative health databases and of the regional digital infrastructure.</p> <p>On the other hand, the most relevant <i>EU and Italian</i> contextual elements that could negatively impact the LGP implementation are criticalities due to the COVID-19 pandemic; bureaucratic procedures; the limits due to privacy restrictions on data management and sharing; the lack of training courses on new digital health issues. At <i>regional level</i>, contextual elements that could negatively influence the implementation of LGP are: the lack of a health surveillance system already fitted for providing the data required for</p>

	stratification; the lack of connection with primary care data; the heterogeneity of the devices and systems provided to professionals; the difficulty in the integration of the different healthcare information systems and heterogeneity of the data to be collected and processed; the difficulty in technology use due to limited specific skill in some professionals.
Intervention(s)	<p>The intervention includes two main phases: 1) to set up and test the population stratification tool (i.e. the Catalan AMG algorithm) for planning and decision-making purposes, with a focus on NCDs; and 2) to develop a dashboard to visualize aggregated data derived from the stratification and other health-related indicators. The target population is the entire population of Marche region (~1.500.000 persons).</p> <p>The first phase started with the analysis of the Catalan AMG algorithm requirements as well as the study of the structure and content of the regional administrative health databases to identify the criteria for data selection. A preliminary test of the applicability of the algorithm was carried out by sharing anonymized data with the oGP and analysing output file of the AMG tool. This task was followed by data preparation procedures. Access to and analysis of the data was carried out in compliance with the Data Protection Regulation (GDPR), involving the Data Protection Officer (DPO) for a preliminary assessment. The procedure, while respecting a homogeneous structure, was carried out separately for each HAD in order to adapt to their different specificities and structure, i.e. identifying the necessary fields, coding and linking the various tables in the case of multi-part databases. Original data from selected HADs were extracted and pseudo-anonymized by technical staff and stored in a devoted safe folder in csv format. All the HADs were stored as .zip files and directly read and unzipped by the software. For performance reasons, some of the HADs with bigger size were pre-processed (i.e. selecting only relevant fields) and stored as smaller versions. After extracting the data necessary for the algorithm (patient code, diagnosis date, diagnosis code), quality checks were conducted to verify the presence of missing and invalid values. Subsequently, the data were cleaned, and a second round of checks and cleaning was carried out. A short report of the quality checks carried out was produced and follow-up meetings were organised with the regional contact persons responsible for each specific database. This made it possible to validate the quality control procedure and to better understand some of the results obtained and the main data collection mechanisms. This comparison led to some revisions of the data preparation procedure and a list of further activities to be implemented for improving data quality. After the completion of this activity, we proceed with the linkage of the databases and the preparation of a file meeting the technical requirements of the algorithm. Then, the algorithm, which was transferred by the oGP with devoted instructions for its use, was launched using Marche data as input file. The output produced by the algorithm includes a string for each citizen with information on health status, level of complexity and presence of a set of diseases, that was subsequently analysed. In parallel, we revised the available national guidelines to define the social and healthcare programmes and services needed by the citizens based on their level of complexity.</p> <p>The second phase, i.e. development of a dashboard, started during the preparation data procedure. A literature review was conducted to identify relevant health-related indicators useful to evaluate regional population's health. These indicators have been elaborated also through the contribution of health databases experts, considering those defined at national/regional levels to monitor the performance of the healthcare system. The selection of the indicators was done against criteria of availability of good quality data sources, feasibility, and relevance for healthcare programming purposes. In parallel, different options</p>

	<p>of dashboard structures were analysed to identify the most suitable solution to be implemented in the regional context. After discussion with the oGP, we decided to use their already implemented solution with some adaptations. For this reason, a proposal for a dashboard, including its structure and content was elaborated. To ensure that the analyses were systematic and valid, these complex activities have been strictly monitored during the weekly follow-up meetings, involving the different components of NAWG. Constant support and technical assistance were received by the oGP staff during the whole process. The intervention also included a transversal activity of identification of policies and other actions promoting the sustainability of the pilot.</p> <p>Intervention's implementation has required a multi-professional working group, with different and complementary skills, mainly affiliated to Marche Regional Health Agency (ARS Marche). In details, 8 professionals participated in the activities:</p> <ul style="list-style-type: none"> - The head of the HTA and Biomedical Technologies department, as principal investigator, - The head of the Administrative Health Databases and Monitoring Department, as responsible for data access and management, - the Head of the Community and Hospital-Community Integration Department, for the definition of the healthcare services for integrated care for chronic diseases, - a Project Manager and researcher responsible for EU projects, as project manager and support in data analysis, - a nurse, co-responsible for the development of the clinical components of the project, - a statistician/data analyst, who worked on data preparation and analysis, - an informatic managing HADs, who supported data extraction and technical aspects of the intervention, - an administrative employee, supporting the administrative and accounting tasks. <p>In addition, relevant regional healthcare managers have been involved in the health data quality controls and in the definition of the dashboard's indicators.</p>
<p>Study of the Intervention(s)</p>	<p>The approach chosen for assessing the impact of the intervention and to establish whether the observed outcomes were due to the intervention, i.e. a more effective and efficient healthcare services programming, included:</p> <ul style="list-style-type: none"> • Qualitative analysis, to identify the needs of Marche Region Heads of Unit's in terms of information and data on health status of the population and use of healthcare services relevant for improving healthcare programming, orienting the implementation of the algorithm and the development of the Dashboard toward an optimal chronicity management. • Quantitative methods, related to the comparison between healthcare information and data available to date and the one resulting from the application of the algorithm and the processing of the dashboard. The comparison between the information available in the two moments is related to the information needed for planification and decision-making process. Actual situation is based on fragmented data, whereas the application of the intervention is expected to provide more accurate data based on linked HADs' data, which would cover the existing informational gap on important issues in terms of healthcare programming, with tangible benefits in the medium to long term. In addition, quantitative methods were also applied to compare the preliminary's study results, aimed at evaluating the feasibility of implementation of the algorithm in Marche region, with data available in Regional Health Agency, collected and analysed for different purposes, and the quality control carried out for each HAD before the linkage, ensuring that such HADs could indeed form the basis of the algorithm.

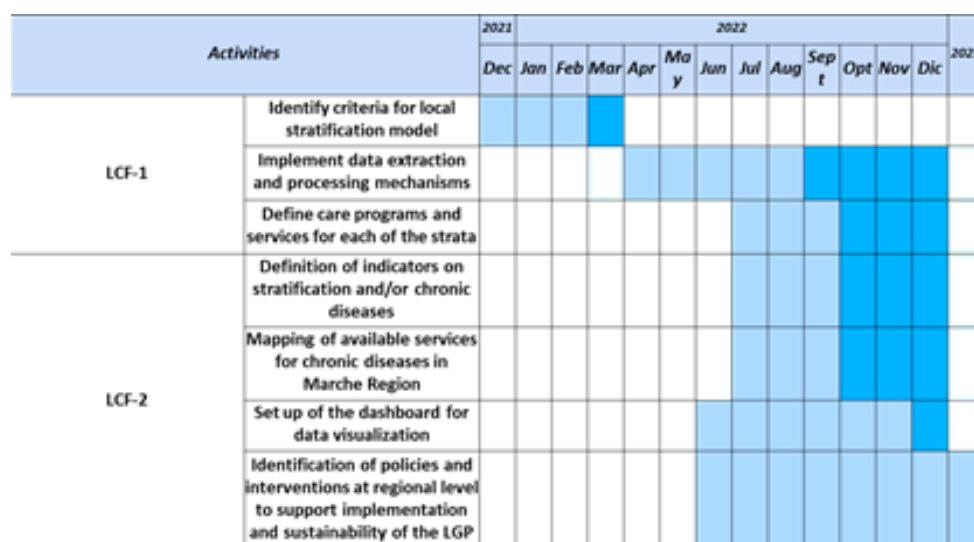
<p>Measures</p>	<p>Measures chosen for studying processes and outcomes of the intervention, namely the Key Performance Indicators (KPIs), have been developed for every Local Core Feature's (LCF) activity.</p> <p>LCF-1: Implementation of a risk stratification tool based on adjusted morbidity group.</p> <p>The KPI of the first activity, namely the <u>identification of criteria for local stratification model (1.1-PDSA1)</u>, is the elaboration of a list of stratification criteria to extract health data needed for the algorithm.</p> <p>The second activity, i.e. the <u>implementation of data extraction and processing mechanisms (1.1-PDSA2)</u>, foresees the following KPIs:</p> <ul style="list-style-type: none"> - the database with required health data (Y/N), as a preliminary requisite to implement the AMG algorithm. - a short report on quality check (Y/N), to address the need to assess the correctness of analysis and data management procedures, including both quantitative results and qualitative data derived from consultations with professionals. - the procedure for data extraction (Y/N), as a technical manual needed to explain the procedure and replicable it over time. - a short report on pilot test results (Y/N), as evidence of the results of the intervention, to be used for dissemination purposes; - the integration of the tool in the regional IT infrastructure (Y/N), to ensure the sustainability of the intervention. <p>For what concerns, <u>the definition of care programs and services for each of the strata (1.3-PDSA2)</u>, the KPI identified is the elaboration of guidelines on population management strategies (Y/N), that reflects the need to define healthcare services and facilities for each stratum of the pyramid, coherently with national and regional regulations, as a basis for subsequent analysis and evaluations of the decision-makers.</p> <p>LCF-2: the building of a map/dashboard of citizens' health/risk and available services.</p> <p>In the first activity, <u>definition of indicators on stratification and/or chronic diseases (2.1-PDSA2)</u>, the KPI is the list of indicators (Y/N), aimed to identify relevant measures to be included in the dashboard and be analysed globally and within groups identified by the algorithm. The second activity, <u>mapping of available services for chronic diseases in Marche Region (2.2-PDSA2)</u>, foresees the development of the list of facilities/services (Y/N), as a prerequisite to elaborate maps of services to be analysed against the healthcare needs of the population. Respect to the third activity, <u>the setting up of the dashboard for data visualization (2.3-PDSA2)</u>, the KPI of reference is the availability of the dashboard (Y/N), that would include and visualize data derived from indicators. The last activity, <u>the identification of policies and interventions at regional level to support implementation and sustainability of the LGP (2.4-PDSA2)</u>, has the development of a sustainability plan (Y/N) as KPI, needed to identify key actions able to outreach and involve relevant stakeholders and to promote prosecution of the activities at the end of the implementation phase.</p>
<p>Analysis</p>	<p>Qualitative data were collected during meetings with experts through the use of notes and subsequent analysis and summaries of main results.</p> <p>Quantitative data were collected through official sources and databases, as well as from the output produced by the AMG tool. The analysis was carried out by the statistical software R, version 4.1.0, R studio IDE, and Stata. Descriptive statistics were produced for quality control of healthcare databases, such as frequencies of missing and invalid data on relevant variables, by year, organisation, type/timing of evaluation (e.g. baseline and follow-up for homecare, emergency department and short intensive care for urgency database). Additional analysis was performed according to experts' requests, to identify</p>

any pattern of missing/invalid data by type of service and/or healthcare provider, and to verify if quality and completeness of data improved after adoption of devoted regulations at national/regional levels. Output data from the AMG were analysed in aggregated form, providing regional and provincial descriptive statistics on health status of the population.

What did you find?

Interventions and evolution over time:

Details about the intervention and its evolution over time are shown in the figure below.



The **initial planning** is shown in light blue colour, whereas the **modifications** occurred during the implementation are shown in darker blue.

Results

In **LCF1**, the data extraction phase started later than planned due to some delays in the internal procedures for personnel recruitment and in the authorization procedures for the transfer of the algorithm from the oGP site. Based on these criticalities, the recruitment procedures have been constantly monitored in collaboration with the administrative offices to speed up the process. In parallel, the activities have been rescheduled accordingly. The data preparation procedure was extended due to the complexity of the healthcare databases and the need to carry out a set of quality controls. The definition of care services was subsequently postponed, also due to the development and adoption of new regulation at the National level. Activities of **LCF2** needed a reordering after technical evaluations and were extended due to the additional time needed to complete the data preparation. As consequence, the integration of the tool in the regional IT infrastructure was delayed, due to longer time needed to complete previous activities and overburdened personnel. The activity of setting up of the dashboard for data visualization presented delays related to the data preparation phase and to the revision previously planned plan. Indeed, initial plan of reusing internal tools was abandoned (for the time being) because of changes in the organisation and time restrictions. Therefore, a new option of dashboard was defined thanks to the support of the oGP, for which implementation is still ongoing and it will continue during the post-implementation phase.

LCF1's outcomes: Implementation of a risk stratification tool based on adjusted morbidity group

The identification of criteria for local stratification model (1.1-PDSA1) led to select databases providing ICD-9 codes of diagnosis or those providing diagnosis that can be translated into ICD-9 codes, namely hospital admission, emergency and urgency, homecare, and exemption codes. In addition, the Health Registry of citizens living in the Marche region was

included to retrieve personal data (e.g. date of birth, sex) requested by the algorithm. An additional criterion was to extract data from 2015 to ensure a high level of completeness and quality.

The implementation of data extraction and processing mechanisms (1.1-PDSA2) started with the conduction of a preliminary test to evaluate the AMG tool applicability in the Marche context. The analysis of the output file showed the good quality of Marche data, the applicability of the tool in our context and preliminary results in line with available evidence. The data preparation phase produced the following results:

- the **creation of files** including healthcare data in the format requested by the algorithm.
- the elaboration of short reports on **quality check** including description of the procedure, gaps and inconsistencies found in the data, feedback received by a multi-professional group (clinicians, experts in the dataflows), additional analysis performed, and a list of potential actions to improve the quality of data.
- a **short manual** describing the procedure for data extraction, manipulation and analysis, to be updated with the subsequent revisions of the procedure (e.g. simplification of data extraction, automatization of some steps, integration of the AMG in the Regional IT system);
- a report describing the **results of a pilot** test conducted after data collection, analysis, and control. The pilot test analysed the health status of Marche citizens in 2021 (N=1,578,220). The prevalence of chronic disease increases with age, with higher values in men than in women. The burden of diseases is huge in the 70-79 and 80+ age groups, where respectively 25% and 35% of men and 16% and 26.5% of women are affected by 4 or more chronic pathologies. The pyramid of the Marche population divided into the five strata shows that the population with the highest complexity is the older one, with an increase already starting from those aged 45 years. As the complexity increases, so does the average age and the number of chronic diseases. Particularly striking is the trend in the rate of hospitalisation, which takes on very high values in the two strata of high and very high risk. It is interesting to note that the first three strata see a higher prevalence of women, while the last two (high and very high risk) see a higher prevalence of men. The pathologies more prevalent in the Marche population are hypertension, diabetes, and cardiovascular pathologies.
- the **integration of the tool** in the regional IT infrastructure has started with the implementation of preliminary procedures and it is currently ongoing.

The definition of care programs and services for each of the strata (1.2-PDSA2) included the elaboration of population management guidelines for AMG strata, starting with health promotion, to case management strategy, focusing on chronic diseases management, coherently with national and regional current regulations (DM 77/22).

LCF2's outcome: building of a map/dashboard of citizens' health/risk and available services.

The definition of indicators on stratification and/or chronic diseases (2.1-PDSA2), resulted in a list of relevant **indicators** in relation to socio-demographic aspects, prevention; hospitalizations; community services; resources consumption. For each indicator, details are provided on: data source, formula, rationale, level of geographical aggregation, analysis by AMG groups and diseases.

The map of available services for chronic diseases in Marche Region (2.2-PDSA2) was gained though the collection of databases/registries of health and social care facilities/services (e.g. community services, hospitals, residential and semi-residential facilities), including info on sources, timing of updates, classification and users. This action allows to evaluate

the readiness of each Marche province in providing and delivering healthcare services for the various strata of the population.

The setting up of the dashboard for data visualization (2.3-PDSA2), is currently ongoing. A draft structure has been developed based on the MSIQ tool of the oGP, selecting the sections of interest in our context.

The last activity, the identification of policies and interventions at regional level to support implementation and sustainability of the LGP (2.4-PDSA2), led to the elaboration of a preliminary set of actions to further support the intervention. These includes: the analysis and monitoring of relevant National/Regional guidelines, laws, and plans (e.g. the National Recovery and Resilience Plan) linked to or relevant for the intervention; the dissemination of the results at regional, national, and EU level; the constant update of the Director of the Health Department to facilitate promotion actions; the involvement of healthcare managers and experts in the definition of the indicators and dashboard; the inclusion of the results of the preliminary test in a Regional Decree, approved by the Regional Council, on the adoption of the new national regulation on the standards for the community services, which places population stratification as the first step of the process; the integration of the tool in the Regional IT system; the definition of devoted actions to improve the quality of healthcare data. Sustainability issues were also discussed with the oGP to support identification of facilitators and development of future activities within and beyond JADECARE.

Main **challenges** occurred during the intervention were: the need to continuously align the activities with the new National regulations on healthcare services, the reorganisation of the regional healthcare system, and the overburdened personnel.

Unexpected challenges were the complexity of healthcare databases, which resulted in more effort needed to complete the data preparation procedure, the development of the dashboard, due to revision of initial plans and options, and the limitations in the GDPR application in Italy, which is still under discussion at national level.

As regards **unexpected positive findings**, we can acknowledge: the great results obtained during the pilot test with the AMG; the strong interest showed by the healthcare managers in the project, especially on the dashboard and indicators; the relevant insights on health data collection gained through the quality checks of the data; the publication of the results of the intervention on a Regional Decree approved by the Regional Council.

What does it mean?

Summary

The intervention was **successfully implemented** in the Marche Region, allowing to test the adoption of a population health management tool based on the Catalan AMG, as well as to define the structure and contents of a dashboard to visualize the results of the stratification algorithm and other health-related indicators. Along these results, the intervention produced additional knowledge on health databases of Marche, including evidence of the improvement actions carried out in the last year and the identification of aspects to be further monitored.

In details, the intervention confirmed the applicability in our context of the open-source, flexible and validated AMG tool. The output of the algorithm provided relevant information on the health status of Marche citizens and the prevalence of NCDs, which will be further explored through specific indicators on healthcare services use and consumption of resources. Moreover, the activities promoted the collaboration of the different healthcare managers and experts involved in the project and the identification of informative needs to support healthcare programming and monitoring.

	<p>Main strengths of the intervention are the strong methodological approach of the JA; the continuous support received by the oGP and their availability to share their tools; the good quality of our health administrative databases; the internal support received by key stakeholders; the multi-professional working group; the timing of the intervention in relation to key national/regional processes linked to the intervention, promoting its sustainability.</p>
Interpretation	<p>To be truly effective, healthcare systems must be able to protect the health of the whole population and not just of those who actively seek health care, by addressing the needs of each citizen in terms of both prevention and treatment. Special attention must be paid to individuals with chronic diseases, which are now increasingly common in terms of incidence and prevalence. Knowledge on the epidemiological profile and indicators correlated with the health needs and outcomes of the patients is crucial. Indicators related to the quality of healthcare and adherence to guidelines for specific diseases would support proactive surveillance programs under the territorial care enhancement plan (DM 77/20 on standards of community healthcare services).</p> <p>AMG tool, applied in more than 90% of Spanish regions, is an open-source algorithm that elaborates administrative health databases to classify citizens of a given territory on the basis of complexity and health status and to provide detailed information on chronic diseases affecting the population. Indeed, literature shows that AMG, among the different multimorbidity measures, is flexible and transferable/adaptable to others context, showing also a better discrimination and predictive power (Monterde et al. 2020) (Dueñas et al 2016). Moreover, AMG classification system is particularly suited for classification of patients with NCDs (Barrio-Cortes et al. 2021).</p> <p>Marche Region bases its healthcare programming activities on HADs, that are well implemented and available over time. Each HAD had a different structure and includes one or more tables linked through one or more key variables. Although the complexity of data linkage and preparation, the intervention confirmed the capacity of AMG tool to be transferred to other contexts and produce valid results. The AMG output provided relevant information on health status of the population which were not available before, or only partly available through survey data. The subsequent development of a dashboard to visualize the results will produce further crucial information on the use of services and consumption of resources by the different groups identified by the algorithm. Therefore, the intervention has enabled the Marche Region to equip itself with a fundamental tool for supporting decision-makers in programming of social and health care services to address the health needs of the population. These results are in line with the Ministerial Decree No. 77/2022 on standards and organisation of community services, which was recently addressed by the Regional Council Decree No. 1781 of 27/12/2022 through inclusion of the intervention results. AMG tool has a great potential as it allows us to obtain information on the health status of the population in an up-to-date and rapid manner and, thanks to its geographical disaggregation, it allows to identify the areas with the highest incidence of specific diseases. Moreover, the classification of the population by risk categories makes it possible to develop specific care pathways based on citizens' needs in terms of prevention and management of pathologies, with particular regard to risk factors and chronic ones. Finally, the results of the algorithm can be used to make more in-depth analyses of performance and resource consumption, to identify the areas and/or groups that absorb high levels of resources. The implementation of these tools in the Marche Region will support, in the long term, a more effective NCDs management. Moreover, they will answer to the institutional mandate related to citizens' classification and provide inputs to other Regions for its application.</p>

	<p>The achieved results exceeded the initial expectations, thanks to the validity and reliability of the tool and the good collaboration among the participants.</p> <p>As a publicly owned open tool, the AMG allows to reduce the costs associated to the adoption of a population health management tool, and its validation in an EU country enhances the validity and applicability in similar healthcare systems and populations.</p>
Limitations	<p>The intervention is affected by the following limitations:</p> <ul style="list-style-type: none"> - The use of regional health data could affect the generalizability of the results and their comparability with other EU/Italian contexts. - The use of a limited set of administrative health databases, which are collected for reimbursement and performance monitoring reasons, and the presence of missing/invalid data could affect the validity of the results in terms of underestimation of specific health conditions/diseases. - The privacy restrictions allowing only aggregated data analysis could limit extensive validation analysis and checks. - Lack of primary care data, which are used in AMG, could affect the reliability of the results <p>The following activities were carried out to minimize the impact of the above limitations:</p> <ul style="list-style-type: none"> - Extensive quality check of the source data before the implementation of the AMG - Consultations with experts of each administrative health database to validate data preparation procedure, understand interpretation of the data, identify potential biases in the results. - Continuous collaboration with the oGP to check the correct application of the tool. - Comparison of the results with available evidence at national/regional level - Plan of further validation activities to be carried out before the final implementation of the tool, through scientific publications.
Conclusions	<p>The results confirmed the usefulness of the intervention for the adoption of the stratification tool and the dashboard. These tools have the potential to support decision-making process and healthcare services programming, with the final goal of improving the quality of life of the citizens living in the Marche Region.</p> <p>At National level, this experience could bring useful information for the ongoing discussion on adoption of these tools and validity/suitability of administrative health databases for this purpose. Moreover, the similar structure of HADs in the other Italian regions allows the transferability of the data preparation procedure (and the applicability of the AMG) in other contexts.</p> <p>The results are also relevant to other EU contexts and to the EU bodies to support the European Health Data Space initiative and the development of recommendations on the use of health data.</p> <p>The intervention could be further elaborated and extended with additional studies, also in collaboration with the oGP; some activities are already planned and being explored.</p> <p>The suggested next steps are:</p> <p>TECHNICAL/OPERATIVE ACTIONS:</p> <ul style="list-style-type: none"> • <u>Development of the dashboard</u>, also through maps to visualize healthcare services that will be activated based on recent social and health planning regulations (at national and regional level). • <u>Continuous revision of Indicators according to the needs of decision-makers in the various healthcare sectors.</u>

	<ul style="list-style-type: none"> • <u>Addition of further healthcare databases for AMG and indicators' computing (e.g.: hospice database)</u>, to make the data more accurate and to add potentially relevant information. • <u>make it a useful tool for regional and clinical managers</u> for close monitoring of population's health status and resources consumption, with possible comparison and benchmarking activities, in order to comply with the requirements of recent national and regional regulations regarding the <u>stratification mandate</u>. <p>SUSTAINABILITY ACTIONS:</p> <ul style="list-style-type: none"> • Enhancing and maximising AMG and dashboard's potential through <u>definition of a roadmap</u> to enhance its use as a tool for regional and clinical managers, e.g. for programming and implementing healthcare policies and services, process of budget and resources application, supporting investments in prevention and continuity of care (such as territorial operative centres, community hospitals and houses, home care, family nursing, palliative care and telemedicine) • Defining further analysis and actions to improve the quality and completeness of healthcare data. • Disseminating data culture in institutions, raising awareness of the health care professionals on proper reporting of information.
Other information	
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Viljandi Hospital, EE (VH)

Pre-implementation

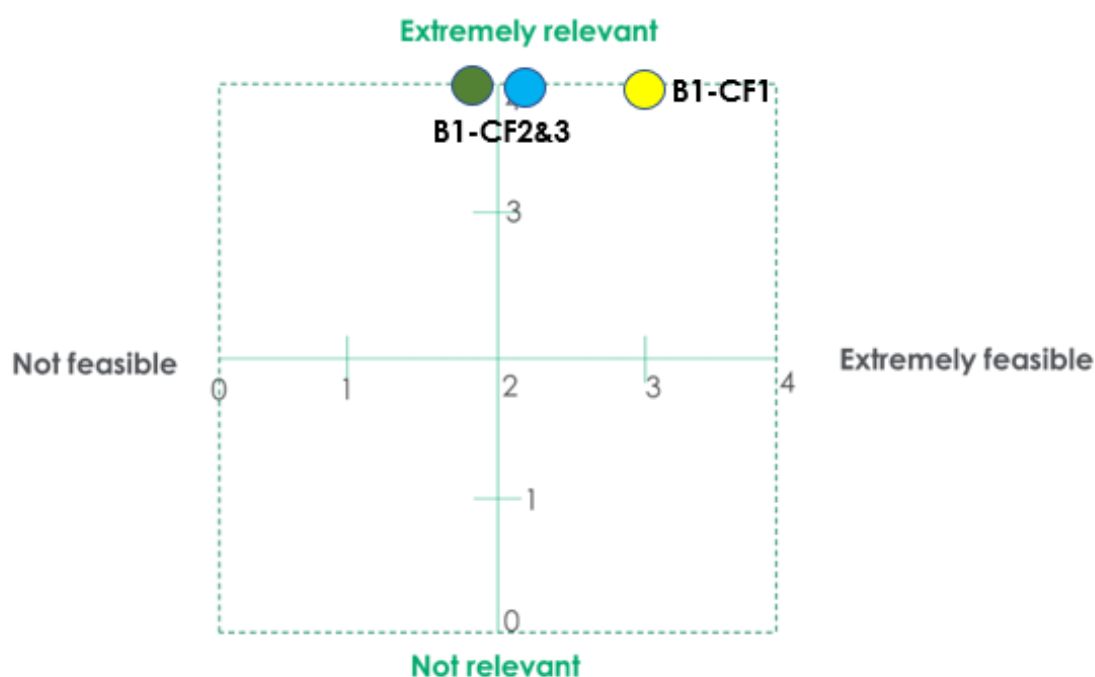
Scope definition

Identified and prioritized needs

Block	Prioritized needs
Block 1 - Health risk assessment: population-based and enhanced clinical decision making	Case finding and risk stratification.
	Monitoring the interventions on population level, developing population needs profiles and identifying prioritization areas.
	Needs assessment, care planning and monitoring interventions

Assessment of Core Features

Core feature	Relevance	Feasibility
CF1.1 Assessment of transferability, and identification of steps for adoption, according to intellectual property rules, of the Catalan population-based risk stratification tool (AMG) into the ecosystem of the next adopter.	4	3
CF1.2 Health data management strategies	4	2
CF1.3 Development of enhanced risk prediction modelling for health policy purposes and/or clinical risk prediction	4	2



Final Core Features selected

CF1.1 Assessment of transferability, and identification of steps for adoption, according to intellectual property rules, of the Catalan population-based risk stratification tool (AMG) into the ecosystem of the next adopter.

CF1.2 Health data management strategies

CF1.3 Development of enhanced risk prediction modelling for health policy purposes and/or clinical risk prediction

Situation analysis

	Strengths	Weaknesses
Internal	<ul style="list-style-type: none"> Digital developments that allow for two-way patient-system communication Chronicity analysis is a priority aspect at regional level (there are ongoing projects and initiatives on the same topic). Evaluation of integrated care services is planned and be established as part of a systematic approach. Ambition to foster collaborative work across healthcare tiers. Ambition to crosstalk among different cultures, different interests, different visions, different perspectives. 	<ul style="list-style-type: none"> No special funding allocated or available. Problems with the design of the evaluation methodologies and indicators.
	Opportunities	Threats
External	<ul style="list-style-type: none"> Construction of dialogue seeking the alignment of all the stakeholders involved. eHealth deployed. Digital infrastructure and digital developments to ensure data security. There are different projects that serve as a guide to consolidate innovation 	<ul style="list-style-type: none"> Innovation is encouraged but there is no overall plan, lack of will to continuously adapt the innovations developed to new needs. Fragmented innovation funding, mostly for pilots. Not sure that initial and ongoing costs can/will be financed. No actions in place to continuously identify new barriers, minimise their impact and address issue. Lack of databases with demographic, clinical and resource use information. Little acceptance of risk stratification models usefulness. Legal framework compatibility with risk stratification needs.

Strategic Intervention Areas

Strategic intervention area	Priority	Ranking
Launch a cross-sectoral discussion to ensure the consistency of the funding model with the overall coordination and integration objectives	3	1
Start risk stratification and profiling the needs of the population in the region	3	2
Actively participate in national initiatives on the development of coordinated care processes and their funding models	3	3
Continue cooperation in the provision of integrated and coordinated services - develop networking and coordinated service provision in the region in cooperation with partners in the health and care sector, including the conclusion of cooperation agreements	2	4
Ensure continued support at management level for coordination objectives	1	5

Definition of the LGP and LAP

Local Good Practice

Local Good Practice	A funding model for person-centred and integrated services	
Target population	~50,000 habitants	Setting(s) Viljandi county
Main aim		
Improve the results of the health and quality of life of the population and increase the efficiency of the healthcare system through better planning and use of resources.		
Outcomes	Local Core Features and their Components	Inputs
<ul style="list-style-type: none"> Cooperation between Viljandi Hospital and other service providers is carried out. IT tools supporting integrated care funding modelling and risk stratification. Funding model has been proposed in integrated care provision in Viljandi county. Assessment feasibility of nationwide implementation of oGP-s. 	Develop a funding model for person-centred and integrated services: <ul style="list-style-type: none"> Risk stratification model Case finding Value-based contracting and payment framework Analytical model to execute the contract. 	<ul style="list-style-type: none"> Assessment of transferability of Opti-Medis framework. Assessment of transferability of risk stratification and case finding tools. Identification of steps for adoption of the Catalan population-based risk stratification tool into the ecosystem of the NA.
General description		
Generating predictive model is needed to strengthen population health management and provide better-tailored services for risk groups. Contracting and funding models developed are lined with person-centred and integrated services.		
Local Core Feature 1		
Develop a funding model for person-centred and integrated services: <ul style="list-style-type: none"> Risk stratification model. Case finding. Value-based contracting and payment framework. Analytical model to execute the contract. 		

Local Action Plan

Local Good Practice	A funding model for person-centred and integrated services	
Target population	~50,000 habitants	Setting Viljandi county
Main aim		
Improve the results of the health and quality of life of the population and increase the efficiency of the healthcare system through better planning and use of resources.		
General description		
Generating predictive model is needed to strengthen population health management and provide better-tailored services for risk groups. Contracting and funding models developed are lined with person-centred and integrated services.		

Related oGPs and CFs	Mix'n'Match OptiMedis & Catalan OGP				
	CF1.1 Assessment of transferability, and identification of steps for adoption, according to intellectual property rules, of the Catalan population-based risk stratification tool (AMG) into the ecosystem of the next adopter.				
	CF1.2 Health data management strategies				
	CF1.3 Development of enhanced risk prediction modelling for health policy purposes and/or clinical risk prediction				
Local Core Feature 1		Develop a funding model for person-centred and integrated services.			
SMART objective					
We will design a contracting and payment framework approach based on OptiMedis that includes Catalanian AMG risk stratification model.					
Activities	Actors	Resources	Setting(s)	Timeline	KPIs
Create a core group to define the local contracting and payment framework model	-GPs, nurses -Hospital doctors and nurses -Healthcare planning experts	Professionals from different settings	-GP practices -Viljandi Hospital -Estonian Ministry of Social Affairs	01.01.2022, (5 months)	Number and profile of professionals engaged in the definition of the contracting and payment framework approach.
Establish criteria for contracting and payment framework	-Healthcare professionals -OptiMedis experts -AMG experts	Professionals from different settings	-Viljandi Hospital -Estonian Ministry of Social Affairs -EHIF	02.02.2022 (4 months)	List of criteria used for contracting and payment framework (Y/N)
Set up the data extraction and processing mechanisms	-IT experts -Data scientists -OptiMedis experts -AMG experts	-OptiMedis experts -AMG experts -IT infrastructure -Subcontractor for technical development	Viljandi Hospital	01.01.2022 (5 months)	-Database creation (Y/N) -Technical design (%) -Functional design (%)

Implement case finding and risk stratification	<ul style="list-style-type: none"> -IT experts -Data scientists -OptiMedis experts -AMG experts 	<ul style="list-style-type: none"> -IT infrastructure -Subcontractor for technical development 	Viljandi Hospital	01.04.2022 (5 months)	Case finding and risk stratification tool is implemented (Y/N)
Design contracting and payment framework	<ul style="list-style-type: none"> -GPs -Hospital management. -OptiMedis experts -AMG experts 	Professionals from different settings	<ul style="list-style-type: none"> -Viljandi Hospital -Estonian Ministry of Social Affairs -EHIF 	01.04.2022 (5 months)	Contracting and payment framework agreed (Y/N)
Assess case finding and risk stratification based contracting and payment framework against established criteria	<ul style="list-style-type: none"> -Experts -Healthcare professionals -Healthcare planning experts 	Professionals from different settings	<ul style="list-style-type: none"> -Viljandi Hospital -GP practices -Estonian Ministry of Social Affairs -EHIF 	01.09.2022 (3 months)	Conformance report (Y/N)

Implementation

1st PDSA Cycle

Plan

LCF1								
Develop a funding model for person-centred and integrated services.								
Activities (from the LAP)	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Create a core group to define the local contracting and payment framework model	Reaching core stakeholders agreement	-GPs, nurses. -Hospital doctors and nurses. -Healthcare planning experts.	01.01.22 - 31.01.22	Number and profile of professionals engaged in the definition of the contracting and payment framework approach	VH project manager	On stakeholder's meetings	Registration forms	5
	Expanding and agreeing with key stakeholders	-GPs, nurses. -Hospital doctors and nurses. -Healthcare planning experts	01.02.22 - 28.02.22					
	Agreeing on all stakeholder's letter of intent of Viljandi county	-GPs, nurses. -Hospital doctors and nurses.	01.03.22 - 31.03.22					

		-Healthcare planning experts						
Activity 2: Establish criteria for contracting and payment framework	Introduction and creating possible scenarios	-IT Experts -Healthcare professionals	02.02.22 - 28.02.22	List of criteria used for contracting and payment framework (Y/N)	VH project manager	On workshop	Agreement	Yes
	Agreeing roadmap	-IT Experts -Healthcare professionals	01.03.22 - 31.03.22					
	Defining alternatives	-IT Experts -Healthcare professionals	01.04.22 - 30.04.22					
	Concluding agreement	-IT Experts -Healthcare professionals	01.05.22 - 31.05.22					
Activity 3: Set up the data extraction and processing mechanisms.	Improving incrementally data extract and loading (ETL) according to model requirements - Phase 1	-IT experts -Data scientists	01.01.22 - 31.01.22	1.Database creation (Y/N) 2.Technical design (%)	VH project manager	After Phase 5 data extract and loading	Phase 5 report on data extract and loading	1.Yes 2.100% 3.100%
	Improving incrementally data extract and loading (ETL) - Phase 2	-IT experts -Data scientists	01.02.22 - 28.02.22	3.Functional design (%)				

	Improving incrementally data extract and loading (ETL) - Phase 3	-IT experts -Data scientists	01.03.22 - 31.03.22					
	Improving incrementally data extract and loading (ETL) - Phase 4	-IT experts -Data scientists	01.04.22 - 30.04.22					
	Improving incrementally data extract and loading (ETL) - phase 5	-IT experts -Data scientists	01.05.22 - 31.05.22					
Activity 4: Implement case finding and risk stratification.	Gathering and systematising LAP specific information and planning further action based upon agreed roadmap	-IT experts -Data scientists	01.4.22- 30.4.22	Case finding and risk stratification tool is implemented (Y/N)	VH project manager	After publishing local case finding and risk stratification framework	Published local case finding and risk stratification framework	Yes
	Drafting local case finding and risk stratification framework	-IT experts -Data scientists	01.05.22 -31.5.22					
	Drafting local case finding and risk stratification framework	-IT experts -Data scientists	01.06.22 - 30.06.22					
	Agreeing on local case finding and risk stratification framework	-IT experts -Data scientists	01.08.22 - 31.08.22					

Activity 5: Design contracting and payment framework.	Gathering and systematising LAP specific information and planning further action based upon agreed roadmap	-IT Experts -Healthcare professionals -Healthcare planning experts	01.4.22-30.4.22	Contracting and payment framework proposed (Y/N)	VH project manager	After publishing local contracting and payment framework	Published local contracting and payment framework	Yes
	Drafting local contracting and payment framework	-IT Experts -Healthcare professionals -Healthcare planning experts	01.05.22-31.5.22					
	Improving local contracting and payment framework	-IT Experts -Healthcare professionals -Healthcare planning experts	01.06.22-30.06.22					
	Agreeing on local contracting and payment framework	-IT Experts -Healthcare professionals	01.08.22-31.08.22					

		-Healthcare planning experts						
Activity 6: Assess proposed case finding and risk stratification based contracting and payment framework against established criteria.	Introducing preliminary report and gathering feedback	-IT Experts -Healthcare professionals -Healthcare planning experts	01.09.22 - 30.09.22	Conformance report (Y/N)	VH project manager	After publishing stakeholders contracting and payment framework model agreement	Published stakeholders contracting and payment framework model agreement	Yes
	Introducing improved report and gathering feedback	-IT Experts -Healthcare professionals -Healthcare planning experts	01.10.22 - 31.10.22					
	Introducing agreement draft and gathering feedback and finalizing report and agreement	-IT Experts -Healthcare professionals -Healthcare planning experts	01.11.22 - 30.11.22					

Do

Cycle number (1 or 2)	1	
Activity	KPI	Actual value
LCF 1 - Activity 1: Create a core group to define the local contracting and payment framework model	Number and profile of professionals engaged in the definition of the contracting and payment framework approach	5
LCF 1 - Activity 2: Establish criteria for contracting and payment framework	List of criteria used for contracting and payment framework (Y/N)	Yes
LCF 1 - Activity 3: Set up the data extraction and processing mechanisms.	Database creation (Y/N)	Yes
	Technical design (%)	100%
	Functional design (%)	100%
LCF 1 - Activity 4: Implement case finding and risk stratification.	Case finding and risk stratification tool is implemented (Y/N)	To be completed in PDSA 2
LCF 1 - Activity 5: Design contracting and payment framework.	Contracting and payment framework proposed (Y/N)	To be completed in PDSA 2
LCF 1 - Activity 6: Assess proposed case finding and risk stratification based contracting and payment framework against established criteria.	Conformance report (Y/N)	To be completed in PDSA 2

QUESTIONS	ANSWERS
What was actually implemented? Any deviation from the planned actions	Health care professionals from primary care & hospital care are engaged (GPs, specialist doctors, RN both family nurses and hospital and home care nurses, social workers, data manager), planned no (5) was exceeded for synergy of combined expertise. There is a list of criteria of the contracting and payment framework approach created. Database is created and design requirements for technical and functionality full-filled.
Problems? Unexpected findings? Please describe	Due to current situation in health care has slowed down the planned activities, meetings have been held, plans expanded and agreed with key stakeholders discussed.

IMPLEMENTATION PROGRESS OF THE LOCAL GOOD PRACTICE			
0-25%	25-50%	50-75%	75-100%
	X		

Study

Cycle number	1
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Activity	KPI	Target value	Actual value	Reasons for the deviations	Mitigation actions implemented	Impact of mitigation actions
LCF 1 - Activity 1: Create a core group to define the local contracting and payment framework model	Number and profile of professionals engaged in the definition of the contracting and payment framework approach	5	5			
LCF 1 - Activity 2: Establish criteria for contracting and payment framework	List of criteria used for contracting and payment framework (Y/N)	Yes	Yes			
LCF 1 - Activity 3: Set up the data extraction and processing mechanisms.	Database creation (Y/N)	Yes	Yes			
	Technical design (%)	100%	100%			
	Functional design (%)	100%	100%			
LCF 1 - Activity 4: Implement case finding and risk stratification.	Case finding and risk stratification tool is implemented (Y/N)	Yes	To be completed in PDSA 2			
LCF 1 - Activity 5: Design contracting and payment framework.	Contracting and payment framework proposed (Y/N)	Yes	To be completed in PDSA 2			
LCF 1 – Activity 6: Assess proposed case finding and risk stratification based contracting and payment framework against established criteria.	Conformance report (Y/N)	Yes	To be completed in PDSA 2			

Act

Cycle number (1 or 2)	1		
Activity	Maintain	Adapt	Abandon
LCF 1 - Activity 1: Create a core group to define the local contracting and payment framework model	X		
LCF 1 - Activity 2: Establish criteria for contracting and payment framework	X		
LCF 1 - Activity 3: Set up the data extraction and processing mechanisms.	X		
LCF 1 - Activity 4: Implement case finding and risk stratification.	X		
LCF 1 - Activity 5: Design contracting and payment framework.	X		
LCF 1 - Activity 6: Assess proposed case finding and risk stratification based contracting and payment framework against established criteria.	X		

QUESTIONS	ANSWERS
Any new proposed action for the future?	oGP expertise is present and available; national stakeholders are interested; discussions are in place to define synergies between partners and opportunities

2nd PDSA Cycle

Plan

LCF1	Develop a funding model for person-centred and integrated services.							
Activities (from the LAP)	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Create a core group to define the local contracting and payment framework model	Reaching core stakeholders agreement	-GPs, nurses. -Hospital doctors and nurses. -Healthcare planning experts.	01.01.22 - 31.01.22	Number and profile of professionals engaged in the definition of the contracting and payment framework approach	VH project manager	On stakeholder's meetings	Registration forms	5
	Expanding and agreeing with key stakeholders	-GPs, nurses. -Hospital doctors and nurses. -Healthcare planning experts	01.02.22 - 28.02.22					
	Agreeing on all stakeholder's letter of intent of Viljandi county	-GPs, nurses. -Hospital doctors and nurses.	01.03.22 - 31.03.22					

		-Healthcare planning experts						
Activity 2: Establish criteria for contracting and payment framework	Introduction and creating possible scenarios	-IT Experts -Healthcare professionals	02.02.22 - 28.02.22	List of criteria used for contracting and payment framework (Y/N)	VH project manager	On workshop	Agreement	Yes
	Agreeing roadmap	-IT Experts -Healthcare professionals	01.03.22 - 31.03.22					
	Defining alternatives	-IT Experts -Healthcare professionals	01.04.22 - 30.04.22					
	Concluding agreement	-IT Experts -Healthcare professionals	01.05.22 - 31.05.22					
Activity 3: Set up the data extraction and processing mechanisms.	Improving incrementally data extract and loading (ETL) according to model requirements - Phase 1	-IT experts -Data scientists	01.01.22 - 31.01.22	1.Database creation (Y/N) 2.Technical design (%)	VH project manager	After Phase 5 data extract and loading	Phase 5 report on data extract and loading	1.Yes 2.100% 3.100%
	Improving incrementally data extract and loading (ETL) - Phase 2	-IT experts -Data scientists	01.02.22 - 28.02.22	3.Functional design (%)				

	Improving incrementally data extract and loading (ETL) - Phase 3	-IT experts -Data scientists	01.03.22 - 31.03.22					
	Improving incrementally data extract and loading (ETL) - Phase 4	-IT experts -Data scientists	01.04.22 - 30.04.22					
	Improving incrementally data extract and loading (ETL) - phase 5	-IT experts -Data scientists	01.05.22 - 31.05.22					
Activity 4: Implement case finding and risk stratification.	Gathering and systematising LAP specific information and planning further action based upon agreed roadmap	-IT experts -Data scientists	01.4.22- 30.4.22	Case finding and risk stratification tool is implemented (Y/N)	VH project manager	After publishing local case finding and risk stratification framework	Published local case finding and risk stratification framework	Yes
	Drafting local case finding and risk stratification framework	-IT experts -Data scientists	01.05.22 -31.5.22					
	Drafting local case finding and risk stratification framework	-IT experts -Data scientists	01.06.22 - 30.06.22					
	Agreeing on local case finding and risk stratification framework	-IT experts -Data scientists	01.08.22 - 31.08.22					

Activity 5: Design contracting and payment framework.	Gathering and systematising LAP specific information and planning further action based upon agreed roadmap	-IT Experts -Healthcare professionals -Healthcare planning experts	01.4.22-30.4.22	Contracting and payment framework proposed (Y/N)	VH project manager	After publishing local contracting and payment framework	Published local contracting and payment framework	Yes
	Drafting local contracting and payment framework	-IT Experts -Healthcare professionals -Healthcare planning experts	01.05.22-31.5.22					
	Improving local contracting and payment framework	-IT Experts -Healthcare professionals -Healthcare planning experts	01.06.22-30.06.22					
	Improving local contracting and payment framework based on CPTS contracting and payment framework	-IT Experts -Healthcare professionals	01.08.22-31.08.22					

		-Healthcare planning experts						
Activity 6: Assess proposed case finding and risk stratification based contracting and payment framework against established criteria.	Introducing preliminary report and gathering feedback	-IT Experts -Healthcare professionals -Healthcare planning experts	01.09.22 - 30.09.22	Conformance report (Y/N)	VH project manager	After publishing stakeholders contracting and payment framework model agreement	Published stakeholders contracting and payment framework model agreement	Yes
	Introducing improved report and gathering feedback	-IT Experts -Healthcare professionals -Healthcare planning experts	01.10.22 - 31.10.22					
	Introducing agreement draft and gathering feedback. Finalizing report and agreement	-IT Experts -Healthcare professionals -Healthcare planning experts	01.11.22 - 30.11.22					

Do

Cycle number (1 or 2)	2	
Activity	KPI	Actual value
LCF 1 - Activity 1: Create a core group to define the local contracting and payment framework model	Number and profile of professionals engaged in the definition of the contracting and payment framework approach	5
LCF 1 - Activity 2: Establish criteria for contracting and payment framework	List of criteria used for contracting and payment framework (Y/N)	Yes
LCF 1 - Activity 3: Set up the data extraction and processing mechanisms.	Database creation (Y/N)	Yes
	Technical design (%)	100%
	Functional design (%)	100%
LCF 1 - Activity 4: Implement case finding and risk stratification.	Case finding and risk stratification tool is implemented (Y/N)	Yes
LCF 1 - Activity 5: Design contracting and payment framework.	Contracting and payment framework proposed (Y/N)	Yes
LCF 1 – Activity 6: Assess proposed case finding and risk stratification based contracting and payment framework against established criteria.	Conformance report (Y/N)	Yes

QUESTIONS	ANSWERS
What was actually implemented? Any deviation from the planned actions	Case finding and risk stratification tool is used locally, sustainability actions are planned to implement the tool at national level (national project “PAIK2022-2025” initiated). Contracting and payment framework agreed among the current project team, discussions with stakeholders done and framework implementation will follow over some time of the period.
Problems? Unexpected findings? Please describe	Regarding the contracting and payment framework model implementation on municipality level - the local level stakeholders & collaborative partner active involvement is slightly slowed down due to the raised workload related to their usual tasks, and the change of contact person; stakeholders contracting and payment framework model agreement reporting delayed.

IMPLEMENTATION PROGRESS OF THE LOCAL GOOD PRACTICE			
0-25%	25-50%	50-75%	75-100%
			X

Study

Cycle number	2
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Activity	KPI	Target value	Actual value	Reasons for the deviations	Mitigation actions implemented	Impact of mitigation actions
LCF 1 - Activity 1: Create a core group to define the local contracting and payment framework model	Number and profile of professionals engaged in the definition of the contracting and payment framework approach	5	5			
LCF 1 - Activity 2: Establish criteria for contracting and payment framework	List of criteria used for contracting and payment framework (Y/N)	Yes	Yes			
LCF 1 - Activity 3: Set up the data extraction and processing mechanisms.	Database creation (Y/N)	Yes	Yes			
	Technical design (%)	100%	100%			
	Functional design (%)	100%	100%			
LCF 1 - Activity 4: Implement case finding and risk stratification.	Case finding and risk stratification tool is implemented (Y/N)	Yes	Yes			
LCF 1 - Activity 5: Design contracting and payment framework.	Contracting and payment framework proposed (Y/N)	Yes	Yes			
LCF 1 - Activity 6: Assess proposed case finding and risk stratification based contracting and payment framework against established criteria.	Conformance report (Y/N)	Yes	Yes			

Act

Cycle number (1 or 2)	2		
Activity	Maintain	Adapt	Abandon
LCF 1 - Activity 1: Create a core group to define the	X		

local contracting and payment framework model			
LCF 1 - Activity 2: Establish criteria for contracting and payment framework	X		
LCF 1 - Activity 3: Set up the data extraction and processing mechanisms.	X		
LCF 1 - Activity 4: Implement case finding and risk stratification.	X		
LCF 1 - Activity 5: Design contracting and payment framework.	X		
LCF 1 – Activity 6: Assess proposed case finding and risk stratification based contracting and payment framework against established criteria.	X		

QUESTIONS	ANSWERS
Any new proposed action for the future?	No completely new activities proposed but some oGP support while ensuring the sustainability (both on regional and national level) of already planned and tested activities might be beneficial.

Post-implementation

ITEM	ANSWER
Title and abstract	
Title	An initiative to generating predictive model in order to strengthen population health management and provide better-tailored services for multimorbidity risk group patients in Estonia.
Abstract	Background: Estonia had a mix and match approach in Jadedcare as next adopter. The implementation of the elements of Optimedis module and Catalan risk patient identification tool took place in time. The reasoning behind adapting and implementing the chosen elements of original good practices came from having a need for a predictive model to strengthen population health management and provide better-tailored services for multimorbidity patient risk groups. Contracting and funding model which facilitates person-centred care provision was seen as something that could potentially help add extra value for those same groups. Estonia entered the project aiming to design a contracting and payment framework approach based on the OptiMedis model and a risk stratification model

	<p>based on the Catalan AMG approach. The main aim was to prepare a funding model coupled with risk stratification model to be implemented in Viljandi county.</p> <p>Local problem: Triggers for local good practice were as follows: no frameworks of integrated care provision in the country, value-based contracting practically missing in Estonia, the different payment schemes for hospital and ambulatory care have impact on incentivizing the transformation from case-based care to population health-oriented care model. Moreover, the lack of risk stratification and case finding tools to facilitate high risk patient identification for care-management service were reasons to encourage the active participation in Jadecare project.</p> <p>Methods: Evaluation of integrated care services was planned and established as part of a systematic approach. Target population is elderly with concomitant chronic diseases and social health determinants at a high risk of hospitalization. Key components of service are vertical and horizontal integration, care management, patient-centred care process. Interventions: Original good practice chosen for the implementation was two-folded: (1) Catalan risk stratification and case finding consisting of identifying high risk patients for care management initiatives in the Viljandi county and to predict the needs of care for the region; (2) OptiMedis accountable care organization (ACO) focusing on local care organization and steering organization to better align providers around persons for person centred care delivery, choosing and implementing other integrated care pathways in the region and to monitor performance of care delivery.</p> <p>Results: Regional formation of ACO framework created and local interests mapped (e.g. fracture prevention, timely stroke detection and intervention, different addiction treatments). State insurance fund claims databases available and ready to feed data to the original good practice risk stratification algorithms. Additional regional care pathways are operational (e.g. post-stroke care) and some are still <i>under construction</i> (e.g. osteoporosis, diabetes). Care management functionality is planned for the Estonian central health record (eHealth) system and a front-end solution to our regional providers. Capacity building with care manager educational programs is under way. Challenges, barriers, and main facilitators of the implementation process are mapped.</p> <p>Conclusions: Case finding, and risk stratification tool is used locally, sustainability actions are planned to implement the tool at national level project initiated and funded by the Estonian Health Insurance Innovation Fund.</p>
Why did you start?	
Problem description	<p>Digital infrastructure to support integrated care was piloted in Estonia but there was not yet region-wide coverage. Some standardized coordinated care processes were underway; guidelines used, some initiatives and pathways were formally described. On national level the coordination of social care service and health care service needs was introduced.</p> <p>Threats considered related to lack of agreed technical standards existing to enable shared procurement of new systems, some large-scale consolidations of ICT were underway.</p> <p>Consolidated innovation funding was not available.</p>
Available knowledge	<p>The World Bank project in collaboration with Estonian Health Insurance Fund and the Estonian Family Physicians Association started the pilot of risk-stratified care management approach already in 2017.</p> <p><i>"In Estonia, risk-stratified care management approach was first introduced in primary care to provide better help to high-risk patients who usually suffer from several chronic diseases, other accompanying conditions and are at high risk of health status deterioration and in-</i></p>

	<p><i>creased healthcare utilization. High-risk patient care management module aimed at creating a tool for family physicians and nurses, which could be used to act proactively to avoid the deterioration of the condition of chronically ill patients and to better manage their care process in cooperation with specialized medical care and the social system. The pilot included 96 randomly selected practice lists with more than 2000 patients. More than 70% of family physicians were satisfied with risk-stratified care management and found it a valuable tool to improve the monitoring of chronically ill patients. The results showed that, the care management for chronically ill patients has become more patient-centred and the number of visits to family physicians, as well as the number of consultations with family nurses have increased. At the same time, more than half of the physicians admitted that this approach to the care of chronically ill patients requires more time. One of the biggest challenges is insufficient cooperation with social assistance authorities to support chronically ill patients, who also face socio-economic problems."</i></p> <p>The PAIK project (2016-2020) is an area-specific support service for providing continuous healthcare and top social services in Viljandi County in Estonia. PAIK is a pilot project initiated by Viljandi Hospital and the Ministry of Social Affairs and funded by the Estonian Health Insurance Fund. This project combined health and social care parties for the benefit of people: e.g. family physician, specialist doctors, local government social worker and pharmacist, the community and family. The objectives of the project were as follows: (1) to improve cooperation between healthcare areas and the social system; (2) to provide support for patients coping with chronic disease; (3) to value a patient-focused approach in the treatment process; (4) to reduce overlap in health and social care. The target group consisted of residents in the Viljandi area who had been diagnosed with a chronic condition and required social support.</p>
Rationale	<p>Triggers for local good practice were as follows: no frameworks of integrated care provision in the country, value-based contracting practically missing in Estonia, the different payment schemes for hospital and ambulatory care have impact on incentivizing the transformation from case-based care (FFS) to population health oriented care model. Moreover, the lack of risk stratification and case finding tools to facilitate high risk patient identification for care-management service were reasons to encourage the active participation in Jadedcare project.</p> <p>The reasoning to develop and implement the original good practices based on the need of generating a predictive model in order to strengthen population health management and provide better-tailored services for multi-morbidity patient risk groups. Contracting and funding model which facilitates person-centred care provision add extra value.</p>
Specific aims	<p>The ultimate aim was improving the results of the health and quality of life of the population and increase the efficiency of the healthcare system through better planning and use of resources.</p> <p>Estonia entered the project aiming to design a contracting and payment framework approach based on the OptiMedis model and a risk stratification model based on the Catalan AMG approach. The main aim was to prepare a funding model coupled with risk stratification model to be implemented in Viljandi county.</p> <p>Local core feature and their components were following: to develop a county wide risk stratification approach based on Catalan AMG, valued-based payment framework and analytical model to execute the contract.</p>
What did you do?	
Context	<p>Estonia is a country on the eastern coast of Baltic Sea, total area 45227 km², population 1.3M, the service is of Viljandi hospital is about ~50 000 people. Type of hospitals in the Hospital Network Development Plan are as follows: regional, central, general, and local hospitals. We have compulsory solidarity-based health insurance and is financed mostly</p>

	<p>from the state budget (social tax) under the health insurance budget through the means of the Estonian Health Insurance Fund and through direct allocations. Viljandi hospital is a general hospital, it consists of 7 clinics, 3 centres, medical and non-medical support services. We have a 3-year experience implementation of integrated care project, called PAIK service pilot. It is crucial to notice that there is no value-based payment models in place resulting in a very fragmented health and social care system and integrated models for taking care of people with complex needs are lacking. Primary care is covered by 30 GPs.</p>
Intervention(s)	<p>Target population is elderly with concomitant chronic diseases and social health determinants at a high risk of hospitalization.</p> <p>Key components of service: Vertical and horizontal integration, care management, patient-centred care process</p> <p>Triggers for Estonian local good practice:</p> <ul style="list-style-type: none"> • No frameworks of integrated care provision in the country • Value-based contracting so-far missing in Estonia. • Different payment schemes for hospital and ambulatory care => impact on incentivizing the transformation from case-based care (FFS) to population health-oriented care model. • Paucity of risk stratification and case finding tools to facilitate high risk patient identification for care-management services. • No accountable care organizations in Estonia. <p>Implementation steps:</p> <ol style="list-style-type: none"> 1. Created a core group to define the local contracting and payment framework model. 2. Established criteria for contracting and payment framework. 3. Set up the data extraction and processing mechanisms. 4. Implemented case finding and risk stratification. 5. Designed contracting and payment framework. 6. Assessed proposed case finding and risk stratification based contracting and payment framework against established criteria. <p>Core group consisted of following specialists: GPs and nurses; hospital doctors and nurses; health care planning experts; social workers, and social work coordinators at municipality level; IT experts, data scientist, ministry representative.</p>
Study of the Intervention(s)	<p>Assessment of transferability of Optimedis framework, risk stratification and case finding tools, and identification of steps for adoption of the Catalan population-based risk stratification tool in Estonia.</p> <p>Challenges to implementation noted:</p> <ul style="list-style-type: none"> • Availability of health professional time to dedicate to JADECARE actions. • Healthcare sector is very conservative – how to get the professionals to change how they do things? • Overburdened primary and specialist healthcare system – little time and resources for process improvement and planning. • Setback in the IT department – change of our hospital medical records system caused loss of important functionality. • Medical and social support records are not on the same IT platforms. <p>Other barriers of implementation progress:</p>

	<ul style="list-style-type: none"> • Changes and ambitions at the local level slow to reach the decision makers on state level. • Fee-for-service payment model not best suited for integrated care provision and payment models slow to change. • Doctors do not perceive value of healthcare and the social system co-operation. • Limited social support system capacity. • Teams changing and constant deficit of the workforce in rural areas. <p>Main facilitators mapped:</p> <ul style="list-style-type: none"> • Motivated leadership in the region • Ministry of Social Affairs and the Health Insurance Fund (Eesti Haigekassa) interested in integrated care and care pathways implementation. • Support from IFIC (since 2018) and JADECARE teams. • Continued financial support - positive decision for PAIK project funding from the Estonian Health Insurance Fund (Eesti Haigekassa, Tervisekassa) on 19 May 2022. • Strong core team in Viljandi.
Measures	<p>Key performance indicators:</p> <ul style="list-style-type: none"> • Case finding and risk stratification tool is implemented. • Contracting and payment framework agreed. <p>Regarding the contracting and payment framework model implementation on municipality level - the local level stakeholders and collaborative partner active involvement is slightly slowed down due to the raised workload related to their usual tasks, and the change of contact person; stakeholders contracting and payment framework model agreement reporting delayed.</p> <p>Case finding and risk stratification tool is used locally, sustainability actions are planned to implement the tool at national level (national project "PAIK2022-2025" initiated). Contracting and payment framework agreed among the current project team, discussions with stakeholders done and framework implementation will follow over some time of the period.</p>
Analysis	<p>No deviations were identified regarding the PDSA cycle PLAN and STUDY phases.</p> <p>The KPIs were reached, e.g., case findings and risk stratification tool is implemented, contracting and payment framework is proposed and is assess case finding and risk stratification to be based on contracting and payment framework against established criteria. Needed databased was created - the data extraction and processing mechanisms were set up.</p> <p>Case finding and risk stratification too is used locally, sustainability actions are planned to implement the tool at national level, e.g. national project „PAIK 2022-2025“was initiated. Contracting and payment framework agreed among the current project team, discussions with stakeholders done and framework implementation will follow over some time of the period. Regarding the contracting and payment framework model implementation on municipality level the local level stakeholders and collaborative partners active involvement is slightly slowed down due to the rise of workload related to professionals' usual tasks, and the change of contact person.</p>
What did you find?	
Results	<p>Case finding and risk stratification tool is used locally, sustainability actions are planned to implement the tool at national level (national project "PAIK2022-2025" initiated). Contracting and payment framework agreed among the current project team, discussions with</p>

	<p>stakeholders done and framework implementation will follow over some time of the period.</p> <p>No deviations from the planned actions were identified.</p> <p>Regional formation of ACO framework created and local interests mapped (e.g. fracture prevention, timely stroke detection and intervention, different addiction treatments). State insurance fund claims databases available and ready to feed data to the original good practice risk stratification algorithms. Additional regional care pathways are operational (e.g. post-stroke care) and some still under <i>construction</i> (e.g. osteoporosis, diabetes). Care management functionality is planned for the Estonian central health record (eHealth) system and a front-end solution to our regional providers. Capacity building with care manager educational programs is under way.</p> <p>Challenges, barriers, and main facilitators of the implementation process are mapped.</p>
What does it mean?	
Summary	<p>Regional formation of ACO framework was created and local interests mapped. State insurance fund claims databases available and ready to feed data to the original good practice risk stratification algorithms. Additional regional care pathways are operational, and some are still <i>under construction</i>. Care management functionality is planned for the Estonian central health record (eHealth) system and a front-end solution to our regional providers. Capacity building with care manager educational programs is under way. Challenges, barriers, and main facilitators of the implementation process are mapped. Case finding and risk stratification tool is used locally, sustainability actions were planned to implement the tool at national level project initiated, namely PAIK 2022-2025 which was co-funded by the Estonian Health Insurance Innovation Fund.</p>
Interpretation	<p>No deviations regarding the planned actions were identified related to the intervention and outcomes.</p> <p>The used case finding, and risk stratification tool is unique in Estonia.</p> <p>There were several various stakeholders involved; the impact of the project is positive and provides long- term effects. The goal was to apply the stratification tool to improve the efficiency of health care system, and the quality of life of elderly with concomitant chronic diseases and social health determinants by providing them services that meet their needs.</p> <p>No differences between observed and anticipated outcomes were noted.</p> <p>Constantly the costs were observed, and additional financing was sought.</p>
Limitations	<p>Limits to the generalizability of the work to be considered are related to the fact that the risk stratification tool was implemented at one county in Estonia. Wider implementations are planned and proposed on state level.</p> <p>The Catalan risk stratification and case finding tool consisted of identifying high risk patients for care management initiatives in Viljandi county and to predict the needs of care for the region. Support provided by the oGP-team was much appreciated and always available.</p>

	<p>On local level – strong motivation in implementing the tool noted.</p> <p>High quality of health data available and continuous efforts to maintain the quality of data.</p> <p>Involvement of relevant stakeholders.</p>
Conclusions	<p>Case finding and risk stratification tool is used locally, sustainability actions are planned to implement the tool at national level project initiated and funded by the Estonian Health Insurance Innovation Fund.</p> <p>Sustainability plans are discussed with stakeholders.</p> <p>Plans to test similar case finding and stratification tool in other counties is in a process.</p>
Other information	
Funding	<p>In addition to the Jadedcare funding, Viljandi hospital provided needed funding to cover additional costs</p>

Jahn Ferenc South-Pest Hospital and Clinic, HU (JFDPK)

Pre-implementation

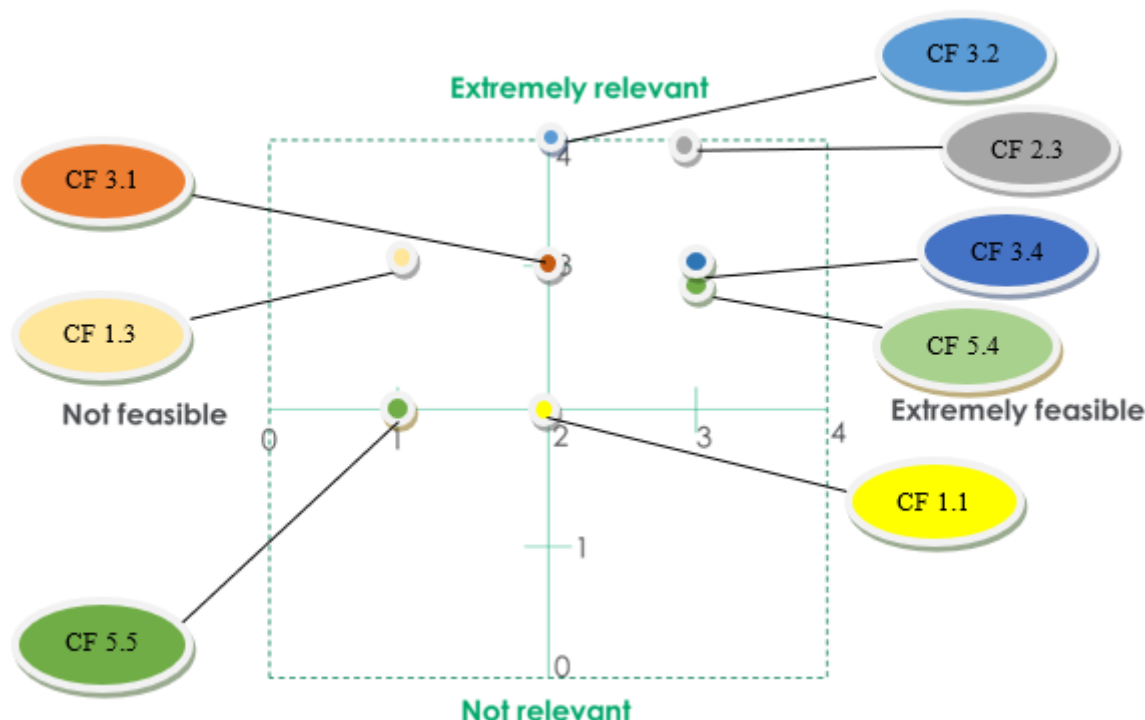
Scope definition

Identified and prioritized needs

Block	Prioritized needs
Block 1 - Health risk assessment: population-based and enhanced clinical decision making	Facilitate secondary use of health data
	Elaborate data gathering and data driven decision making methods
Block 2 - Promotion of healthy lifestyles	Strengthen the cooperation and facilitate systematic approach in the field of rehabilitation
	Develop a monitoring system that can help the evaluation too.
Block 3 - Vertical and Horizontal integration experiences adopted in Catalonia	Improve the quality of services and strengthen the collaboration between different care providers
	Improve patient education techniques and solutions
	Reduction of inappropriate hospital admissions
Block 5 - Digital support of integrated care services	Promote digital platforms to support integrated care and case management
	Support data gathering from the ICT tools supporting adaptive case management
	Identify and tackle possible inhibitors from the side of healthcare providers and form the side of the patients

Assessment of Core Features

Core feature	Relevance	Feasibility
CF2.3 Rehabilitation of chronic patients	4	3
CF5.4 ICT tools supporting adaptive case management & collaborative work	4	3
CF3.4 Integrated Care for admission avoidance of subacute and frail patients	3	3
CF 3.2 Support for complex case management including home hospitalization, transitional care and vertical & horizontal integration supported by digital tools	4	2
CF3.1 Programme for chronic and frail patients	3	2
CF1.3 Development of enhanced risk prediction modelling for health policy purposes and/or clinical risk prediction	3	1
CF 1.1 Assessment of transferability, and identification of steps for adoption, according to intellectual property rules of the Catalan population-based risk stratification tool (AMG) into the ecosystem of the next adopter.	2	2
CF 5.5 Cloud-based strategies (SISCAT program)	2	1



Final Core Features selected

- CF1.3 Development of enhanced risk prediction modelling for health policy purposes and/or clinical risk prediction
- CF2.3 Rehabilitation of chronic patients
- CF3.1 Programme for chronic and frail patients
- CF3.2 Support for complex case management including home hospitalization, transitional care and vertical & horizontal integration supported by digital tools.
- CF3.4 Integrated Care for admission avoidance of subacute and frail patients.
- CF5.4 ICT tools supporting adaptive case management & collaborative work.

Situation analysis

	Strengths	Weaknesses
Internal	<ul style="list-style-type: none"> National eHealth Digital Service Infrastructure (eHDSI) - working modules: ePrescription, eProfile (PS) and Discharge letters (centralised, interoperable, assured, and certified systems and suppliers). Plans to have a digital infrastructure and digital developments to ensure data security. Tight GDPR interpretation is an inhibitor. Health promotion offices (HPOs) have been established in hospitals and clinics as well as piloted through projects to take over in-patient functions and provide prevention services. 	<ul style="list-style-type: none"> Rather underdeveloped protocols, skills and infrastructure for digitally enabled person centric risk assessment, stratification, and decision-making Payment based statistics needs adjustment prior to assessment and policy decision, however, uncertainties cannot be eliminated entirely. Only the ePrescription/eDispensation system uses real structured data (EHR) (+some systems partially, e.g. COVID-19 vaccination booking and certification) Lack of guidelines and plans for the development of coordinated care processes.

External	<ul style="list-style-type: none"> Existing network of (hospital/clinic based) health promotion offices (HPOs) developed for health screening, prevention, and promotion as well as coordination of integrated care activities/services. Different strategies and approaches are possible and developed/tested by projects/pilots and for integration of care. Define appropriate strategies despite integration is currently lacking. Ambition to integrate the different levels of care (primary care and hospital care) Cooperation on capacity building for integrated care is growing. General practitioners (GPs) are gate keepers. Hospital system has been reorganized - Vertical integration: National/county hospitals control local hospitals and cooperate with GPs and homecare (partly through HPOs). Increased empowerment and adherence of hospitals to provide integrated care solutions. Available personal (pseudonymized) statistics at national and institutional level: <ul style="list-style-type: none"> - Registry of data of financed health care services - Registry of doctors and health care professionals - Registry of operating permits of health service providers. 	<ul style="list-style-type: none"> Lack of direct reimbursement schemes for home hospitalization and horizontal integration. Citizens and employers have not been prepared to take over functions (lack of digital health literacy, eSkills, empowerment, inhibitors, and facilitators) Agreements between funders and providers and between different levels of care to align objectives, activities, and funding.
	Opportunities	Threats
	<ul style="list-style-type: none"> Several (digital) case management projects and pilots were conducted. Some care coordinated processes already in place. Management and key staff are getting more committed to open for innovation. Reimbursement of certain telehealth services and tools. Approved protocols for reimbursed telehealth services. Majority of local governments are open to cooperate. COVID-19 experiences have increased acceptance of digital solutions and services. Ongoing development of information standards (e.g., Coding, formatting) and exploration of options for consolidating ICT. Systematic attempt to standardize the use of citizen healthcare data. Active patient organisations. 	<ul style="list-style-type: none"> Uncertainties in the economic background (growth, inflation, employment, reimbursement etc.) keep citizens and employers from spending for necessary investments. No integrated services used in daily practice in general, only pilots/local services. Innovation in technology, treatment protocols and care systems are not entirely coordinated. Low willingness and/or free time (of staff) to learn using new technology and apply new guidelines. Initial and ongoing costs have not been directly/transparently financed (are not linked to a complex case management based on digital technologies). The processes are only at the beginning of testing. Great number of general practitioners' districts are empty (weakening the traditionally complete geographical coverage and accessibility).

<ul style="list-style-type: none"> • Most stakeholders are open to use results of innovation and take part in co-creation. • National eHDSI: mobile gateway and patient pathway management modules are under construction or planned. • Nationally standardized social security number. • Centralized citizen registry and identification system. • Ongoing development to reach the full EHR system. • Strong cyber security and privacy control. • Existing relevant strategies and action plans (based on stakeholder dialogues and literature) to improve protocols, skills, infrastructure, and adherence/empowerment. • Acceptance of usefulness of deinstitutionalization is increasing among all key stakeholder groups. • Available grants and funding for training, education and facilitating transition and investment 	<ul style="list-style-type: none"> • Poor adherence of family members and their employers. • General lack of doctors and other health professionals. • Lacking digital skills of staff. • Staff burn-out. • Weak (digital) health literacy of citizens.
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Strategic Intervention Areas

Strategic intervention area	Priority	Ranking
Access, validate and assess health data of citizens in pilot area and compare to national level data to prove focus areas of intervention.	3	1
Development and further development of interoperable digital health tools and care protocols for person centric digitally enable integrated care integrated into the national central eHealth Digital Service Infrastructure (EESZT.GOV.HU), including eHealth, mHealth, teleHealth, remoteCare and smartCare solutions as well as innovative ways of using health and health related data.	3	2
Increase awareness, commitment and digital skills of the staff and provide them information and guidance on digitally enabled clinical risk prediction, complex case management including home hospitalization, transitional care and vertical & horizontal integration, rehabilitation and admission avoidance.	2	3
Increase patient, citizen and employer empowerment and adherence for cooperation and accepting new ways of access to prevention, treatment and rehabilitation or other care services.	1	4

Definition of the LGP and LAP

Local Good Practice

Local Good Practice	Complex care and rehabilitation of multimorbid type 2 diabetes patients with risk of minor amputation to prevent major amputations and loss of lower limb		
Target population		Setting(s)	
Multimorbid type 2 diabetes patients with the risk of lower limb minor amputation in the care area of the Jahn Ferenc South Pest Hospital (approx. 100 persons/year)		Jahn Ferenc South-Pest Hospital and Clinic	
Main aim			
To provide complex, integrated care and aftercare for patients with the risk of lower limb minor amputation to prevent further complications. Aftercare includes reviewing the patients' internal drug therapy, providing patient education and psychological guidance, and ensuring and monitoring the performance of the necessary tests.			
Outcomes	Local Core Features and their Components	Inputs	
<ul style="list-style-type: none">-Transparent and more simple patient pathways-Development of off-site investigation pathways-Increased effectiveness of patient education-Improved collaboration and information sharing between different care providers-Improved aftercare for multimorbid type 2 diabetes patients-Effective risk assessment algorithm for type II diabetes complication-Developed and tested methods to measure the needs of the patients with type II diabetes-Defined risk factors for risk stratification-Developed and tested health literacy assessment tools-Assessed feasibility of complex, integrated care and aftercare for multimorbid type 2 diabetes patients	<ul style="list-style-type: none">-Development of a risk assessment algorithm and prediction model for type II diabetes complications and a further risk stratification method for health policy purposes including prevention<ul style="list-style-type: none">* Risk assessment algorithm* Identification of relevant risk factors for risk stratification-Complex acute care for multimorbid type 2 diabetes patients with risk of minor amputation<ul style="list-style-type: none">* Integrated, complex preoperative diabetology protocol* Integrated, complex post-operative protocol* Standardised system for requesting examinations with the use of digital patient pathway management system-Complex rehabilitation program for multimorbid type 2 diabetes patients with minor amputation<ul style="list-style-type: none">* Complex and integrated aftercare for multimorbid type 2 diabetes patients with minor amputation* Standardized (digital) health literacy assessment method* Complex post-operative diabetic and dietetic education systems	<ul style="list-style-type: none">-Alignment of policy makers-Training and technical assistance for healthcare providers-Identification of relevant care providers to formulate the optimal patient pathway-IT systems to help the patient pathway management-Type II diabetes care protocols	

	<p>tem tailored for patients with different health literacy level supported by ICT tools</p> <p>-Long term aftercare for multimorbid type 2 diabetes patients to minimize quality of life loss and complications</p> <ul style="list-style-type: none"> * Long-term aftercare HealthPlan based individual needs and the available capacities * Lifestyle change programmes for type II diabetes patients * Assessment of the effectiveness of the complex and integrated care with a dashboard of indicators 	
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General description

Type II diabetes is one the most common non-communicable disease in Hungary. The neglected or the inadequate care and services could lead to major complication for example minor toe amputations or more extended, major lower limb amputations. (Toe or other smaller amputations usually precedes limb amputation) Unfortunately, Hungary is leading in the number of major amputations worldwide (41.1 major amputations per 100,000 people); big part of these amputations can be prevented by proper and continuous diabetes care. In our local good practice, we try to formulate and test an integrated complex diabetes care approach to prevent major amputations. The care process includes the acute care, the rehabilitation, the long term aftercare and the tertiary prevention services. This complex and integrated care plan will be supported by digital solutions and tools in the field of risk assessment, patient pathway planning, health literacy assessment, patient education.

Local Core Feature 1

Development of a risk assessment algorithm and prediction model for type II diabetes complications and a further risk stratification method for health policy purposes including prevention

Local Core Feature 2

Complex acute care for multimorbid type 2 diabetes patients with risk of minor amputation

Local Core Feature 3

Complex rehabilitation program for multimorbid type 2 diabetes patients with minor amputation

Local Core Feature 4

Long term aftercare for multimorbid type 2 diabetes patients to minimize quality of life loss and complications

Local Action Plan

Local Good Practice	Complex care and rehabilitation of multimorbid type 2 diabetes patients with risk of minor amputation to prevent major amputations and loss of lower limb	
Target population	Multimorbid type 2 diabetes patients with the risk of lower limb minor amputation in the care area of the Jahn Ferenc South Pest Hospital (approx. 100 persons/year)	Setting
		Jahn Ferenc South-Pest Hospital and Clinic
Main aim		

To provide complex, integrated care and aftercare for patients with the risk of lower limb minor amputation to prevent further complications. Aftercare includes reviewing the patients' internal drug therapy, providing patient education and psychological guidance, and ensuring and monitoring the performance of the necessary tests.

General description

Type II diabetes is one the most common non-communicable disease in Hungary. The neglected or the inadequate care and services could lead to major complication for example minor toe amputations or more extended, major lower limb amputations. (Toe or other smaller amputations usually precedes limb amputation) Unfortunately, Hungary is leading in the number of major amputations worldwide (41.1 manor amputations per 100,000 people); big part of these amputations can be prevented by proper and continuous diabetes care. In our local good practice, we try to formulate and test an integrated complex diabetes care approach to prevent major amputations. The care process includes the acute care, the rehabilitation, the long term aftercare and the tertiary prevention services. This complex and integrated care plan will be supported by digital solutions and tools in the field of risk assessment, patient pathway planning, health literacy assessment, patient education.

Related oGPs and CFs	Catalan Hub for Open Innovation on ICT-supported integrated care services for chronic patients:
	<u>Core Feature 1.3:</u> Development of enhanced risk prediction modelling for health policy purposes and/or clinical risk prediction.
	<u>Core Feature 2.3:</u> Rehabilitation of chronic patients.
	<u>Core Feature 3.1:</u> Programme for acute and frail patients.
	<u>Core Feature 3.2:</u> Support for complex case management including home hospitalization, transitional care and vertical & horizontal integration supported by digital tools.
	<u>Core Feature 3.4:</u> Integrated Care for admission avoidance of subacute and frail patients.
	<u>Core Feature 5.4:</u> ICT tools supporting adaptive case management & collaborative work.

Local Core Feature 1	Development of a risk assessment algorithm and prediction model for type II diabetes complications and a further risk stratification method for health policy purposes including prevention.
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SMART objective

In the framework of JADECARE, we will identify the risk factors involved with a severe diabetic foot gangrene among multimorbid patients with type 2 diabetes so that providing a basis to define adjusted morbidity groups, which will support healthcare services strategic planning later in the future. Our main objective is to formulate the risk assessment algorithm and test it with at least 15 patients.

Activities	Actors	Resources	Setting(s)	Timeline	KPIs
Development a risk assessment algorithm for type II diabetes complication	Medical Staff	Current Guidelines for Diabetes Care	Hospital	Oct/Nov 2021	Risk factors included in the risk assessment algorithm (target: at least 3)
Implement risk assessment, risk classification for multimorbid type 2 diabetes patients	Medical Staff	Clinical data of medical records + Structured interview of each patient	Hospital	Continuously - During the hospital stay of each patient	Number of patients who participated in the risk assessment (target: 15 patients with type II diabetes)

Identification of key Medical History Elements	Medical Staff	Clinical data of medical records + Structured interview of each patient	Hospital	Continuously - During the hospital stay of each patient	Number of patients who take part in the Identification of key Medical History Elements (target: 10 patients with type II diabetes)
Identification of relevant risk factors for risk stratification such as neglected treatment and care needs and factors or patient and provider compliance	Medical Staff	Clinical data of medical records + Structured interview of each patient	Hospital	Continuously - During the hospital stay of each patient	Identified relevant risk factors for type II diabetes complication for risk stratification purpose (target: at least 3 relevant risk factors for type II diabetes complication)
Local Core Feature 2	Complex acute care for multimorbid type 2 diabetes patients with risk of minor amputation				
SMART objective					
In the framework of JADECARE, we will provide preoperative and postoperative management for the patient who has undergone minor amputation for a diabetic foot. Our main objective is to develop and then use the complex preoperative and postoperative protocols with at least 10 patients.					
Activities	Actors	Resources	Setting(s)	Timeline	KPIs
Develop and introduce a preoperative diabetology protocol to ensure consistent and safe patient treatment and care	Members of Diabetology Department	Current Guidelines of Medical Care	Hospital	Oct/Nov 2021	Number of developed complex diabetology protocol (target: 2, at least one preoperative and one postoperative protocol)
Introduction of a pre-operative integrated (diabetology-angiology-etc) protocol (professional guideline) (bottom-up approach, generalising individualised patient pathways)	Medical Staff	Current Guidelines of Surgical and Medical Care	Hospital	Oct/Nov 2021	Number of health care providers with different speciality included in the formulation of the complex diabetology protocols (target: 4)

Formulation and im- plementation of a post-operative inte- grated protocol (pro- fessional guideline) (bottom-up approach, generalising individual- ised patient pathways)	Medical Staff	Current Guidelines of Surgical and Medical Care	Hospital and Outpa- tient Clinics	Formulation: Oct/Nov 2021 Implementa- tion: During the whole pro- gram	Number of patients that got their pa- tient pathway ac- cording to the new protocols (target: 10 patient with type II diabetes)
Strengthening (build- ing and linking missing links, tuning) + short- ening individualised patient pathways, for- mulate complex case management methods	Medical Staff and Hospital Leadership	Current Guidelines of Surgical and Medical Care	Hospital and Outpa- tient Clinics	Oct/Nov 2021	Number of health care professionals with different spe- cialty included in pa- tient pathways
Use of a standardised protocol for requesting examinations with the use of digital patient pathway management system	-Medical Staff -IT Staff	Current Guidelines of Surgical and Medical Care + Medical IT System	Hospital	During the whole pro- gram	1.Number of pa- tients that got their patient pathway ac- cording to the new protocols 2.Level of patient satisfaction with pathway
Local Core Feature 3	Complex rehabilitation program for multimorbid type 2 diabetes patients with mi- nor amputation				
SMART objective					
We will we develop a new integrated and holistic approach to provide complex rehabilitation program for multimorbid type 2 diabetes patients with minor amputation. Our objective is to involve at least 10 patients in the complex rehabilitation program.					
Activities	Actors	Resources	Setting(s)	Timeline	KPIs
Provide complex and integrated aftercare for multimorbid type 2 diabetes patients with minor amputation	-Medical Staff -Physiotherapist -Dietician -Home care nurse	-Electronic Health Data	-Outpatient Clinics -HPO -Primary Care	Continu- ously: Regular fol- low-up visits scheduled depending	Number of patients involved in the com- plex rehabilitation program (target: at least 10 multimorbid type 2 diabetes pa- tients with minor amputation)

	<div><div>-Primary Doctor</div><div>-Family Member</div><div>-Social Worker</div><div>-Staff of Health Promotion Office</div></div>		<div><div>-Home hospitalisation</div><div>-Telehealth visits</div></div>	on the specialty and the individual needs	
Development of area-specific physiotherapy groups	<div><div>-Physiotherapist</div><div>-Leader of HPO</div></div>	HPO	Health Promotion Office	Oct/Nov 2021	Number of available services (e. g. physiotherapy, mental health services, etc.) (target: at least 4)
Produce and test a standardized (digital) health literacy assessment method	<div><div>-Medical Staff</div><div>-Staff of HPO</div></div>	Guidelines of the topic	<div><div>-Hospital</div><div>-Health Promotion Office</div><div>-Telehealth visits</div></div>	Oct/Nov 2021	Number of patients that have their health literacy level assessed with the new health literacy assessment method (target: at least 10 multimorbid type 2 diabetes patients with minor amputation)
Implement a post-operative complex diabetic and dietetic education system tailored for patients with different health literacy level supported by ICT tools (written + audio-visual)	<div><div>-Medical Staff</div><div>-Diabetology Nurse</div><div>-Dietician</div><div>-Staff of HPO</div></div>	Electronic Health Data	<div><div>-Hospital</div><div>-Diabetology Outpatient Clinic</div><div>-Health Promotion Office</div><div>-Telehealth visits</div></div>	Continuously – Started during the hospital stay and continued within 1 week after minor amputation and hospital discharge	Level of patient satisfaction with complex diabetic and dietetic education (target: at least 6 on a scale from 1-10)
Local Core Feature 4	Long term aftercare for multimorbid type 2 diabetes patients to minimize quality of life loss and complications				
SMART objective					
In the framework of JADECARE, we will formulate a long-term aftercare method for multimorbid type 2 diabetes patient with minor amputation after complete wound healing to minimize the chance of further complications. Our objective is to make personalised long term aftercare plan for at least 5 patients.					

Activities	Actors	Resources	Setting(s)	Timeline	KPIs
Formulate long term aftercare health plan based on the individual needs and the available capacities	<ul style="list-style-type: none"> -Medical Staff -Primary Doctor -Family Member -Social Worker -Physiotherapist -Psychologist -Staff of Health Promotion Office 	Medical Guidelines	<ul style="list-style-type: none"> -Outpatient Clinics -Primary Care -Home hospitalisation -Health Promotion Office 	Oct/Nov 2021	Numbers lifestyles change programmes (e. g. patient education, patient clubs etc.) (target: at least 3)
Involving patients in aftercare and lifestyle change programmes (patient education, patient clubs, physiotherapy, psychologist, health education) using digital tools	<ul style="list-style-type: none"> -Medical Staff -Primary Doctor -Family Member -Social Worker -Physiotherapist -Psychologist -Staff of Health Promotion Office 	Capacities of HPO	<ul style="list-style-type: none"> -Outpatient Clinics -Primary Care -Home hospitalisation -Health Promotion Office 	Continuously – Within 1 months after minor amputation and thereafter on a regular basis	Number of individual personalised long term aftercare plans (target: at least 5)
Create a dashboard of measurable and achievable indicators to assess the effectiveness of the complex and integrated care.	<ul style="list-style-type: none"> -Project Manager -Data scientists -Medical Staff -Primary Doctor -Family Member -Social Worker -Physiotherapist -Psychologist 	Electronic Health Care Data	Hospital	Oct/Nov 2021	Number of indicators that are developed to measure the effectiveness of the whole complex and integrated care process (target: at least 10 indicator)

	-Staff of Health Promotion Of- fice				
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Implementation

1st PDSA Cycle

Plan

LCF1								
Development of a risk assessment algorithm and prediction model for type II diabetes complications and a further risk stratification method for health policy purposes including prevention.								
Activities	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Development a risk assessment algorithm for type II diabetes complication	Review of current clinical guidelines	Healthcare professionals	Oct/Nov 2021	Risk factors included in the risk assessment algorithm	Medical staff	30/11/2021	Source: Current Guidelines for Diabetes Care and patient's data	target: at least 3
	Review of individual patient characteristics							
Activity 2: Implement risk assessment, risk classification for multimorbid type 2 diabetes patients	Implement algorithm tool	Healthcare professionals	Continuously - During the hospital stay of each patient	Number of patients who participated in the risk assessment	Medical staff	22/12/2022	Source: Clinical data of medical records + Structured interview of each patient	target: 15 patients with type II diabetes
Activity 3: Identification of key Medical History Elements	Review of Medical History	Healthcare professional	Continuously - During the hospital stay of each patient	Number of patients who take part in the Identification of key Medical	Medical staff <i>HCP</i>	22/12/2022	Source: Clinical data of medical records + Structured	target: 10 patients with type II diabetes

				History Elements			interview of each patient	
Activity 4: Identification of relevant risk factors for risk stratification such as neglected treatment and care needs and factors or patient and provider compliance	Review of Medical History	Healthcare professional	Continuously - During the hospital stay of each patient	Identified relevant risk factors for type II diabetes complication for risk stratification purpose	Medical staff	22/12/2022	Source: Clinical data of medical records + Structured interview of each patient	target: at least 3 relevant risk factors for type II diabetes complication

LCF2		Complex acute care for multimorbid type 2 diabetes patients with risk of minor amputation						
Activities	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Develop and introduce a perioperative diabetology protocol to ensure consistent and safe patient treatment and care	Review of current clinical guidelines	Medical Staff	Dec 2022	Number of developed complex diabetology protocol	Medical staff HCP	22/12/2022	Source: Current Guidelines of Medical Care	target: 2, at least one pre-operative and one postoperative protocol
	Consultation between HCP's							
	Develop a preoperative hospital protocol							
	Develop a postoperative hospital protocol							
	Review of current guidelines	Medical Staff	Dec 2022			22/12/2022		target: 4

Activity 2: Introduction of a preoperative integrated (diabetology-angiology-etc) protocol (professional guideline) (bottom-up approach, generalising individualised patient pathways)	Consultation between HCP's	Hospital Leadership		Number of health care professionals with different specialty included in the formulation of the complex diabetology protocols	Medical staff		Source: Current Guidelines of Surgical and Medical Care	
Activity 3: Formulation and implementation of a post-operative integrated protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways)	Review of current guidelines	-Medical Staff	During the whole program	Number of health care professionals with different specialty included in the formulation of the complex diabetology protocols	Medical staff	22/12/2022	Source: Current Guidelines of Surgical and Medical Care	target: 4
	Consultation between HCP's	-Hospital Leadership						
Activity 4: Strengthening (building and linking missing links, tuning) + shortening individualized patient pathways, formulate complex case management methods	Discussions and consensus between departments inside the hospital	Medical Staff and Hospital Leadership	During the whole program	Number of health care professionals with different specialty included in patient pathways	-Hospital directorates -Administration -Medical staff	22/12/2022	Source: - Current Guidelines of Surgical and Medical Care -Cooperation agreements	target: 4
	Discussion and negotiations between different health care providers inclusive of OKFŐ							

					-OKFÓ members - Primary care		-National E-Health Infrastructure -Patient pathway management tool	
Activity 5: Use of a standardized protocol for requesting examinations with the use of digital patient pathway management system	Discussions between medical staff and IT staff about the aimed developments	-Medical Staff -IT Staff	During the whole program	1.Number of patients that got their patient pathway according to the new protocols 2.Level of patient satisfaction with pathway management system	-Medical staff -HPO -IT staff	22/12/2022	Source: Medical records	1.target: 10 patients with type II diabetes 2.target: at least 7 on a scale from 1-10
	Elaborate the IT background and the digital patient pathway management system							
	Get feedback from the patients							

LCF3	Complex rehabilitation program for multimorbid type 2 diabetes patients with minor amputation.							
Activities	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target

Activity 1: Provide complex and integrated aftercare for multimorbid type 2 diabetes patients with minor amputation	Write referrals letters	<ul style="list-style-type: none"> -Medical Staff -Physiotherapist -Dietician 	Continuously: Regular follow-up visits scheduled depending on the specialty and the individual needs	Number of available services (e. g. physiotherapy, mental health services, etc.)	Medical staff	22/12/2022	Source: Clinical data of medical records (National E-Health Infrastructure)	target: at least 4
	Follow up the patients	<ul style="list-style-type: none"> -Home care nurse -Primary Doctor -Family Member -Social Worker -Staff of Health Promotion Office (*HPO) 						
Activity 2: Development of area-specific physiotherapy groups	Development of physiotherapy protocol	<ul style="list-style-type: none"> -Physiotherapist -Leader of HPO 	Jan 2022	Number of patients involved in the group	<ul style="list-style-type: none"> -Physiotherapist -Leader of HPO 	22/12/2022	Source: HPO registry	target: at least 10 multimorbid type 2 diabetes patients with minor amputation
	Offering and advising participation for the patients							
	Organizing the physiotherapy program							

Activity 3: Produce and test a standardized (digital) health literacy assessment method	Produce the test	-Medical Staff -Staff of HPO	Jan 2022	Number of patients that have their health literacy level assessed with the new health literacy assessment method	Leader of HPO	22/12/2022	Source: HPO registry	Target: yes target: at least 10 multimorbid type 2 diabetes patients with minor amputation
	Implement the test							
Activity 4: Implement a postoperative complex diabetic and dietetic education system tailored for patients with different health literacy level supported by ICT tools (written + audio-visual)	Implement the education	-Medical Staff -Diabetology Nurse -Dietician -Staff of HPO -IT staff	During the whole program	Number of patients involved in the education	Dieticians Medical staff	22/12/2022	Source: HIS registries	target: at least 10 multimorbid type 2 diabetes patients with minor amputation
Activity 5: Develop and introduce a Patient Education Effectiveness Feedback System	Develop the questionnaire	-Medical Staff -Diabetology Nurse -Staff of Health Promotion Office	Jan/Mar 2022	Level of patient satisfaction with complex diabetic and dietetic education	-Leader of HPO -Specialist Nurse	22/12/2022	Source: Registries	target: yes
	Get feedback from the patients							target: at least 6 on a scale from 1-10

Activity 6: Provide mental health support as part of the rehabilitation system	Give consultation for the patients	Psychologist	During the whole program	Number of patients involved in the consultation	Psychologists of HPO	22/12/2022	Source: HPO Registries	target: at least 10 multimorbid type 2 diabetes patients with minor amputation
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LCF4	Long term aftercare for multimorbid type 2 diabetes patients to minimize quality of life loss and complications									
Activities	Actions			Actors	Timeline	KPIs measure (data collection)				
						KPI	Who	When	How	Target
Activity 1: Formulate long-term aftercare health plan based on the individual needs and the available capacities	Follow	current	medical	-Medical Staff -Primary Doctor -Family Member -Social Worker -Physiotherapist -Psychologist -Staff of Health Promotion Office	During the whole program	Number of individual personalised long term aftercare plans	Medical Staff	22/12/2022	Source: Medical Guidelines	target: at least 5

Activity 2: Involving patients in aftercare and lifestyle change programmes (patient education, patient clubs, physiotherapy, psychologist, health education) using digital tools	Offer these consultations for the patients	<ul style="list-style-type: none"> -Medical Staff -Primary Doctor -Family Member -Social Worker -Physiotherapist -Psychologist -Staff of Health Promotion Office 	During the whole program	Number of lifestyles change programmes (e.g. patient education, patient clubs etc.)	<ul style="list-style-type: none"> -Medical Staff -HPO 	22/12/2022	Source: HPO's registry	target: at least 3
Activity 3: Create a dashboard of measurable and achievable indicators to assess the effectiveness of the complex and integrated care.	Analyze and summarize the results	<ul style="list-style-type: none"> -Project Manager -Data scientists -Medical Staff -Primary Doctor -Family Member -Social Worker 	Dec 2022	Number of indicators that are developed to measure the effectiveness of the whole complex and integrated care process	<ul style="list-style-type: none"> -Medical Staff -Data scientists 	22/12/2022	Source: Electronic Health Care Data	target: at least 10 indicators

		-Physiotherapist -Psychologist -Staff of Health Promotion Office						
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Do

Cycle number (1 or 2)	1	
Activity	KPI	Actual value
LCF 1 – Activity 1: Development a risk assessment algorithm for type II diabetes complication	Number of Risk factors included in the risk assessment algorithm	3
LCF 1 – Activity 2: Implement risk assessment, risk classification for multimorbid type 2 diabetes patients	Number of patients who participated in the risk assessment	3
LCF 1 – Activity 3: Identification of key Medical History Elements	Number of patients who take part in the Identification of key Medical History Elements	3
LCF 1 – Activity 4: Identification of relevant risk factors for risk stratification such as neglected treatment and care needs and factors or patient and provider compliance	Number of Identified relevant risk factors for type II diabetes complication for risk stratification purpose	3
LCF 2 – Activity 1: Develop and introduce a perioperative diabetology protocol to ensure consistent and safe patient treatment and care	Number of developed complex diabetology protocol	2
LCF 2 – Activity 2: Introduction of a preoperative integrated (diabetology-angiology-etc) protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways	Number of health care professionals with different specialty included in the formulation of the complex diabetology protocols	4
LCF 2 – Activity 3: Formulation and implementation of a post-operative integrated protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways)	Number of health care professionals with different specialty included in the formulation of the complex diabetology protocols	4
LCF 2 – Activity 4: Strengthening (building and linking missing links, tuning) + shortening individualized patient pathways, formulate complex case management methods	Number of health care professionals with different specialty included in patient pathways	3
LCF 2 – Activity 5: Use of a standardized protocol for requesting examinations with the use of digital patient pathway management system	Number of patients that got their patient pathway according to the new protocols	3
	Level of patient satisfaction with pathway	7
LCF 2 – Activity 1: Provide complex and integrated aftercare for multimorbid type 2 diabetes patients with minor amputation	Number of available services (e. g. physiotherapy, mental health services, etc.)	4
LCF 3 – Activity 2: Development of area-specific physiotherapy groups role, reference internist)	Number of patients involved in the group	3

LCF 3 – Activity 3: Produce and test a standardized (digital) health literacy assessment method	Number of patients that have their health literacy level assessed with the new health literacy assessment method	0
LCF 3 – Activity 4: Implement a postoperative complex diabetic and dietetic education system tailored for patients with different health literacy level supported by ICT tools (written + audio-visual)	Number of patients involved in the education	3
LCF 3 – Activity 5: Develop and introduce a Patient Education Effectiveness Feedback System	Level of patient satisfaction with complex diabetic and dietetic education	0
LCF 3 – Activity 6: Provide mental health support as part of the rehabilitation system	Number of patients involved in the consultation	1
LCF 4 – Activity 1: Formulate long-term aftercare health plan based on the individual needs and the available capacities	Number of individual personalised long term aftercare plans	3
LCF 4 – Activity 2: Involving patients in aftercare and lifestyle change programs (patient education, patient clubs, physiotherapy, psychologist, health education) using digital tools	Number of lifestyles change programmes (e. g. patient education, patient clubs etc.)	0
LCF 4 – Activity 3: Create a dashboard of measurable and achievable indicators to assess the effectiveness of the complex and integrated care	Number of indicators that are developed to measure the effectiveness of the whole complex and integrated care process	0

QUESTIONS	ANSWERS
What was actually implemented? Any deviation from the planned actions	<p>Ethical permission for research purposes.</p> <p>IT system development started within the hospital.</p> <p>Hospital protocol build for the use case.</p> <p>Communication and agreement between the hospital healthcare providers strengthen because of the cause.</p> <p>Health promotion office integrated with the hospital life→ stronger cooperation, plus opportunity to widen the health service for patients.</p> <p>More emphasis on the patient pathway management.</p>
Problems? Unexpected findings? Please describe	<p>No prior diabetes management.</p> <p>No primary care visits, no laboratory control.</p> <p>Impact of lack of consultation.</p> <p>Patients from bad social environment (lack of health culture, and primer knowledge) not just the healthcare sector problem but a social sector problem.</p> <p>Digital incompetencies amongst the patients.</p>
IMPLEMENTATION PROGRESS OF THE LOCAL GOOD PRACTICE	
0-25%	25-50%
50-75%	75-100%

	x		
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Study

Cycle number (1or 2)		1				
Activity	KPI	Target value	Actual value	Reasons for the deviations	Mitigation actions implemented	Impact of mitigation actions
LCF 1 – Activity 1: Development a risk assessment algorithm for type II diabetes complication	Number of Risk factors included in the risk assessment algorithm	3	3			
LCF 1 – Activity 2: Implement risk assessment, risk classification for multimorbid type 2 diabetes patients	Number of patients who participated in the risk assessment	15	3	Patient enrolment is still in progress. Due to: delay caused by COVID + ethical approval obtained lately.	Continue to work	It will be part of 2 nd PDSA cycle
LCF 1 – Activity 3: Identification of key Medical History Elements	Number of patients who take part in the Identification of key Medical History Elements	10	3	Patient enrolment is still in progress	Continue to work	It will be part of 2 nd PDSA cycle
LCF 1 – Activity 4: Identification of relevant risk factors for risk stratification such as neglected treatment and care needs and factors or patient and provider compliance	Number of Identified relevant risk factors for type II diabetes complication for risk stratification purpose	3	3			
LCF 2 – Activity 1: Develop and introduce a perioperative diabetology protocol to ensure consistent and safe patient treatment and care	Number of developed complex diabetology protocol	2	2			

LCF 2 – Activity 2: Introduction of a preoperative integrated (diabetology-angiology-etc) protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways)	Number of health care professionals with different specialty included in the formulation of the complex diabetology protocols	4	4			
LCF 2 – Activity 3: Formulation and implementation of a post-operative integrated protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways)	Number of health care professionals with different specialty included in the formulation of the complex diabetology protocols	4	4			
LCF 2 – Activity 4: Strengthening (building and linking missing links, tuning) + shortening individualized patient pathways, formulate complex case management methods	Number of health care professionals with different specialty included in patient pathways	4	3	Communication and cooperation between HCP's should be improved. Internal and external factors. different level of collaborations (internal-hospital level, external-decision makers).	More frequent meetings and spreading the importance of the project amongst Hungarian stakeholders.	Strengthen the cooperation between the different healthcare providers in PDSA2.
LCF 2 – Activity 5: Use of a standardized protocol for requesting examinations with the use of digital patient pathway management system	Number of patients that got their patient pathway according to the new protocols	10	3	patient enrolment is still in progress. IT background is still to be developed.	continue to work	it will be part of 2 nd PDSA cycle
	Level of patient satisfaction with pathway	7	7			
LCF 3 – Activity 1: Provide complex	Number of available services	4	4			

and integrated aftercare for multimorbid type 2 diabetes patients with minor amputation	(e. g. physiotherapy, mental health services, etc.)					
LCF 3 – Activity 2: Development of area-specific physiotherapy groups role, reference internist)	Number of patients involved in the group	10	3	Difficulties occurred as far as patient mobility is concerned. Home care preferred	Investigating the HR for home care.	
LCF 3 – Activity 3: Produce and test a standardized (digital) health literacy assessment method	Number of patients that have their health literacy level assessed with the new health literacy assessment method	10	0	It was not priority regarding the study plan.	Reorganizing the original plan (concerning essentials)	Postpone and replace this activity by simple short interview of the patient
LCF 3 – Activity 4: Implement a postoperative complex diabetic and dietetic education system tailored for patients with different health literacy level supported by ICT tools (written + audio-visual)	Number of patients involved in the education	10	3	Patient enrolment is still in progress.	Continue to work	It will be part of 2 nd PDSA cycle
LCF 3 – Activity 5: Develop and introduce a Patient Education Effectiveness Feedback System	Level of patient satisfaction with complex diabetic and dietetic education	6	0	To be postponed Feedback is gained only orally	Not a priority.	Information gathered by the healthcare professional in interview format.
LCF 3 – Activity 6: Provide mental health support as part of the rehabilitation system	Number of patients involved in the consultation	10	1	Legally a patient cannot be forced to visit mental health support.	HCP emphasizing the importance of mental health.	
LCF 4 – Activity 1: Formulate long-term aftercare health plan based	Number of individual personalised long	5	3	Other factors like banned	Following the whole protocol	

on the individual needs and the available capacities	term aftercare plans			gathering during the pandemic. It is too early in this patient follow-up phase.		
LCF 4 – Activity 2: Involving patients in aftercare and lifestyle change programs (patient education, patient clubs, physiotherapy, psychologist, health education) using digital tools	Number of lifestyles change programmes (e. g. patient education, patient clubs etc.)	3	0	Covid restrictions-banned gatherings. Not in that phase		it will be part of 2 nd PDSA cycle
LCF 4 – Activity 3: Create a dashboard of measurable and achievable indicators to assess the effectiveness of the complex and integrated care	Number of indicators that are developed to measure the effectiveness of the whole complex and integrated care process	10	0	This was too early in the use-case	Planned the right time	

Act

Cycle number (1 or 2)	1		
Activity	Maintain	Adapt	Abandon
LCF 1 – Activity 1: Development a risk assessment algorithm for type II diabetes complication	X		
LCF 1 – Activity 2: Implement risk assessment, risk classification for multimorbid type 2 diabetes patients	X		
LCF 1 – Activity 3: Identification of key Medical History Elements	X		
LCF 1 – Activity 4: Identification of relevant risk factors for risk stratification such as neglected treatment and care needs and factors or patient and provider compliance	X		
LCF 2 – Activity 1: Develop and introduce a perioperative diabetology protocol to ensure consistent and safe patient treatment and care	X		

LCF 2 – Activity 2: Introduction of a preoperative integrated (diabetology-angiology-etc) protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways		X - more interaction between with specialist doctors is needed	
LCF 2 – Activity 3: Formulation and implementation of a post-operative integrated protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways)		X - more interaction among specialist doctors and hospital management is needed	
LCF 2 – Activity 4: Strengthening (building and linking missing links, tuning) + shortening individualized patient pathways, formulate complex case management methods		X - more interaction among specialist doctors and hospital management is needed at hospital level and between different providers	
LCF 2 – Activity 5: Use of a standardized protocol for requesting examinations with the use of digital patient pathway management system		X - more consultation is needed between hospital doctors and IT staff (To be postponed until IT staff complete the background support)	
LCF 3 – Activity 1: Provide complex and integrated aftercare for multimorbid type 2 diabetes patients with minor amputation		X - medical staff is strongly advised to use checklists as well	
LCF 3 – Activity 2: Development of area-specific physiotherapy groups role, reference internist)		X - replaced by home care	
LCF 3 – Activity 3: Produce and test a standardized (digital) health literacy assessment method		X - to be postponed	
LCF 3 – Activity 4: Implement a postoperative complex diabetic and dietetic education system tailored for patients with different health literacy level supported by ICT tools (written + audio-visual)		X - Improving availability in the outpatient setting would be preferred.	
LCF 3 – Activity 5: Develop and introduce a Patient Education Effectiveness Feedback System		X - to be postponed	
LCF 3 – Activity 6: Provide mental health support as part of the rehabilitation system		X - not an obligatory element, patient's consent makes it optional	
LCF 4 – Activity 1: Formulate long-term aftercare health plan based on the individual needs and the available capacities		X - more interaction is needed between hospital and primary care level	
LCF 4 – Activity 2: Involving patients in aftercare and lifestyle change programs (patient education, patient clubs, physiotherapy, psychologist, health education) using digital tools		X - to be postponed	

LCF 4 – Activity 3: Create a dashboard of measurable and achievable indicators to assess the effectiveness of the complex and integrated care		X - to be postponed	
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QUESTIONS	ANSWERS
Any new proposed action for the future?	Clear agreement is to be done about IT work, concerning cooperation about software development and patient pathway management

2nd PDSA Cycle

Plan

LCF1		Development of a risk assessment algorithm and prediction model for type II diabetes complications and a further risk stratification method for health policy purposes including prevention.						
Activities	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Development a risk assessment algorithm for type II diabetes complication	Review of current clinical guidelines	Healthcare professionals	Oct/Nov 2021	Risk factors included in the risk assessment algorithm	Medical staff	30/11/2021	Source: Current Guidelines for Diabetes Care and patient's data	target: at least 3
	Review of individual patient characteristics							
Activity 2: Implement risk assessment, risk classification for multimorbid type 2 diabetes patients	Implement algorithm tool	Healthcare professionals	Continuously - During the hospital stay of each patient	Number of patients who participated in the risk assessment	Medical staff	22/12/2022	Source: Clinical data of medical records + Structured interview of each patient	target: 15 patients with type II diabetes
Activity 3: Identification of key Medical History Elements	Review of Medical History	Healthcare professional	Continuously - During the hospital stay of each patient	Number of patients who take part in the Identification of key Medical History Elements	Medical staff <i>HCP</i>	22/12/2022	Source: Clinical data of medical records + Structured interview	target: 10 patients with type II diabetes

							of each patient	
Activity 4: Identification of relevant risk factors for risk stratification such as neglected treatment and care needs and factors or patient and provider compliance	Review of Medical History	Healthcare professional	Continuously - During the hospital stay of each patient	Identified relevant risk factors for type II diabetes complication for risk stratification purpose	Medical staff	22/12/2022	Source: Clinical data of medical records + Structured interview of each patient	target: at least 3 relevant risk factors for type II diabetes complication

LCF2		Complex acute care for multimorbid type 2 diabetes patients with risk of minor amputation						
Activities	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Develop and introduce a perioperative diabetology protocol to ensure consistent and safe patient treatment and care	Review of current clinical guidelines	Medical Staff	Dec 2022	Number of developed complex diabetology protocol	Medical staff HCP	22/12/2022	Source: Current Guidelines of Medical Care	target: 2, at least one pre-operative and one postoperative protocol
	Consultation between HCP's							
	Develop a preoperative hospital protocol							
	Develop a postoperative hospital protocol							
	Review of current guidelines	Medical Staff	Dec 2022			22/12/2022		target: 4

Activity 2: Introduction of a preoperative integrated (diabetology-angiology-etc) protocol (professional guideline) (bottom-up approach, generalising individualised patient pathways)	Consultation between HCP's	Hospital Leadership		Number of health care professionals with different specialty included in the formulation of the complex diabetology protocols	Medical staff		Source: Current Guidelines of Surgical and Medical Care	
Activity 3: Formulation and implementation of a post-operative integrated protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways)	Review of current guidelines	-Medical Staff	During the whole program	Number of health care professionals with different specialty included in the formulation of the complex diabetology protocols	Medical staff	22/12/2022	Source: Current Guidelines of Surgical and Medical Care	target: 4
	Consultation between HCP's	-Hospital Leadership						
Activity 4: Strengthening (building and linking missing links, tuning) + shortening individualized patient pathways, formulate complex case management methods	Discussions and consensus between departments inside the hospital	Medical Staff and Hospital Leadership	During the whole program	Number of health care professionals with different specialty included in patient pathways	-Hospital directorates -Administration -Medical staff	22/12/2022	Source: - Current Guidelines of Surgical and Medical Care -Cooperation agreements	target: 4
	Discussion and negotiations between different health care providers inclusive of OKFŐ							

					-OKFŐ mem- bers - Primary care		-National E-Health Infrastuc- ture -Patient pathway manage- ment tool	
Activity 5: Use of a standardized protocol for requesting examinations with the use of digital patient pathway management system	Discussions between medical staff and IT staff about the aimed developments	-Medical Staff -IT Staff	During the whole program	1.Number of pa- tients that got their patient pathway accord- ing to the new protocols 2.Level of patient satisfaction with pathway management system	-Medi- cal staff -HPO -IT staff	22/12/2022	Source: Medical records	1.target: 10 pa- tients with type II diabe- tes 2.target: at least 7 on a scale from 1-10
	Elaborate the IT background and the digital patient pathway man- agement system							
	Get feedback from the patients							

LCF3		Complex rehabilitation program for multimorbid type 2 diabetes patients with minor amputation.						
Activities	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Provide complex and integrated aftercare for multimorbid type 2 diabetes patients with minor amputation	Write referrals letters	-Medical Staff -Physiotherapist -Dietician	Continuously: Regular follow-up visits scheduled depending on the specialty and the individual needs	Number of available services (e. g. physiotherapy, mental health services, etc.)	Medical staff	22/12/2022	Source: Clinical data of medical records (National E-Health Infrastructure)	target: at least 4
	Follow up the patients	-Home care nurse -Primary Doctor -Family Member -Social Worker -Staff of Health Promotion Office (*HPO)						
Activity 2: Development of area-specific physiotherapy groups	Development of physiotherapy protocol	-Physiotherapist	Jan 2022		-Physiotherapist	22/12/2022	Source: HPO registry	target: at least 10 multimor-

	Offering and advising participation for the patients	-Leader of HPO		Number of patients involved in the group	-Leader of HPO			bid type 2 diabetes patients with minor amputation
	Organizing the physiotherapy program							
Activity 3: Produce and test a standardized (digital) health literacy assessment method	Produce the test	-Medical Staff -Staff of HPO	Jan 2022	Number of patients that have their health literacy level assessed with the new health literacy assessment method	Leader of HPO	22/12/2022	Source: HPO registry	Target: yes target: at least 10 multimorbid type 2 diabetes patients with minor amputation
	Implement the test							
Activity 4: Implement a postoperative complex diabetic and dietetic education system tailored for patients with different health literacy level supported by ICT tools (written + audio-visual)	Implement the education	-Medical Staff -Diabetology Nurse -Dietician -Staff of HPO -IT staff	During the whole program	Number of patients involved in the education	Dieticians Medical staff	22/12/2022	Source: HIS registries	target: at least 10 multimorbid type 2 diabetes patients with minor amputation
Activity 5: Develop and introduce a Patient Education	Develop the questionnaire	-Medical Staff	Jan/Mar 2022	Level of patient	-Leader of HPO	22/12/2022	Source: Registries	target: yes

Effectiveness System	Feedback	Get feedback from the patients	-Diabetology Nurse -Staff of Health Promotion Office		satisfaction with complex diabetic and dietetic education	-Specialist Nurse			target: at least 6 on a scale from 1-10
Activity 6: Provide mental health support as part of the rehabilitation system		Give consultation for the patients	Psychologist	During the whole program	Number of patients involved in the consultation	Psychologists of HPO	22/12/2022	Source: HPO Registries	target: at least 10 multimorbid type 2 diabetes patients with minor amputation

LCF4	Long term aftercare for multimorbid type 2 diabetes patients to minimize quality of life loss and complications									
Activities	Actions			Actors	Timeline	KPIs measure (data collection)				
						KPI	Who	When	How	Target
Activity 1: Formulate long-term aftercare health plan based on the individual needs and the available capacities	Follow	current	medical	-Medical Staff -Primary Doctor -Family Member -Social Worker	During the whole program	Number of individual personalised long term aftercare plans	Medical Staff	22/12/2022	Source: Medical Guidelines	target: at least 5

		-Physiotherapist -Psychologist -Staff of Health Promotion Office						
Activity 2: Involving patients in aftercare and lifestyle change programmes (patient education, patient clubs, physiotherapy, psychologist, health education) using digital tools	Offer these consultations for the patients	-Medical Staff -Primary Doctor -Family Member -Social Worker -Physiotherapist -Psychologist -Staff of Health Promotion Office	During the whole program	Number of lifestyles change programmes (e.g. patient education, patient clubs etc.)	-Medical Staff -HPO	22/12/2022	Source: HPO's registry	target: at least 3
Activity 3: Create a dashboard of measurable and achievable indicators to assess the effectiveness of the complex and integrated care.	Analyze and summarize the results	-Project Manager -Data scientists -Medical Staff	Dec 2022	Number of indicators that are developed to measure the effectiveness of the whole complex and	-Medical Staff -Data scientists	22/12/2022	Source: Electronic Health Care Data	target: at least 10 indicators

		-Primary Doc- tor -Family Mem- ber -Social Worker -Physiothera- pist -Psychologist -Staff of Health Promotion Of- fice		integrated care process				
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Do

Cycle number (1 or 2)	2	
Activity	KPI	Actual value
LCF 1 – Activity 1: Development a risk assessment algorithm for type II diabetes complication	Number of Risk factors included in the risk assessment algorithm	3
LCF 1 – Activity 2: Implement risk assessment, risk classification for multimorbid type 2 diabetes patients	Number of patients who participated in the risk assessment	15
LCF 1 – Activity 3: Identification of key Medical History Elements	Number of patients who take part in the Identification of key Medical History Elements	10
LCF 1 – Activity 4: Identification of relevant risk factors for risk stratification such as neglected treatment and care needs and factors or patient and provider compliance	Number of Identified relevant risk factors for type II diabetes complication for risk stratification purpose	3
LCF 2 – Activity 1: Develop and introduce a perioperative diabetology protocol to ensure consistent and safe patient treatment and care	Number of developed complex diabetology protocol	2
LCF 2 – Activity 2: Introduction of a preoperative integrated (diabetology-angiology-etc) protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways	Number of health care professionals with different specialty included in the formulation of the complex diabetology protocols	4
LCF 2 – Activity 3: Formulation and implementation of a post-operative integrated protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways)	Number of health care professionals with different specialty included in the formulation of the complex diabetology protocols	4
LCF 2 – Activity 4: Strengthening (building and linking missing links, tuning) + shortening individualized patient pathways, formulate complex case management methods	Number of health care professionals with different specialty included in patient pathways	4
LCF 2 – Activity 5: Use of a standardized protocol for requesting examinations with the use of digital patient pathway management system	Number of patients that got their patient pathway according to the new protocols	10
	Level of patient satisfaction with pathway	7
LCF 3 – Activity 1: Provide complex and integrated aftercare for multimorbid type 2 diabetes patients with minor amputation	Number of available services (e. g. physiotherapy, mental health services, etc.)	4
LCF 3 – Activity 2: Development of area-specific physiotherapy groups role, reference internist)	Number of patients involved in the group	10
LCF 3 – Activity 3: Produce and test a standardized (digital) health literacy assessment method	Number of patients that have their health literacy level assessed with the new health literacy assessment method	10
LCF 3 – Activity 4: Implement a postoperative complex diabetic and dietetic education system tailored for patients with different health literacy level supported by ICT tools (written + audio-visual)	Number of patients involved in the education	10

LCF 3 – Activity 5: Develop and introduce a Patient Education Effectiveness Feedback System	Level of patient satisfaction with complex diabetic and dietetic education	0
LCF 3 – Activity 6: Provide mental health support as part of the rehabilitation system	Number of patients involved in the consultation	10
LCF 4 – Activity 1: Formulate long-term aftercare health plan based on the individual needs and the available capacities	Number of individual personalised long term aftercare plans	5
LCF 4 – Activity 2: Involving patients in aftercare and lifestyle change programs (patient education, patient clubs, physiotherapy, psychologist, health education) using digital tools	Number of lifestyles change programmes (e. g. patient education, patient clubs etc.)	0
LCF 4 – Activity 3: Create a dashboard of measurable and achievable indicators to assess the effectiveness of the complex and integrated care	Number of indicators that are developed to measure the effectiveness of the whole complex and integrated care process	10

QUESTIONS	ANSWERS
What was actually implemented? Any deviation from the planned actions	<p>Ethical permission for research purposes.</p> <p>IT system development started within the hospital.</p> <p>Hospital protocol build for the use case.</p> <p>Communication and agreement between the hospital healthcare providers strengthen because of the cause.</p> <p>Health promotion office integrated with the hospital life→ stronger cooperation, plus opportunity to widen the health service for patients.</p> <p>More emphasis on the patient pathway management.</p> <p>Involvement of Hungarian stakeholders.</p> <p>Establish connection between the primary care and professional care.</p>
Problems? Unexpected findings? Please describe	<p>No prior diabetes management.</p> <p>No primary care visits, no laboratory control.</p> <p>Impact of lack of consultation.</p> <p>Patients from bad social environment (lack of health culture, and primer knowledge) not just the healthcare sector problem but a social sector problem.</p> <p>Digital incompetencies amongst the patients.</p>

IMPLEMENTATION PROGRESS OF THE LOCAL GOOD PRACTICE			
0-25%	25-50%	50-75%	75-100%
			x

Study

Cycle number (1or 2)	2					
Activity	KPI	Target value	Actual value	Reasons for the deviations	Mitigation actions implemented	Impact of mitigation actions
LCF 1 – Activity 1: Development a risk assessment algorithm for type II diabetes complication	Number of Risk factors included in the risk assessment algorithm	3	3			
LCF 1 – Activity 2: Implement risk assessment, risk classification for multimorbid type 2 diabetes patients	Number of patients who participated in the risk assessment	15	15			
LCF 1 – Activity 3: Identification of key Medical History Elements	Number of patients who take part in the Identification of key Medical History Elements	10	10			
LCF 1 – Activity 4: Identification of relevant risk factors for risk stratification such as neglected treatment and care needs and factors or patient and provider compliance	Number of Identified relevant risk factors for type II diabetes complication for risk stratification purpose	3	3			
LCF 2 – Activity 1: Develop and introduce a perioperative diabetology protocol to ensure consistent and safe patient treatment and care	Number of developed complex diabetology protocol	2	2			
LCF 2 – Activity 2: Introduction of a preoperative integrated (diabetology-angiology-etc) protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways	Number of health care professionals with different specialty included in the formulation of the complex diabetology protocols	4	4			

LCF 2 – Activity 3: Formulation and implementation of a post-operative integrated protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways)	Number of health care professionals with different specialty included in the formulation of the complex diabetology protocols	4	4			
LCF 2 – Activity 4: Strengthening (building and linking missing links, tuning) + shortening individualized patient pathways, formulate complex case management methods	Number of health care professionals with different specialty included in patient pathways	4	4			
LCF 2 – Activity 5: Use of a standardized protocol for requesting examinations with the use of digital patient pathway management system	Number of patients that got their patient pathway according to the new protocols	10	10			
	Level of patient satisfaction with pathway	7	7			
LCF 3 – Activity 1: Provide complex and integrated aftercare for multimorbid type 2 diabetes patients with minor amputation	Number of available services (e. g. physiotherapy, mental health services, etc.)	4	4			
LCF 3 – Activity 2: Development of area-specific physiotherapy groups role, reference internist)	Number of patients involved in the group	10	10			
LCF 3 – Activity 3: Produce and test a standardized (digital) health literacy assessment method	Number of patients that have their health literacy level assessed with the new health literacy assessment method	10	0	It was not priority regarding the study plan.	Reorganizing the original plan (concerning essentials)	Postpone and replace this activity by simple short interview of the patient
LCF 3 – Activity 4: Implement a postoperative complex diabetic and dietetic	Number of patients involved in the education	10	10			

education system tailored for patients with different health literacy level supported by ICT tools (written + audio-visual)						
LCF 3 – Activity 5: Develop and introduce a Patient Education Effectiveness Feedback System	Level of patient satisfaction with complex diabetic and dietetic education	6	0	To be postponed Feedback is gained only orally	Not a priority in the use case.	Information gathered by the healthcare professional in interview format.
LCF 3 – Activity 6: Provide mental health support as part of the rehabilitation system	Number of patients involved in the consultation	10	10			
LCF 4 – Activity 1: Formulate long-term aftercare health plan based on the individual needs and the available capacities	Number of individual personalised long term aftercare plans	5	5			
LCF 4 – Activity 2: Involving patients in aftercare and lifestyle change programs (patient education, patient clubs, physiotherapy, psychologist, health education) using digital tools	Number of lifestyles change programmes (e. g. patient education, patient clubs etc.)	3	3			
LCF 4 – Activity 3: Create a dashboard of measurable and achievable indicators to assess the effectiveness of the complex and integrated care	Number of indicators that are developed to measure the effectiveness of the whole complex and integrated care process	10	10			

Act

Cycle number (1 or 2)	1		
Activity	Maintain	Adapt	Abandon
LCF 1 – Activity 1: Development a risk assessment algorithm for type II diabetes complication	X		

LCF 1 – Activity 2: Implement risk assessment, risk classification for multimorbid type 2 diabetes patients	X		
LCF 1 – Activity 3: Identification of key Medical History Elements	X		
LCF 1 – Activity 4: Identification of relevant risk factors for risk stratification such as neglected treatment and care needs and factors of patient and provider compliance	X		
LCF 2 – Activity 1: Develop and introduce a perioperative diabetology protocol to ensure consistent and safe patient treatment and care	X		
LCF 2 – Activity 2: Introduction of a preoperative integrated (diabetology-angiology-etc) protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways)		X - more interaction between with specialist doctors is needed	
LCF 2 – Activity 3: Formulation and implementation of a post-operative integrated protocol (professional guideline) (bottom-up approach, generalizing individualized patient pathways)		X - more interaction among specialist doctors and hospital management is needed	
LCF 2 – Activity 4: Strengthening (building and linking missing links, tuning) + shortening individualized patient pathways, formulate complex case management methods		X - more interaction among specialist doctors and hospital management is needed at hospital level and between different providers Changing is in progress concerning the structure of cooperation between primary and secondary care	
LCF 2 – Activity 5: Use of a standardized protocol for requesting examinations with the use of digital patient pathway management system		X - more consultation is needed between hospital doctors and IT staff (IT staff is working continuously on cooperation between medical and IT members to develop the IT support in the background)	
LCF 2 – Activity 1: Provide complex and integrated aftercare for multimorbid type 2 diabetes patients with minor amputation		X - medical staff is strongly advised to use checklists as well	

LCF 3 – Activity 2: Development of area-specific physiotherapy groups role, reference internist)		X - Covid erased the group physio sessions. Replaced by home care.	
LCF 3 – Activity 3: Produce and test a standardized (digital) health literacy assessment method			X - Replaced by short orientation as part of the medical assessment.
LCF 3 – Activity 4: Implement a postoperative complex diabetic and dietetic education system tailored for patients with different health literacy level supported by ICT tools (written + audio-visual)		X - Improving availability in the outpatient setting would be preferred.	
LCF 3 – Activity 5: Develop and introduce a Patient Education Effectiveness Feedback System			X - Replaced by short orientation as part of the medical assessment.
LCF 3 – Activity 6: Provide mental health support as part of the rehabilitation system		X - not an obligatory element, patient's consent makes it optional	
LCF 4 – Activity 1: Formulate long-term aftercare health plan based on the individual needs and the available capacities		X - more interaction is needed between hospital and primary care level	
LCF 4 – Activity 2: Involving patients in aftercare and lifestyle change programs (patient education, patient clubs, physiotherapy, psychologist, health education) using digital tools		X - This is adapted to patient needs.	
LCF 4 – Activity 3: Create a dashboard of measurable and achievable indicators to assess the effectiveness of the complex and integrated care		X - Data processing is still in progress.	

QUESTIONS	ANSWERS
Any new proposed action for the future?	<ul style="list-style-type: none"> -Establishment and operation of a Diabetes Outpatient Clinic based on a local protocol (Novelty: to establish a Multidisciplinary Diabetes Foot Clinic in the hospital) - IT support for this from the patient journey management side by Patient Pathway Management Tool - Study based on experience, development of a national protocol agreed by professional associations - Formulation of policy proposals

	<ul style="list-style-type: none"> - Development of a program for national expansion - Participation in further projects based on knowledge sharing and exchange of experience
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Post-implementation

ITEM	ANSWER
Title and abstract	
Title	Complex care and rehabilitation of multimorbid patients with type 2 diabetes who undergo minor amputation to prevent lower extremity loss
Abstract	Acute care includes minor amputation surgery and perioperative care. Chronic care includes the efforts of complete wound healing, regaining preamputation basic mobility, in the meanwhile reviewing the patients' drug therapy, providing patient education and psychological guidance, as well as ensuring and monitoring the performance of the necessary tests.
Why did you start?	
Problem description	<p>Diabetic foot syndrome is a typical multidisciplinary clinical problem. However, the patients have been treated in a regular way, the different discipline's areas work either isolated rather than well connected with each other. To improve quality and efficacy of care, complex and integrated care system is desirable. Most patients enter the health care system with delay. The care of patients has been provided so far, but complex and integrated management of isolated treatment teams was needed to increase efficiency. Patients come to the attention of medical care late.</p> <p>Internal analysis showed that a high proportion of diabetic patients who underwent a minor amputation resulted in a major amputation.</p> <p>1, Keep patients who come in from nowhere in focus (keep them in care) to see if this helps delay further complications. 2., Provide them with complex care.</p>
Available knowledge	Internal analysis has shown that a high proportion of diabetic patients who have undergone a minor amputation undergo a major amputation.
Rationale	<p>1. Keeping patients who come in from nowhere in focus (in care) to see if it helps delay further complications.</p> <p>2. Provide them with complex care.</p>
Specific aims	To provide complex integrated care and aftercare for patients who undergo lower limb minor amputation to prevent further complications.
What did you do?	
Context	<p>Access, validate and assess health data of citizens in pilot area and compare to national level data to prove focus areas of intervention.</p> <p>Development and further development of interoperable digital health tools and care protocols for person centric digitally enable integrated care integrated into the national central eHealth Digital Service Infrastructure (EESZT.GOV.HU), including eHealth, mHealth, teleHealth, remoteCare and smartCare solutions as well as innovative ways of using health and health related data.</p>

	<p>Increase awareness, commitment and digital skills of the staff and provide them information and guidance on digitally enabled clinical risk prediction, complex case management including home hospitalization, transitional care and vertical & horizontal integration, rehabilitation, and admission avoidance.</p> <p>Increase patient, citizen and employer empowerment and adherence for cooperation and accepting new ways of access to prevention, treatment and rehabilitation or other care services</p>
Intervention(s)	<ol style="list-style-type: none"> 1. Development of a risk assessment algorithm and prediction model for type II diabetes complications and a further risk stratification method for health policy purposes including prevention. 2. Develop and implement a multidisciplinary complex acute care for multimorbid type 2 diabetes patients with risk of minor amputation 3. Implement a complex rehabilitation program for multimorbid type 2 diabetes patients with minor amputation 4. Create a long-term aftercare plan for multimorbid type 2 diabetes patients to minimize quality of life loss and complications
Study of the Intervention(s)	<p>Assessing the impact: Quantitative analysis: a reduction in the number of interventions in the target population, who used the developed multidisciplinary care system.</p> <p>Approach used to establish whether the observed outcomes were due to the intervention: Not all members of the target population participated in the process (for individual reasons). They can be partly used to evaluate the process.</p>
Measures	The processes contain two kinds of Key Performance Indicators: Developed healthcare protocols; and Number of targeted patients
Analysis	<p>We reviewed the medical data and pathways of 40 patients who had previously undergone a minor amputation. The primary objective of the study was to look for commonalities; the presence/absence of critical, preventive examinations and to identify indicators from the results of these examinations that warned of the risk of amputation. A qualitative analysis was carried out based on individual questionnaires collected from the people involved in the project. Again, our aim was to identify the environmental, social, health and lifestyle factors that predispose to the disease, as well as the potential for intervention.</p>
What did you find?	
Results	<p><u>Interventions:</u></p> <ol style="list-style-type: none"> 1. Obtaining national ethical board permission for data collection 2. IT background required significant development - improvements were made, development needs and ongoing consultation between IT and medical staff 3. To abandon collateral branches of the main care process in order to avoid collecting too much data from one patient. <p><u>Details:</u></p> <ol style="list-style-type: none"> 1. All the goals stated as Key Performance Indicators (with modifications) have been completed. <p><u>Observations:</u></p> <ol style="list-style-type: none"> 1. High risk patients have had more complications.

	<p>2.Previously non-compliant patients continued to have non-compliant attitudes in many instances.</p> <p><u>Unintended:</u></p> <ol style="list-style-type: none"> 1.Lack of previous medical control - link to primary care + social problems cannot be solved by health care professionals. 2.Communication and cooperation between HCP's should be improved. 3.Systemic problems that require broader changes do not change in a short time. 4.Patient mobility was poorer as expected. 5.Health literacy and digital literacy amongst the elderly and in some levels of society is very poor. 6.Some participants showed an unexpected level of enthusiasm. <p><u>Missing data:</u></p> <p>Not prioritized elements are of less significance, that is why we postponed/abandoned working on them.</p>
What does it mean?	
Summary	<p><u>Key findings:</u></p> <ol style="list-style-type: none"> 1.Medical staff is strongly advised to use checklists during the care process. 2.Consultations between HCP's are to be improved. 3.Cooperation between medical and IT members is necessary to develop IT support in the background. 4.Patient education is a continuous need that is to be supported. <p><u>Strengths:</u></p> <ol style="list-style-type: none"> 1.The significance is high due to the prevalence of the clinical problem, its high impact on QoL, on mortality risk prediction, and its social and financial burden. 2.The oGP and The Catalan Working Group offer exemplary proposals for implementation.
Interpretation	<p>The entire study draws attention to the need for better management of diabetic foot problems. Even if a minor amputation is the only surgical therapeutic choice, attention must be paid on comorbidities. This will predict the success of acute care; however chronic care of underlying diabetes needs to start much earlier to improve overall health status and reduce the risk of complications.</p> <p>Causality between our intervention(s) and the outcomes cannot be proven.</p> <p>Multimorbid patients with poor socio-economic status and limited health literacy are the main target population.</p> <p>Life expectancy is below the national average in our hospital area.</p> <p>As far as diabetic foot care is concerned, there is an unprovoked shift from the preventive point of view towards the complication management due to several reasons. Time and effort consuming care can enhance the overall outcomes and reduce the health service utilization including improvement of patient satisfaction as well.</p>

Limitations	<p>During the implementation phase we found out that the biggest limitation is the lack of communication:</p> <ul style="list-style-type: none"> - between the medical staff inside the hospital, - between each healthcare provider, especially with primary care doctors. <p>The other main limitation is the lack of health literacy and digital understanding among the target population.</p> <p>Further limitation is that it was not a multicentric study.</p> <p>We did not have a control group. The only possible comparison was to study earlier patient pathways.</p> <p>The number of patients is small as far as statistical relevance is concerned.</p> <p>Our study served as a prospective observation, a pilot for changing everyday practice during the care of patients, getting together key stakeholders respectively.</p>
Conclusions	<p><u>Usefulness:</u></p> <ol style="list-style-type: none"> 1.The transition of oGP's knowledge and experience to the NAWG. 2.Exact statement is provided about medical and environmental risk and retrospective risk analysis for lower limb amputation as a major problem in diabetic population. 3.IT developments have started and partially undergone supporting the health care processes and providing the basics of digitally enabled person centered care. 4.Key stakeholders have approached each other to collaborate on the project. 5.Further collaboration between stakeholders might be established. <p><u>Sustainability:</u></p> <p>Community, financial and organizational sustainability is a question of health care policy. The unmet need of improving diabetic complications is a nationwide phenomenon. The government administers the health system, especially a., the quality assurance of medical care, b., the effective patient pathways with the corresponding involvement of extra human resource capacities such as patient pathway managers, and c., the payment procedures plus human resources for preventive care approach including primary, secondary, and tertiary prevention.</p> <p>The local sustainment is supported by the hospital management and the NAWG.</p> <p>The planned diabetic foot clinic is a perfect opportunity to test, maintain and develop the project outcomes, and deepens the vertical and horizontal cooperation.</p> <p><u>Potential:</u></p> <ol style="list-style-type: none"> 1.IT development can be used in further areas of medical care 2.Clear patient pathways and collaboration between different stakeholders can be useful in further areas of medical care. <p><u>Implications:</u></p> <ol style="list-style-type: none"> 1.Capacity optimization is inevitable. 2.Care teams should be established. 3.Quality indicators with real world evidence are to be defined.

	<p><u>Suggestions:</u></p> <ol style="list-style-type: none"> 1.To expand the collaboration to the whole hospital service area. 2.To increase human resource capacities in the Hungarian health care and social care system. 3.Education of health care professionals and non-healthcare members of the specialty in order to force unified and standardized steps at each provider's level containing obligatory and "cannot be postponed" elements. 4.To provide governmental support of different components of quality assurance. 5.To provide other national/EU funding to expand the focus of the project and/or distribute the outcomes nationwide.
Other information	
Funding	EU funding

ASL Napoli 2 Nord, I (ASL NA2)

Pre-implementation

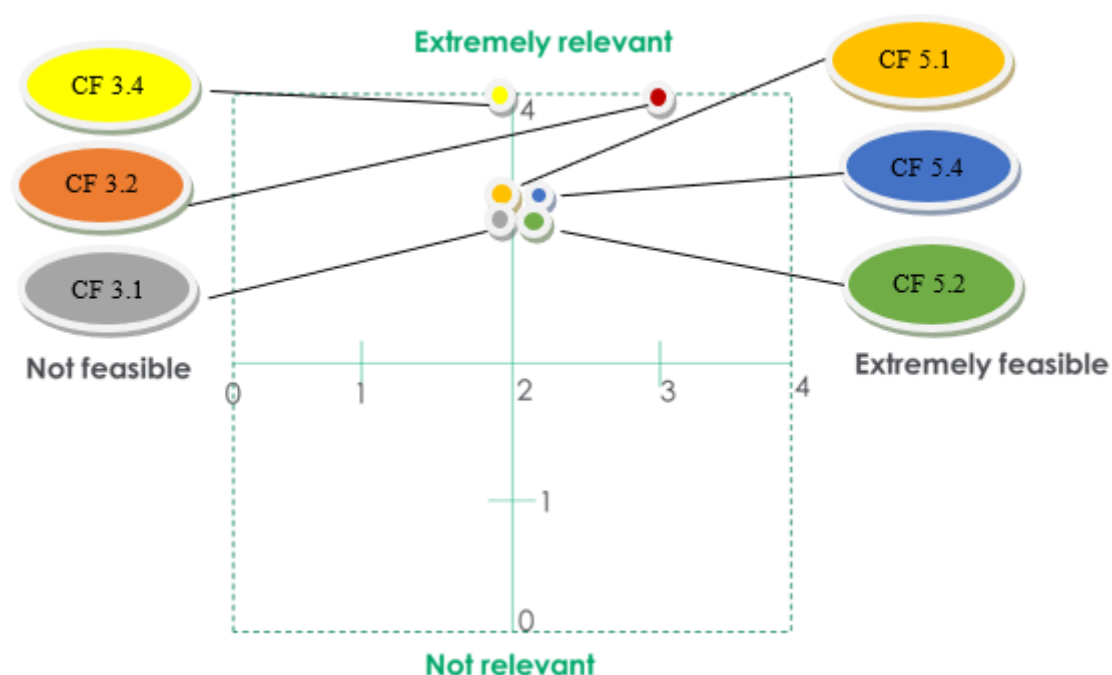
Scope definition

Identified and prioritized needs

Block	Prioritized needs
Block 3 - Vertical and Horizontal integration experiences adopted in Catalonia	Strengthen the link between the points of the network of services, hospital and territorial, also to reduce inappropriate hospital admissions.
	Strengthening/qualification of the territorial network of accredited social and social, semi-residential and residential, public, and private services.
Block 5 - Digital support of integrated care services	Implementation of information technologies to support the home care of interventions.
	Platform to support the integrated management of frail elderly patients.

Assessment of Core Features

Core feature	Relevance	Feasibility
CF3.1 Programme for chronic and frail patients	3	2
CF 3.2 Support for complex case management including home hospitalization, transitional care and vertical & horizontal integration supported by digital tools	4	3
CF3.4 Integrated Care for admission avoidance of subacute and frail patients	4	2
CF5.1 Regional information exchange platform (HC3)	3	2
CF5.2 Primary care electronic medical record (eCAP) and electronic prescription	3	2
CF5.4 ICT tools supporting adaptive case management & collaborative work	3	2



Final Core Features selected

CF 3.2 Support for complex case management including home hospitalization, transitional care and vertical & horizontal integration supported by digital tools.

CF3.4 Integrated care for admission avoidance of subacute and frail patients.

CF5.1 Regional information exchange platform (HC3).

CF5.4 ICT tools supporting adaptive case management & collaborative work.

Situation analysis

	Strengths	Weaknesses
Internal	<ul style="list-style-type: none"> Existence of a care model for chronic frail patients based on multidimensional and multidisciplinary assessment of the person's need and definition of personalized projects shared between the different points of the hospital network and health and social network interested in taking charge of the person. Criteria and methods shared at regional level for the multidimensional assessment of the need of the person with chronicity with a single assessment tool. Existence of a business model for the integrated care of the users of the home services network with three different levels of home care intensity (I, II, III, Palliative Care). Existence of a ddPAST corporate digital platform: <ul style="list-style-type: none"> PUA Module (Single Access Door): for reporting and the need and starting the process of taking charge of the patient. CDI Module (Integrated Home Care): for the assessment of the patient's need, through the evaluation of the case (e.g. SVAMA form), the design and management of the care plan (PAI) at home. Existence of a Regional Information System (SINFONIA), Health Information System CampaniA, designed to support the entire government of the Campania SSR, increase efficiency, contain costs. Existence of an IT infrastructure (HOMECARE) for monitoring (remote assistance) of patients assisted at home using "Internet of Things" technologies such as home oriented devices and self-monitoring. Existence of a regional platform (ROC) for the protected discharge and integrated hospital-territory management of cancer patients. Existence of a feasibility study for the construction of a platform (ddPAGeF) for the 	<ul style="list-style-type: none"> Poor integration between the different intra-company settings (Hospital-Territory) and between operators of the health system and the social system (Municipality-ASL). Delay in the Regional Accreditation procedures for Socio-Sanitary and social facilities, such facilities could accommodate fragile chronic patients not be cared for at home or on social benefits that social health. Need for training and education of caregivers of frail patients in home care, especially in the use of new technologies. Resistance to change by health and socio-health professionals to the use of new technologies. Need to shift resources from a hospital-centric health system towards a territorial care model. Lack of an integrated information system of electronic medical records shared throughout the ASL company. Lack of a current fragility profile of the health care population of the ASL with indication of the stratification in relation to the state of health, the condition of socio-sanitary fragility and disability. Lack of interoperability between the patient management platform (ddPAST) and the monitoring platform (HOMECARE). Lack of interoperability between the management platform (ddPAST) and the Regional oncology platform (ROC). Lack of time for teamwork.

External	construction of the fragility profile of the ASL Napoli 2 nord population with identification of differentiated risk classes.	
	Opportunities	Threats
	<ul style="list-style-type: none"> • Participation in a European project on which to focus to implement good practices for chronic disease care services "CATALAN OPEN INNOVATION HUB ON ICT SUPPORTED INTEGRATED CARE SERVICES FOR CHRONIC PATIENTS" which will evaluate the impact of the application of the integrated care model for comorbidities. • Participation in a European project co-financed by MISE (Bando Grandi Progetti PON) that is the HOME CARE project for the creation of an integrated platform for the provision of remote monitoring and remote assistance services for patients at home. • Availability of new technologies such as: <ul style="list-style-type: none"> - FIDHOME kit consisting of innovative devices for telemonitoring of vital parameters. - FIDRAY dispenser for the correct intake of drugs, both at home and away. • Existence of a protocol for the integrated management of protected resignation of fragile people, with identification of roles actors, responsibilities and tools, not yet formalized. 	<ul style="list-style-type: none"> • Changes in the political situation. • Changes in organizational models. • Resistance to population change against organizational changes in the public health system. • Socio-economic crisis created by the Covid-19 pandemic.

Strategic Intervention Areas

Strategic intervention area	Priority	Ranking
Sharing of the latest version of the operational protocol for the integrated management of protected discharges of frail people, with identification of actors, roles, responsibilities and tools, and formalization. This is to facilitate the integration between the different intra-company settings (Hospital-Territory) and between operators of the health system and the social system (Municipality-ASL)	3	1
Implement the integrated platform of the HOME CARE project for the provision of remote monitoring and remote assistance services for the patient at home.	3	2
Define a system of interoperability and coordination between the various existing corporate and regional / national platforms.	3	3
Need to improve the self-management of the disease by the patient and caregivers especially in the use of new technologies	2	4

Definition of the LGP and LAP

Local Good Practice

Local Good Practice		ASL NAPOLI2 NORD'S approach to social and health integration (vertical and horizontal integration) and the use of digital technology to improve home care services.
Target population		Setting(s)
Health district of Napoli 2 Nord		ASL NAPOLI 2 NORD
Main aim		
Improve the quality of life and health of the population of the ASL Napoli 2 Nord by strengthening the integration between the Vertical and the Horizontal and improving the management of home care using digital systems.		
Outcomes	Local Core Features and their Components	Inputs
<ul style="list-style-type: none"> • Improve communication between social and health services (Municipalities and ASL). • Improve communication between different intra-company settings (Hospitals and Territory). • Ensure continuity of care of the patient. • Provide home care at the appropriate time and in the appropriate ways based on the simple and complex needs of patients. • Manage home care using digital platforms Telemonitoring and Telemedicine. • Train social and health network operators in the correct use of available technology. 	<p>Implementation of the latest version of the operating protocol for fragile patients and/or patients in home care</p> <ul style="list-style-type: none"> • Formalization of the operational protocol for the management of protected discharges, hospital-territory, of fragile people. • Implementation of the operational protocol for the management of protected discharge. • Monitoring and verification of the implementation of the new protocol. <p>Integration/Development of Digital Platforms to support the management of home care.</p> <ul style="list-style-type: none"> • Integration of the ddPAST company platform for access by social service operators in the Municipalities belonging to the ASL Napoli2 Nord. • Integration of the ddPAST company platform for access by hospital operators. • Creation of the ddPAGEF Fragility Platform. 	<ul style="list-style-type: none"> • Data • Staff • IT system • Funding • Decision-makers • Technical assistance

	<ul style="list-style-type: none"> • Implementation of interoperability between the Platforms (ddPAST, ddPAGeF, HOMECARE). • Realization of training courses on the use of the platforms and on the training of caregivers. 	
General description		
-		
Local Core Feature 1		
Implementation of the latest version of the operating protocol for frail patients and/or in home care.		
Local Core Feature 2		
Integration/Development of Digital Platforms to support the management of home care.		

Local Action Plan

Local Good Practice		ASL NAPOLI2 NORD’S approach to social and health integration (vertical and horizontal integration) and the use of digital technology to improve home care services.
Target population		Setting
Health district of Napoli 2 Nord		ASL NAPOLI 2 NORD
Main aim		
Improve the quality of life and health of the population of the ASL Napoli 2 Nord by strengthening the integration between the Vertical and the Horizontal and improving the management of home care using digital systems.		
General description		
-		
Related oGPs and CFs	Catalan Open Innovation Hub on ICT CF 3.2 Support for complex case management including home hospitalization, transitional care and vertical & horizontal integration supported by digital tools. CF3.4 Integrated care for admission avoidance of subacute and frail patients. CF5.1 Regional information exchange platform (HC3). CF5.4 ICT tools supporting adaptive case management & collaborative work.	
Local Core Feature 1	Implementation of the latest version of the operating protocol for frail patients and/or in home care.	
SMART objective		
The ASL Napoli 2 Nord has formalized the new operating protocol for taking charge of frail patients in the integrated home care system, a protocol shared with all the players involved. The envisaged objective is the		

formalization of the operational protocol for the management of protected hospital-territorial discharges of frail people and the implementation of the envisaged path, also starting from the new operational protocol of home care.

Activities	Actors	Resources	Setting(s)	Timeline	KPIs
Formalization of the operational protocol for the management of protected discharges, hospital-territory, of fragile people	<ul style="list-style-type: none"> -Strategic Management of the ASL -UOC Home Care -UOC Social and Health Integration 	-An operator of each actor identified for the preparation of the defined document and the deliberative act	<ul style="list-style-type: none"> -ASL Napoli 2 Nord -Subsequently, the Municipalities of the ASL 	February 2022	<ul style="list-style-type: none"> - Deliberative act formalizing the new protocol -Document of sharing the protocol with the Municipalities of the ASL
Implementation of the operational protocol for the management of protected discharge	<ul style="list-style-type: none"> -Hospitals of ASL Napoli 2 Nord -Health Districts of ASL Napoli 2 Nord -Municipalities of the ASL 	<ul style="list-style-type: none"> -For Hospital Presidia: Health Management, 1 contact person for the protected discharge of the various Departments and the Emergency Room, the hospital social service -For Health Districts: The District Director, 1 PUA / UVI/Socio-Health Referent, 1 Home Care Referent, 1 Rehabilitation Care Referent -For Municipalities: Director of Social Services, 	<ul style="list-style-type: none"> -ASL Napoli 2 Nord -The Municipalities of the ASL -Any RSA, Rehabilitation Centers, etc., accredited private individuals 	October 2022	Number reports of discharge, protected resignation gestures according to the protocol/ tot reporting of protected discharges, expected 30% in the first year and + 10% for each subsequent year

		1 Social Secretariat/Social Service Referent			
Monitoring and verification of the implementation of the new protocol	<ul style="list-style-type: none"> -Strategic Management of the ASL -UOC Home Care -UOC Social and Health Integration -UOC Information Technologies -Health Districts -Hospitals of ASL -Municipalities of the ASL 	N. 1 contact person for each actor involved	ASL Napoli 2 Nord	December 2022	<ul style="list-style-type: none"> -Definition of the Monitoring System and Tools -Document sharing the Monitoring System with all the actors involved -Semi-annual report processing
Local Core Feature 2 Integration/Development of Digital Platforms to support home care management					
SMART objective					
In the framework of JADECARE, Marche Region will develop a map/dashboard allowing in-depth analysis of stratification data and available services for policy- and decision-making processes					
Activities	Actors	Resources	Setting(s)	Timeline	KPIs
Integration of the ddPAST company platform for the access of social service operators of the Municipalities belonging to the ASL Napoli2 Nord (to facilitate the connection between Districts and Social Services, both for the multidimensional assessment of the Need and for the social-health care)					
Create a working group to define the activities to be performed on the ddPAST platform for access of Social Workers.	<ul style="list-style-type: none"> -Director of the Social Health Integration and Home Care Unit -Social Workers of the Municipalities of the ASL -Director of Information Technology -Executive Analyst -IT Staff 	Expertise of the various figures involved	<ul style="list-style-type: none"> -ASL Napoli 2 Nord -Municipalities of the ASL 		<ul style="list-style-type: none"> -Number and profiles of professionals identified -Documenter analysis formalization
Development of modules accord-	IT Staff	-SQL Server DB	ASL Napoli 2 Nord		-DB Creation/Integration (Y/N)

ing to the specifications of the analysis document		-Visual Studio -Development platform "Serenity" -Programming languages: C#, JavaScript, CSS, HTML.			-% completeness of the technical project -% completeness of the functional design
Testing	IT Staff	ddPAST Platform	ASL Napoli 2 Nord	4 months	-% of new profiles created for the social services of the municipalities -% of access to the system by the social services of the municipalities -% support requests
Integration of the ddPAST company platform for the access of hospital operators (to facilitate protected discharge)					
Create a working group to define the tasks to be performed on the ddPAST platform for hospital operator access.	-Director of the Social Health Integration and Home Care Unit -Health Directors of PP. OO. -Director of Information Technology -Executive Analyst -IT Staff	Expertise of the various figures involved	ASL Napoli 2 Nord		-Number and profiles of professionals identified -Document formalization or functional analysis
Development of modules according to the specifications of the analysis document	IT Staff	-SQL Server -Visual Studio	-ASL Napoli 2 Nord		-DB Creation/Integration (Y/N) -% completeness of the technical project

		-Development platform "Serenity" -Programming languages: C#, JavaScript, CSS, HTML,			-% completeness of the functional design
Testing	IT Staff	ddPAST Platform	ASL Napoli 2 Nord	4 months	-% of new profiles created for hospital workers -% of access to the System by hospital operators -% support requests
Implementation of the ddPAGeF Fragility Platform					
Create a working group to define the specifications of the ddPAGeF Platform to be implemented	-Director of the Social Health Integration and Home Care Unit -Director of the Elderly and Dementia Unit of the Department of Territorial Care -Director of Information Technology -Executive Analyst -IT Staff	Expertise of the various figures involved	-ASL Napoli 2 Nord -MMG	6 months	-Number and profiles of professionals identified -Document formalization or functional analysis
Development of the Platform and modules according to the specifications of the analysis document	IT Staff	-SQL Server -Visual Studio -Development platform "Serenity"	ASL Napoli 2 Nord	10 months	-DB Creation/Integration (Y/N) -% completeness of the technical project -% completeness of the functional design

		-Program- ming lan- guages: C#, JavaScript, CSS, HTML,			
Testing	IT Staff	ddPAGEF Platform	ASL Napoli 2 Nord	4 months	-% of new profiles created for opera- tors -% of access to the System by operators -% support requests
Implementation of interoperability between Platforms (ddPAST, ddPAGEF, HOMECARE)					
Create a working group to define the specifications of interoperability integrations	-Director of Infor- mation Technol- ogy -Executive Analyst -IT Staff	Expertise of the various figures in- volved	ASL Napoli 2 Nord	6 months	-Number and pro- files of professionals identified -Formalization of the functional analysis document
Development of interoperability integration proce- dures and mod- ules	-Director of Infor- mation Technol- ogy -Executive Analyst -IT Staff	-SQL Server -Visual Stu- dio -Develop- ment plat- form "Seren- ity" -Program- ming lan- guages: C#, JavaScript, CSS, HTML,	ASL Napoli 2 Nord	10 months	-Creating the data- base(Y/N) -% completeness of the technical project -% completeness of the functional de- sign
Testing	IT Staff	ddPAGEF Platform	ASL Napoli 2 Nord	4 months	-% of new profiles created for opera- tors -% of access to the System by operators -% support requests
Realization of training courses in the use of platforms and training of care-givers					

Create a working group to define the program of the courses and identify the dedicated spaces.	-Director of Information Technology -Executive Analyst -IT Staff	Expertise of the various figures involved	ASL Napoli 2 Nord	2 months	-Number and profiles of professionals identified -Calendar of courses to be delivered
Provide training courses to all operators and care-givers	-IT Staff	-Expertise of the various figures involved -Course material	ASL Napoli 2 Nord	12 months	-Number and profiles of professionals identified -% delivery

Implementation

1st PDSA Cycle

Plan

LCF1 Implementation of the latest version of the operative protocol for fragile and / or home care patients								
Activities	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Formalization of the operational protocol for the management of protected hospital-territory discharges of frail people	Formalized the new operating protocol for taking charge of frail patients in the integrated home care system, a protocol shared with all the actors involved.	-Strategic direction of ASL -UOC Home Care -UOC Sociosanitary	4 MONTHS - March 2022	Deliberative act of formalization of the new protocol	Strategic direction of ASL	from January to April 2022	Documents are collected from web archive "albo pretorio on line" of ASL Napoli 2 Nord	-Deliberative act number 270 of the 24/02/2022 -Protected discharge of frail patients -Deliberative act number 184 of the 07/02/2022 - Adoption Document "Diagnostic Therapeutic Care Pathway (PDTA) Corporate Dementia"
	Sharing with ASL municipalities the Protocol of Protected Discharge of Frail Patients	-Strategic direction of ASL -UOC Sociosanitary	6 MONTHS - December 2022	Document sharing the protocol with the municipalities of the ASL	UOC Home Care	December 2022	The formalization of the sharing of the Protocol of Protected Discharge of Frail Patients with the municipalities of the ASL will	-Deliberative act number 280 of the 01/03/2022 - Acknowledgment of the document "Pathways of continuity of care for the patient hospitalized for Covid-19" -Deliberative act number 683 of the 27/04/2022 - activation of telerehabilitation pathways/programs

							take place through the signing of specific agreement with the municipalities	
Activity 2: Implementation of the operational protocol for the management of protected discharges	Dissemination of the Protected Discharge Protocol for frail patients, through meetings/meetings/webinars with stakeholders involved in the management of integrated discharge procedures	-Hospitals of ASL Napoli 2 Nord -Health district of ASL Napoli 2 Nord - Municipalities of ASL	4 MONTHS - July 2022	Number of reports of protected discharges managed according to the protocol / total reporting of protected discharges	-UOC Home Care -UOC Home Care -UOSD elderly and dementias	7 MONTHS – January 2023	Through the enterprise platform ddPAST and the regional platform SINFONIA (FAR, SIAD, HOSPICE information flows)	Expected 30% in the first year and + 10% for each subsequent year
Activity 3: Monitoring and verification of the implementation of the new protocol	System design and monitoring tools; semi-annual data collection and reporting processing	-Strategic direction of ASL -UOC Home Care -UOC Sociosanitary	The first report 3 MONTHS – October 2022	-Definition of the system and monitoring tools -Document sharing the monitoring system with all the actors involved	-UOC – IT -UOC Home Care -UOC Sociosanitary	7 MONTHS – January 2023	Through the enterprise platform ddPAST and the regional platform SINFONIA (FAR, SIAD, HOSPICE)	Implementation of the monitoring system, with processing and dissemination of semi-annual reporting

		-UOSD elderly and demen- tias UOC - IT -Hospitals of ASL Napoli 2 Nord -Health dis- trict of ASL Napoli 2 Nord -Municipali- ties of ASL		-Preparation of half-yearly reports	-UOSD elderly and de- mentia		information flows)	
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LCF2		Integration / Development of Digital Platforms to support the management of home care						
Activities	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Integration of the ddPAST corporate platform for the access of social service operators of the municipalities belonging to the Napoli2 Nord ASL	Create a working group to define the activities to be performed on the ddPAST platform for the access of Social Workers.	Professionalism of the various figures involved	6 Months- July 2022	-Number and profiles of the professionals identified -Formalization of the analysis document (Y/N)	Data analyst IT STAFF	December 2021 to May 2022	Query and report	-36 operators of the municipalities -Yes

Activity 2: Integration of the ddPAST corporate platform for the access of hospital operators	Create a working group to define the activities to be performed on the ddPAST platform for the access of hospital operators.	<ul style="list-style-type: none"> -Director of UOC Sociosanitary and Home care -Health director of PP.OO. -IT director3 -Data analyst -IT Staff 	6 Months– January 2023	<ul style="list-style-type: none"> -Number and profiles of the professionals identified -Formalization of the analysis document (Y/N) 	Data analyst IT STAFF	December 2021 to May 2022	Query and report	<ul style="list-style-type: none"> -12 hospital operators -Yes
Activity 3: Creation of the ddPAGeF Fragility Platform	Create a working group to define the specifications of the ddPAGeF	<ul style="list-style-type: none"> -Director of UOC Sociosanitary and Home care -Director of UOSD elderly and dementia program -IT director -Data analyst -IT Staff 	6 Months - July 2023	<ul style="list-style-type: none"> -Number and profiles of the professionals identified -Formalization of the analysis document (Y/N) 	Data analyst IT STAFF	December 2021 to May 2022	Query and report	<ul style="list-style-type: none"> - -Yes
Activity 4: Implementation of interoperability between the Platforms (ddPAST, ddPAGeF, HOMECARE)	Create a working group to define the specifications of the interoperability integrations	<ul style="list-style-type: none"> -IT director -Data analyst -IT Staff 	2 Months - January 2022	<ul style="list-style-type: none"> -Number and profiles of the professionals identified 	Data analyst IT STAFF	December 2021 to May 2022	Query and report	<ul style="list-style-type: none"> - -Yes -Yes

	ddPAST ⇒ Sinfonia (Re- gione) HOMECARE Project			-Formalization of the analysis document (Y/N)				-100%
				-Creation / inte- gration of the DB (Y / N)				-100%
				-% complete- ness of the tech- nical project				-
				-% complete- ness of the func- tional project				
				-Number of pa- tients involved				

Do

Cycle number (1 or 2)	1	
Activity	KPI	Actual value
LCF 1 – Activity 1: Formalization of the operational protocol for the management of protected hospital-territory discharges of frail people	Deliberative act of formalization of the new protocol	New protocol has been formalised. Four corporate protocols for the management of protected hospital-territory discharges of frail persons have been defined and formalized.
	Document sharing the protocol with the municipalities of the ASL	Regarding the Protocol of Protected Discharge of Frail Patients, sharing with ASL municipalities is in progress and will be completed later
LCF 1 – Activity 2: Implementation of the operational protocol for the management of protected discharges	Number of reports of protected discharges managed according to the protocol / total reporting of protected discharges - expected 30% in the first year and + 10% for each subsequent year	The Protected Discharge Protocol for frail patients was sent to all stakeholders involved in the management of the integrated procedures of protected discharges. On 03/29/2022, the first corporate meeting was held with all stakeholders to disseminate awareness of the specific procedures provided in the Protected Discharge Protocol and to welcome and respond to requests for clarification. To facilitate and support the correct application of the procedure, the ASL, in May 2022, enhanced the presence of Social Workers at some Hospital Presidiums and Health Districts. Further reinforcement of social workers is planned in the coming months. In October 2022, the first monitoring of the implementation of the protocol is planned
LCF 1 – Activity 3: Monitoring and verification of the implementation of the new protocol	Definition of the system and monitoring tools	We tested the feasibility of collecting useful data for monitoring sheltered discharges through the use of the enterprise platform ddPAST and the regional platform SINFONIA (FAR, SIAD, HOSPICE information flows). In October 2022, the first monitoring of the implementation of the protocol is planned
	Document sharing the monitoring system with all the actors involved	
	Preparation of half-yearly reports	
LCF 2 – Activity 1: Integration of the ddPAST corporate platform for the access of social service operators of the municipalities belonging to the Napoli2 Nord ASL	Number and profiles of the professionals identified	To Do in Cycle 2.
	Formalization of the analysis document	To Do in Cycle 2.
LCF 2 – Activity 2: Integration of the ddPAST corporate platform for the access of hospital operators	Number and profiles of the professionals identified	To Do in Cycle 2.
	Formalization of the analysis document	To Do in Cycle 2.

LCF 2 – Activity 3: Creation of the ddPAGeF Fragility Platform	Abandoned	Abandoned	
		ddPAST -> Sinfonia (Regione)	HEMOCARE project
LCF 2 – Activity 4: Implementation of interoperability between the Platforms (ddPAST, HEMOCARE)	Number and profiles of the professionals identified	-	-
	Formalization of the analysis document	Yes	Yes
	Creation / integration of the DB (Y / N)	Yes	Yes
	% completeness of the technical project	100%	100%
	% completeness of the functional project	100%	100%
	Number of patients involved	3,069 patients	236 patients

QUESTIONS	ANSWERS
What was actually implemented? Any deviation from the planned actions	<p>Regarding LCF1 activities 1) and 2) sharing with municipalities has been initiated but not fully defined. The objective remains but is subject to slippage.</p> <p>Regarding LCF2 activities 1) and 2) (Integration ddPAST access social workers and hospital workers) the related actions planned in Plan phase have not yet been implemented for the following reasons:</p> <ul style="list-style-type: none"> - Covid-19 Cause. - Delays in establishing a protocol of understanding with municipalities for Social Workers. - Delays in establishing a Memorandum of Understanding with Hospitals. <p>Activities 1) and 2) will be taken up in Cycle 2. The activities under 4) have been started and have also produced verifiable results.</p>
Problems? Unexpected findings? Please describe	<p>For the LCF1 activity there are no unforeseen results but only delays in implementation, also due to COVID.</p> <p>For the LCF2 activity envisaged in item 3), the working group meeting considered it appropriate to abandon the related actions for the following reasons:</p> <ul style="list-style-type: none"> - Existing feasibility study no longer corresponding to the current scenario and therefore to be reformulated. - Timing for the implementation of the software platform no longer corresponding to the timeline envisaged by the JADECARE project.

- Involvement of GPs no longer possible as they are still engaged on the pandemic front.			
IMPLEMENTATION PROGRESS OF THE LOCAL GOOD PRACTICE			
0-25%	25-50%	50-75%	75-100%
		X – LCF1	
X – LCF2			

Study

Cycle number (1or 2)		1				
Activity	KPI	Target value	Actual value	Reasons for the deviations	Mitigation actions implemented	Impact of mitigation actions
LCF 1 – Activity 1: Formalization of the operational protocol for the management of protected hospital-territory discharges of frail people	Deliberative act of formalization of the new protocol	Yes	Yes			
	Document sharing the protocol with the municipalities of the ASL	Yes	Yes			
LCF 1 – Activity 2: Implementation of the operational protocol for the management of protected discharges	Number of reports of protected discharges managed according to the protocol / total reporting of protected discharges - expected 30% in the first year and + 10% for each subsequent year	Yes	Yes			
LCF 1 – Activity 3: Monitoring and verification of the implementation of the new protocol	Definition of the system and monitoring tools	Yes	Yes			
	Document sharing the monitoring system with all the actors involved	Yes	Yes			

	Preparation of half-yearly reports	Yes	Yes			
LCF 2 – Activity 1: Integration of the ddPAST corporate platform for the access of social service operators of the municipalities belonging to the Napoli2 Nord ASL	Number and profiles of the professionals identified	To Do in Cycle 2.	To Do in Cycle 2.	To Do in Cycle 2.	To Do in Cycle 2.	To Do in Cycle 2.
	Formalization of the analysis document	To Do in Cycle 2.	To Do in Cycle 2.	To Do in Cycle 2.	To Do in Cycle 2.	To Do in Cycle 2.
LCF 2 – Activity 2: Integration of the ddPAST corporate platform for the access of hospital operators	Number and profiles of the professionals identified	To Do in Cycle 2.	To Do in Cycle 2.	To Do in Cycle 2.	To Do in Cycle 2.	To Do in Cycle 2.
	Formalization of the analysis document	To Do in Cycle 2.	To Do in Cycle 2.	To Do in Cycle 2.	To Do in Cycle 2.	To Do in Cycle 2.
LCF 2 – Activity 3: Creation of the ddPAGeF Fragility Platform	Abandoned	Abandoned	Abandoned	Abandoned	Abandoned	Abandoned
LCF 2 – Activity 4: Implementation of interoperability between the Platforms (ddPAST, HOMECARE)	Number and profiles of the professionals identified	-	-			
	Formalization of the analysis document	Yes	Yes			
	Creation / integration of the DB (Y / N)	Yes	Yes			
	% completeness of the technical project	100%	100%			
	% completeness of the functional project	100%	100%			
	Number of patients involved	-	3,069 + 276 patients			

Act

Cycle number (1 or 2)	1		
Activity	Maintain	Adapt	Abandon
LCF 1 – Activity 1: Formalization of the operational protocol for the management of protected hospital-territory discharges of frail people	X		
LCF 2 – Activity 2: Integration of the ddPAST corporate platform for the access of hospital operators	X		
LCF 2 – Activity 3: Creation of the ddPAGeF Fragility Platform	X		
LCF 2 – Activity 1: Integration of the ddPAST corporate platform for the access of social service operators of the municipalities belonging to the Napoli2 Nord ASL	X		
LCF 2 – Activity 2: Integration of the ddPAST corporate platform for the access of hospital operators	X		
LCF 2 – Activity 3: Creation of the ddPAGeF Fragility Platform			X
LCF 2 – Activity 4: Implementation of interoperability between the Platforms (ddPAST, HOMECARE)	X		

QUESTIONS	ANSWERS
Any new proposed action for the future?	N.A.

2nd PDSA Cycle

Plan

LCF1		Implementation of the latest version of the operative protocol for fragile and / or home care patients						
Activities	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Formalization of the operational protocol for the management of protected hospital-territory discharges of frail people	Formalized the new operating protocol for taking charge of frail patients in the integrated home care system, a protocol shared with all the actors involved.	-Strategic direction of ASL -UOC Home Care -UOC Sociosanitary	4 MONTHS - March 2022	Deliberative act of formalization of the new protocol	Strategic direction of ASL	from January to April 2022	Documents are collected from web archive "albo pretorio on line" of ASL Napoli 2 Nord	-Deliberative act number 270 of the 24/02/2022 -Protected discharge of frail patients -Deliberative act number 184 of the 07/02/2022 - Adoption Document "Diagnostic Therapeutic Care Pathway (PDPA) Corporate Dementia"
	Sharing with ASL municipalities the Protocol of Protected Discharge of Frail Patients	-Strategic direction of ASL -UOC Sociosanitary	6 MONTHS - December 2022	Document sharing the protocol with the municipalities of the ASL	UOC Home Care	December 2022	The formalization of the sharing of the Protocol of Protected Discharge of Frail Patients with the municipalities of the ASL will take place through	-Deliberative act number 280 of the 01/03/2022 - Acknowledgment of the document "Pathways of continuity of care for the patient hospitalized for Covid-19" -Deliberative act number 683 of the 27/04/2022 - activation of telerehabilitation pathways/programs

							the signing of specific agreement with the municipali- ties	
Activity 2: Implementation of the operational protocol for the management of protected discharges	Dissemination of the Protected Discharge Protocol for frail patients, through meetings/meetings/webinars with stakeholders involved in the management of integrated discharge procedures	-Hospitals of ASL Napoli 2 Nord -Health dis- trict of ASL Napoli 2 Nord - Municipalities of ASL	4 MONTHS - July 2022	Number of reports of protected discharges managed according to the protocol / total reporting of protected discharges	-UOC Home Care -UOC Home Care -UOSD elderly and de- mentias	7 MONTHS – January 2023	Through the enterprise platform ddPAST and the regional platform SINFONIA (FAR, SIAD, HOSPICE information flows)	Expected 30% in the first year and + 10% for each subsequent year
Activity 3: Monitoring and verification of the implementation of the new protocol	System design and monitoring tools; semi- annual data collection and reporting processing	-Strategic di- rection of ASL -UOC Home Care -UOC Soci- osanitary -UOSD elderly and demen- tias	The first report 3 MONTHS – October 2022	-Definition of the system and monitor- ing tools -Document sharing the monitoring system with all the actors involved	-UOC – IT -UOC Home Care -UOC So- ciosani- tary -UOSD elderly	7 MONTHS – January 2023	Through the enterprise platform ddPAST and the regional platform SINFONIA (FAR, SIAD, HOSPICE information flows)	Implementation of the monitoring system, with processing and dissemination of semi-annual reporting

		UOC - IT -Hospitals of ASL Napoli 2 Nord -Health district of ASL Napoli 2 Nord -Municipalities of ASL		-Preparation of half-yearly reports	and dementia			
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LCF2	Integration / Development of Digital Platforms to support the management of home care							
Activities	Actions	Actors	Timeline	KPIs measure (data collection)				
				KPI	Who	When	How	Target
Activity 1: Integration of the ddPAST corporate platform for the access of social service operators of the municipalities belonging to the Napoli2 Nord ASL	Profiling the operators of the pilot Municipality (Giugliano)	-Data analysts -IT experts -Tecnician	01/01/2023 to End	1.Modify Data-Base (Y/N)	-Project manager	February 2023	Query and report	1.Yes
	Modify the Platform to handle new profiles	-Project manager		2.Modify Platform (Y/N)	-Data Analyst			2.Yes
Activity 2: Integration of the ddPAST corporate	Create a working group to define the activities to	-Data analysts	6 Months–from	1.Modify Data-Base (Y/N)	-Project manager	July 2023	Query and report	1.Yes

platform for the access of hospital operators	be performed on the ddPAST platform for the access of hospital operators.	-IT experts -Tecnician -Medician -Project manager	April 2023	2.Modify Plata- form (Y/N)	-Data Analyst			2.Yes
Activity 3: Creation of the ddPAGeF Fragility Platform	Abandoned	Abandoned	Abandoned	Abandoned	Abandoned	Abandoned	Abandoned	Abandoned
Activity 4: Implementa- tion of interoperability between the Platforms (ddPAST, ddPAGeF, HOMECARE)	Create procedures for interoperability Integrations: ddPAST ⇔ Sinfonia (Re- gione) HOMECARE Project	- Data analysts -IT experts -Tecnician -Medician -Project manager	2 Months - January 2022	1.Modify Data- Base (Y/N) 2.Modify Plata- form (Y/N)	-Project manager -Data Ana- lyst	December 2021 to May 2022	Query and report	1.Yes 2.Yes

	Development of interoperability integration procedures and modules ddPAST ⇒ Sinfonia (Regione) HEMOCARE Project	<ul style="list-style-type: none"> - Data analysts -IT experts -Tecnician -Medician -Project manager 	2 Months - May 2022					
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Do

Cycle number (1 or 2)	2	
Activity	KPI	Actual value
LCF 1 – Activity 1: Formalization of the operational protocol for the management of protected hospital-territory discharges of frail people	Deliberative act of formalization of the new protocol	Completed
	Document sharing the protocol with the municipalities of the ASL	Completed
LCF 1 – Activity 2: Implementation of the operational protocol for the management of protected discharges	Number of reports of protected discharges managed according to the protocol / total reporting of protected discharges - expected 30% in the first year and + 10% for each subsequent year	Completed
LCF 1 – Activity 3: Monitoring and verification of the implementation of the new protocol	Profiling the operators of the pilot Municipality (Giugliano)	In progress
	Modify the Platform to handle new profiles	
	Preparation of half-yearly reports	
LCF 2 – Activity 1: Integration of the ddPAST corporate platform for the access of social service operators of the municipalities belonging to the Napoli2 Nord ASL	Modify DataBase (Y/N)	In progress
	Modify Platform (Y/N)	In progress
LCF 2 – Activity 2: Integration of the ddPAST corporate platform for the access of hospital operators	Modify DataBase (Y/N)	In progress
	Modify Platform (Y/N)	In progress

LCF 2 – Activity 3: Creation of the ddPAGeF Fragility Platform	Abandoned	Abandoned
LCF 2 – Activity 4: Implementation of interoperability between the Platforms (ddPAST, HOMECARE)	Modify DataBase (Y/N)	Yes
	Modify Platform (Y/N)	Yes

QUESTIONS	ANSWERS		
What was actually implemented? Any deviation from the planned actions	<p>As regards the LCF1 activities 2.1) the sharing and activation of the procedure was started with a municipality of the ASL. The experimentation with the first municipality ends in February 2023 and from March 2023 it will be disseminated to the other municipalities.</p> <p>As regards the LCF2 2.2) activities for access by hospital operators to the ddPAST platform, it has been resumed and the development of software integrations is ongoing.</p>		
Problems? Unexpected findings? Please describe	<p>There have been delays LCF2 2.2) to evaluate where it is more convenient to integrate the software modules necessary for the activity.</p> <p>After the feasibility analysis, it was decided to develop the modules in the ASL ddPAST internal company platform.</p>		
IMPLEMENTATION PROGRESS OF THE LOCAL GOOD PRACTICE			
0-25%	25-50%	50-75%	75-100%
			X – LCF1
		X – LCF2	

Study

Cycle number (1or 2)		2				
Activity	KPI	Target value	Actual value	Reasons for the deviations	Mitigation actions implemented	Impact of mitigation actions
LCF 1 – Activity 1: Formalization of the operational protocol for the management of	Deliberative act of formalization of the new protocol	Yes	Yes			

protected hospital-territory discharges of frail people	Document sharing the protocol with the municipalities of the ASL	Yes	Yes			
LCF 1 – Activity 2: Implementation of the operational protocol for the management of protected discharges	Number of reports of protected discharges managed according to the protocol / total reporting of protected discharges - expected 30% in the first year and + 10% for each subsequent year	Yes	Yes			
LCF 1 – Activity 3: Monitoring and verification of the implementation of the new protocol	Definition of the system and monitoring tools	Yes	Yes			
	Document sharing the monitoring system with all the actors involved	Yes	Yes			
	Preparation of half-yearly reports	Yes	Yes			
LCF 2 – Activity 1: Integration of the ddPAST	Modify DataBase (Y/N)	Yes	In progress			

corporate platform for the access of social service operators of the municipalities belonging to the Napoli2 Nord ASL	Modify Plataform (Y/N)	Yes	In progress			
LCF 2 – Activity 2: Integration of the ddPAST corporate platform for the access of hospital operators	Modify DataBase (Y/N)	Yes	In progress			
	Modify Plataform (Y/N)	Yes	In progress			
LCF 2 – Activity 3: Creation of the ddPAGeF Fragility Platform	Abandoned	Abandoned	Abandoned	Abandoned	Abandoned	Abandoned
LCF 2 – Activity 4: Implementation of interoperability between the Platforms (ddPAST, HOMECARE)	Modify DataBase (Y/N)	Yes	Yes			
	Modify Plataform (Y/N)	Yes	Yes			

Act

Cycle number (1 or 2)	2		
Activity	Maintain	Adapt	Abandon
LCF 1 – Activity 1: Formalization of the operational protocol for the management of protected hospital-territory discharges of frail people	X		
LCF 2 – Activity 2: Integration of the ddPAST corporate platform for the access of hospital operators	X		
LCF 2 – Activity 3: Creation of the ddPAGeF Fragility Platform	X		
LCF 2 – Activity 1: Integration of the ddPAST corporate platform for the access of social service operators of the municipalities belonging to the Napoli2 Nord ASL	X		

LCF 2 – Activity 2: Integration of the ddPAST corporate platform for the access of hospital operators	X		
LCF 2 – Activity 3: Creation of the ddPAGeF Fragility Platform			X
LCF 2 – Activity 4: Implementation of interoperability between the Platforms (ddPAST, HOMECARE)	X		

QUESTIONS	ANSWERS
Any new proposed action for the future?	N.A.

Post-implementation

ITEM	ANSWER
Title and abstract	
Title	The management of protected hospital-territory discharges of fragile people, supported by digital tools
Abstract	<p>Strengthening vertical (between hospital and territory) and horizontal (between health services and territorial social services) integration is necessary to guarantee the integrated care of users who express complex social and health care needs.</p> <p>The development and implementation of paths and tools shared by all the services and professionals involved and/or mutually autonomous organizations that operate jointly through levels of coordination, has become essential to make entry into the system accessible and governed, reduce fragmentation and the discontinuity within the system and between the various organizations (social and health).</p> <p>The digital maturity levels of organizations influence these levels of integration and the ability to respond to the social and health needs of the population. The ASL Napoli 2 Nord acted both on the development and implementation of shared integration paths and tools and on the development of specific digital tools.</p>
Why did you start?	
Problem description	Organizations offer fragmented responses to the social and health needs of users with chronic conditions. In this way they are unable to take charge of the person in the long term, prevent and contain the disability, guarantee the continuity of care and the integration of social and health interventions. As a consequence of this: a) these users have a greater risk of negative outcomes in terms of increased morbidity, increased frequency and duration of hospitalization, increased risk of disability and non-self-sufficiency, worse quality of life and increased mortality. B) the demand for health and social services by people with chronic pathologies, mainly the elderly, is increasing and the amount of health and social resources to be allocated to this segment of the population is growing.

	The low level of introduction and use of digital tools does not facilitate the organization of integrated responses to the global social and health needs of people with chronic diseases.
Available knowledge	<p>Various planning documents, at national and regional level (Health Plans, Social Plans, Non Self-sufficiency Plan, Chronicity Plan, the New Home Care System and last but not least PNRR and related implementing documents of mission 5-6), from more than a decade have reported among the priority objectives of health policy the rebalancing and integration between hospital and territorial assistance to give concrete answers to the new health needs determined by epidemiological, demographic and social changes.</p> <p>There are also several national and regional documents, not least the PNRR and related implementing documents, which solicit and support the digital transformation of the Health Sector, through the adoption of innovative and technologically advanced solutions and the enhancement of the digital heritage, also to make it more effective delivery of services.</p>
Rationale	Our reference models for the management of chronicity, particularly in the management of protected discharges, are the integrated service delivery models. Models that act at the whole system level and that can offer more potential to people with "complex needs". These are interventions aimed at solving the problems of integration between territorial healthcare assistance and hospital and social healthcare assistance, aimed at supporting positive changes in care processes in terms of: better planning of discharges, better flow of care, reduction of variance in practice and improved knowledge sharing among practitioners.
Specific aims	Strengthen the integration of care between the hospital and the territory and the construction of integrated care pathways to guarantee the effective taking over of the "global" needs of people with chronic conditions, with particular reference to protected discharges, supporting this process with ICT
What did you do?	
Context	<p>STRENGTHS</p> <ul style="list-style-type: none"> - Existence of a care model for chronic frail patients based on multidimensional and multidisciplinary assessment of the person's need and definition of personalized projects shared between the different points of the hospital network and health and social network interested in taking charge of the person; - Criteria and methods shared at regional level for the multidimensional assessment of the need of the person with chronicity with a single assessment tool; - Existence of a business model for the integrated care of the users of the home services network with three different levels of home care intensity (I, II, III, Palliative Care); - Existence of a ddPAST corporate digital platform: a) PUA Module (Single Access Door): for reporting and the need and starting the process of taking charge of the patient; b) CDI Module (Integrated Home Care): for the assessment of the patient's need, through the evaluation of the case (e.g. SVAMA form), the design and management of the care plan (PAI) at home; <p>WEAKNESSES</p>

	<ul style="list-style-type: none"> - Poor integration between the different intra-company contexts (Hospital-Territory) and between operators of the health system and the social system (Municipality-ASL); - Resistance to change on the part of health and social-health professionals to the use of new technologies; - Need to move resources from a hospital health system towards a territorial care model; - Lack of an integrated information system of electronic medical records shared throughout the ASL Company; - Lack of a current profile of fragility of the ASL health population with an indication of the stratification in relation to the state of health, the condition of socio-medical fragility and disability; - Lack of interoperability between different patient management IT platforms <p>THREATS</p> <ul style="list-style-type: none"> - Resistance to organizational changes of the public health system with respect to epidemiological, demographic and social change; - Resistance to population change against organizational changes in the public health system; <p>OPPORTUNITY</p> <ul style="list-style-type: none"> - existence of an operational protocol for the integrated management of protected resignations of fragile people, with identification of roles, responsibilities, and tools, not yet formalized - ongoing experimentation of an integrated platform for the provision of remote monitoring and remote assistance services for the patient at home; - Availability of new technologies such as: <ul style="list-style-type: none"> i) FIDHOME kit consisting of innovative devices for remote monitoring of vital parameters; ii) FIDRAY dispenser for the correct intake of medicines, both at home and away; iii) Innovative smartwatch for remote monitoring of vital activities with potential application for patient care;
Intervention(s)	<p>Description of the intervention(s) in sufficient detail that others could reproduce it.</p> <ul style="list-style-type: none"> - Implementation of the latest version of the operating protocol for frail and/or home patients and formalization of the operating protocol for the management of protected hospital-territorial discharges of frail people. - Monitoring and verification of the implementation of the new protocol. - Integration of the ddPAST company platform for access by social services operators in the municipalities adhering to the ASL Napoli2 Nord. - Integration of the ddPAST company platform for access by hospital operators - Implementation of interoperability between platforms (ddPAST, SINFONIA). <p>Specifics of the team involved in the work:</p>

	4 Managers in charge of Home Care, Social and Health Integration, the Elderly and Dementia, Information Technologies; 1 Analyst; 2 IT Operators; 1 Administrative Officer
Study of the Intervention(s)	<p>Approach chosen for assessing the impact of the intervention(s) (quantitative or qualitative analysis)</p> <p>We have planned to implement a specific monitoring system, mainly with the analysis of quantitative data of users who are guaranteed to be taken in charge in compliance with the integrated protocols and procedures, with the processing and dissemination of half-yearly reports.</p> <p>Approach used to establish whether the observed outcomes were due to the intervention(s)</p> <p>This quantitative analysis of the data will allow us to establish the results due to the intervention of implementation of the integrated protocols</p>
Measures	<p><u>Monitoring and verification of the implementation of the new protocol</u></p> <ul style="list-style-type: none"> - monitoring system design; - cross-referencing of data present in hospital and territorial IT flows, with identification of errors in the recording of protected discharge data; - circular preparations and dissemination for the correct registration in the IT platforms of the data relating to protected discharges, both in the hospital and in the territorial platform, to ensure correct monitoring; preparation of the half-yearly report; <p><u>Integration of the ddPAST company platform for access by social services operators in the municipalities adhering to the ASL Napoli2 Nord</u></p> <ul style="list-style-type: none"> - identified the pilot municipality to activate the integration of social services operators in the ddPAST integrated platform - design and development of social services integration modules to the ddPAST platform: User Management - Social Operator Roles - PUA Office Management Municipality of Giugliano in Campania (Pilot Municipality) - activation of access credentials to the ddPAST integrated platform of social services operators identified by the Municipality of Giugliano - management of 30 days of testing the use of the ddPAST integrated platform by the social services operators of the Municipality of Giugliano - management of any critical issues in ddPAST operation in the testing phase - launch of the integration of social services operators from all municipalities in the territory of the Healthcare Company into the integrated ddPAST platform - monitoring of the reduction in time taken to take care of target users following the integration of social services operators to the ddPAST platform,

	<p>with sharing of user information between the health and social sectors from the moment the need is reported</p> <p><u>Integration of the ddPAST company platform for access by hospital operators</u></p> <ul style="list-style-type: none"> - analysis document of the hospital software requirements (ADT) for the integration between this software of our Hospitals and the ddPAST platform for the integrated computerized hospital-territory management of protected discharges - Development of interoperability services between the two platforms - Management of the one-month testing phase of the interoperability between the two platforms between a hospital and a health district - Implementation of interoperability between the two platforms at company level <p>Monitoring of the reduction in the time taken to take charge of the target users in the area following the implementation of the interoperability of the hospital software (ADT) with the ddPAST platform integrated with the municipal social services</p>
Analysis	<p>Monitoring and verification of the implementation of the new operational protocol for the management of protected hospital discharges: n. protected hospital discharges managed according to the operative protocol/total protected hospital discharges. Expected 30% in the first year and + 10% for each subsequent year.</p> <p>Integration of the ddPAST company platform for access by social services operators in the municipalities adhering to the Napoli2 Nord ASL: report no. access accounts to ddPAST issued for municipal social services operators – at least one operator for each municipal social service; no. accesses to the ddPAST platform by operators of municipal social services - at least 30 accesses for each operator in three months.</p> <p>Integration of the ddPAST corporate platform for access by hospital operators: implementation of the interoperability of the hospital software (ADT) with the ddPAST platform integrated with the municipal social services in all the hospitals and health districts of the ASL Napoli 2 Nord; no. cases of protected hospital discharge managed through the interoperability of the hospital software (ADT) with the ddPAST platform - at least no. 5 cases for each of the four hospitals in three months.</p>
What did you find?	
Results	<p>Monitoring and verification of the implementation of the new protocol.</p> <p>The data present in the IT, hospital and territorial flows (home care) were cross-referenced to seek consistency between the data of the cases registered in each platform as subjects with protected hospital discharge in the year 2022. Only one</p>

	<p>for a small % of the cases did we find consistency of data in both platforms (below 10%). A circular was prepared and circulated for the correct recording of data in hospital and territorial (home care) IT flows of the target people. In May 2023, 1 quarter 2023 monitoring will be carried out with the expectation of finding an increase in the consistency of the data relating to cases that have benefited from protected hospital discharges from the data crossing of the two information flows.</p> <p>Integration of the ddPAST company platform for access by social services operators in the municipalities adhering to the ASL Napoli2 Nord</p> <p>The testing phase is underway with the social service operators of the pilot municipality. Access credentials to the ddPAST platform have been issued for no. 3 operators of the municipality. Upon completion of the 30 days of testing, accesses to the ddPAST platform and the number of cases with social and health needs managed will be monitored with the sharing of user information between the health and social sectors from the moment the need is</p> <p>Integration of the ddPAST company platform for access by hospital operators The analysis document of the hospital software requirements (ADT) for the integration between this software of our hospital facilities and the ddPAST platform for the integrated computerized hospital-territory management of protected discharges is nearing completion.</p>
What does it mean?	
Summary	<ul style="list-style-type: none"> - Monitoring and verification of the implementation of the new operational protocol for the management of protected hospital discharges <p>The shared elaboration and formalization of the new operational protocol for the management of protected hospital discharges, with particular attention to vulnerable people, is identified as a strong point of the project because it clearly defined the roles, tasks and functions of the various actors involved in the care (hospitals, districts, municipal social services). Other strengths are identified in the actions taken to support the implementation of the Protocol: a specific dedicated training course was managed; the social assistants of the health company have been strengthened, both at the hospital and health district level; meetings/webinars were held with the stakeholders involved in the management of the integrated discharge procedures from which critical issues emerged along the way and further actions were identified and implemented to resolve the critical issues (for example: online updating and dissemination mapping of PUA points and Offices SocioSanitarie to facilitate connections between the hospital and the local area; updating of the mapping of residential and semi-residential services at the regional level to support the search for structures with available PLs). Then the need arose to monitor the implementation of the operational protocol. For this reason and pending being able to monitor implementation through the ddPAST corporate platform to complete the integration of hospital operators: a) the tool in use for monitoring social and health interventions was updated; b) The data present in the IT, hospital and territorial flows (home care) were cross-referenced, to seek</p>

	<p>consistency between the data of the cases registered in each platform as subjects with protected hospital discharge in the year 2022</p> <ul style="list-style-type: none"> - Integration of the ddPAST company platform for access by social services operators in the municipalities adhering to the ASL Napoli2 Nord <p>To ensure time reduction and improve the appropriateness of taking charge of people with social and health needs, it was necessary to resolve a critical link between the Health Services (in particular the Health Districts) and the municipal social services, including the sharing and exchange of existing user information, held individually by each sector. For this reason, considering the strong point of already having the ddPAST company platform, identifying the pilot municipality that actively participated in the process, the modules for integrating social services to the ddPAST platform were designed and developed. The testing phase is ongoing before spreading the use of the integrated platform to all the social services of the municipalities belonging to the ASL Napoli 2 Nord. The strong point for the implementation is certainly the long-established good relationship with the social services of the municipalities and the awareness of both sectors to want to improve the IT connection and data sharing</p> <ul style="list-style-type: none"> - Integration of the ddPAST company platform for access by hospital operators <p>To guarantee a reduction in hospitalization times for fragile/vulnerable people in need of protected discharge by anticipating territorial care, it was necessary to resolve a critical link between hospital services and local services (Health Districts and Municipal Social Services). Therefore, a method was sought that could facilitate the communication and sharing of target user data between the various actors. For this reason, considering the strong point of already having the company platform ddPAST, for use by the Health Districts, and the need not to ask hospital operators to register the data of patients in another platform, the method was identified for guarantee interoperability between the hospital software (ADT) with the ddPAST platform for the integrated hospital-territory computerized management of protected discharges. The development of interoperability between platforms is currently in progress. The strength for the implementation of the computerized management of protected discharges is certainly having strengthened the staff of hospital social workers and having identified the method of interoperability between the platforms which does not require hospital operators to replicate the data recording activity on a different platform</p>
Interpretation	<p>The sharing between all the actors involved in the definition of the hospital-territorial protected discharge path for fragile patients, in the design of the integration modules of the social services of the municipalities to the ddPAST platform and in the identification of the methods to guarantee interoperability between the hospital software (ADT) with the ddPAST platform it has had a positive impact on the operators and systems involved in the management of protected hospital discharges because it has made everyone more aware and</p>

	involved in the process. Surely having integrated IT tools for connecting and sharing information between the various players facilitates everyone's work and improves the overall management of the process, with an expected reduction in hospital stay days, a reduction in waiting days for territory and overall reduction of management costs. At the moment we do not have data useful for comparing the results with those of other publications
Limitations	<p>We do not identify any limitations on the replicability of the initiatives in other territories. Right from the initial stages of the project, we thought of solutions that could allow comparison/benchmarks with other realities and the sustainability of the initiatives even beyond the borders and project times.</p> <p>The structure of the ddPAST platform is already such as to include the information required by ordinary healthcare information flows at a national level, just as the hospital software (ADT) and the integration modules of the social services of the municipalities to the ddPAST platform have been designed and developed in so as to detect the information useful to the social services of the municipalities for the access of users to both social and socio-health services (that is, those also required by the national and regional level)</p>
Conclusions	<p>Utility connected to a) improvement and homogenization of the taking charge and continuity of care of frail people; b) reduction of hospitalization and waiting times for territorial care; c) reduction of operator stress to facilitate computerized connections and data sharing; d) reduction of management costs of assistance to people with frailty/vulnerability.</p> <p>Sustainability and diffusion in other contexts: the initiatives have all been designed and developed thinking about the need for comparison/benchmark with other realities and the sustainability of the initiatives even beyond the borders and project times.</p> <p>Suggested next steps: The initiatives are currently being tested. It will be important to accompany operators and services in getting them up and running, supporting them in identifying any critical issues that could arise along the way and identifying and implementing the actions aimed at overcoming them. Another important point is the system implementation of computerized monitoring of the target user and the functionality of the processes.</p>
Other information	
Funding	All project interventions were managed in-house, with the contribution of human resources employed by ASL Napoli 2 Nord.

Annex 1B: Peer Reviewed Publications

Article 1 – Role of Co-creation for Large-Scale Sustainable Adoption of Digitally Supported Integrated Care: Prehabilitation as Use Case

TITLE: Role of Co-creation for Large-Scale Sustainable Adoption of Digitally Supported Integrated Care: Prehabilitation as Use Case

JOURNAL: International Journal of Integrated Care (IJIC)

STATUS: Published 2022

PREPRINT: NA

DOI: <https://doi.org/10.5334/ijic.6503>

ABSTRACT:

Introduction: The efficacy-effectiveness gap constitutes a well-known limitation for adoption of digitally enabled integrated care services. The current report describes the co-creation process undertaken (2016–2021) to deploy a prehabilitation service at Hospital Clínic de Barcelona with the final aim of achieving sustainable adoption and facilitate site transferability.

Methods: An implementation research approach with a population-based orientation, combining experience-based co-design and quality improvement methodologies, was applied. We undertook several design-thinking sessions (Oct-Nov 2017, June 2021 and December 2021) to generate and follow-up a work plan fostering service scalability. The implementation process was assessed using the Comprehensive Framework for Implementation Research, leading to the identification of key performance indicators.

Discussion: Personalization and modularity of the intervention according to patients' surgical risk were identified as core traits to enhance patients' adherence and value generation. A digitally enabled service workflow, with an adaptive and collaborative case management approach, should combine face-to-face and remotely supervised sessions with intelligent systems for patients' and professionals' decision support. The business model envisages operational costs financed by savings generated by the service.

Conclusions: Evidence-based co-creation, combining appropriate methodologies and a structured evaluation framework, was key to address challenges associated with sustainable prehabilitation service adoption, scalability and transferability.

PDF:



Article 1

Article 2 – Actionable Factors Fostering Health Value Generation and Scalability of Prehabilitation

TITLE: Actionable Factors Fostering Health Value Generation and Scalability of Prehabilitation

JOURNAL: Annals of Surgery

STATUS: Published 2022

PREPRINT: NA

DOI: <https://doi.org/10.1097/sla.0000000000005662>

ABSTRACT:

Importance: Prehabilitation has potential for improving surgical outcomes as shown in previous randomized controlled trials. However, a marked efficacy-effectiveness gap is limiting its scalability. Comprehensive analyses of deployment of the intervention in real-life scenarios are required.

Objective: To assess health outcomes and cost of prehabilitation.

Design: Prospective cohort study with a control group built using propensity score matching techniques.

Setting: Prehabilitation unit in a Tertiary-care University hospital.

Participants: Candidates for major digestive, cardiac, thoracic, gynaecologic or urologic surgeries.

Intervention: Prehabilitation program, including supervised exercise training, promotion of physical activity, nutritional optimization, and psychological support.

Main outcomes and measures: The comprehensive complication index, hospital and intensive care unit length of stay and hospital costs per patient until 30 days after surgery. Patients were classified by the degree of program completion and level of surgical aggression for sensitivity analysis.

Results: The analysis of the entire study group did not show differences in study outcomes between prehabilitation and control groups (n=328 each). The per-protocol analysis, including only patients completing the program (n=112, 34%), showed a reduction in mean hospital stay (9.9 (7.2) vs. 12.8 (12.4) days; p=0.035). Completers undergoing highly aggressive surgeries (n=60) additionally showed reduction in mean intensive care unit stay (2.3 (2.7) vs. 3.8 (4.2) days; p=0.021) and generated mean cost savings per patient of 3,092€ (32% cost reduction) (p=0.007). Five priority areas for action to enhance service efficiencies were identified.

Conclusions and Relevance: The study indicates low rate of completion of the intervention and identifies priority areas for re-design of service delivery to enhance effectiveness of prehabilitation.

PDF:



Article 2

Article 3 – Prospective cohort study for assessment of integrated care with a triple aim approach: hospital at home as use case

TITLE: Prospective cohort study for assessment of integrated care with a triple aim approach: hospital at home as use case

JOURNAL: BMC Health Services Research

STATUS: Published 2022

PREPRINT: NA

DOI: <https://doi.org/10.1186/s12913-022-08496-z>

ABSTRACT:

Background: Applicability of comprehensive assessment of integrated care services in real world settings is an unmet need. To this end, a Triple Aim evaluation of Hospital at Home (HaH), as use case, was done. As ancillary aim, we explored use of the approach for monitoring the impact of adoption of integrated care at health system level in Catalonia (Spain).

Methods: Prospective cohort study over one year period, 2017–2018, comparing hospital avoidance (HaH-HA) with conventional hospitalization (UC) using propensity score matching. Participants were after the first episode directly admitted to HaH-HA or the corresponding control group. Triple Aim assessment using multiple criteria decision analysis (MCDA) was done. Moreover, applicability of a Triple Aim approach at health system level was explored using registry data.

Results: HaH-HA depicted lower: i) Emergency Room Department (ER) visits ($p < .001$), ii) Unplanned re-admissions ($p = .012$); and iii) costs ($p < .001$) than UC. The weighted aggregation of the standardized values of each of the eight outcomes, weighted by the opinions of the stakeholder groups considered in the MCDA: i) enjoyment of life; ii) resilience; iii) physical functioning; iv) continuity of care; v) psychological wellbeing; (vi) social relationships & participation; (vii) person-centeredness; and (viii) costs, indicated better performance of HaH-HA than UC ($p < .05$). Actionable factors for Triple Aim assessment of the health system with a population-health approach were identified.

Conclusions: We confirmed health value generation of HaH-HA. The study identified actionable factors to enhance applicability of Triple Aim assessment at health system level for monitoring the impact of adoption of integrated care.

Registration: ClinicalTrials.gov (26/04/2017; NCT03130283).

PDF:



Article 3

Article 4 – The Value of Admission Avoidance: Cost-Consequence Analysis of One-Year Activity in a Consolidated Service

TITLE: The Value of Admission Avoidance: Cost-Consequence Analysis of One-Year Activity in a Consolidated Service

JOURNAL: BMC Cost effectiveness and resource allocation

STATUS: Submitted 2023

PREPRINT: medRxiv

DOI: <https://doi.org/10.1101/2023.01.05.23284217>

ABSTRACT:

Background: Many advantages of hospital at home (HaH), as a modality of acute care, have been highlighted, but controversies exist regarding the cost-benefit trade-offs.

Objective: To assess health outcomes and analytical costs of hospital avoidance (HaH-HA) in a consolidated service with over ten years of delivery of HaH in Barcelona (Spain).

Methods: A retrospective cost-consequence analysis of all first episodes of HaH-HA, directly admitted from the emergency room (ER) in 2017–2018, was carried out. HaH-HA was compared with a propensity-score-matched group of contemporary patients admitted to conventional hospitalization (Controls). Mortality, re-admissions, ER visits, and direct healthcare costs were evaluated.

Registration: ClinicalTrials.gov (26/04/2017; NCT03130283).

Results: HaH-HA and Controls (n=441 each) were comparable in terms of age (73 [SD16] vs 74 [16]), gender (male, 57% vs 59%), multimorbidity, healthcare expenditure during the previous year, case mix index of the acute episode, and main diagnosis at discharge. HaH-HA presented lower mortality during the episode (0 vs. 19 (4.3%); $p < 0.001$). At 30 days post-discharge, HaH-HA and Controls showed similar re-admission rates; however, ER visits were lower in HaH-HA than in Controls (28 (6.3%) vs 34 (8.1%); $p = 0.044$). Average costs per patient during the episode were lower in the HaH-HA group (€ 1,078) than in Controls (€ 2,171). Likewise, healthcare costs within the 30 days post-discharge were also lower in HaH-HA than in Controls ($p < 0.001$).

Conclusions: The study showed higher performance and cost reductions of HaH-HA in a real-world setting. The identification of sources of savings facilitates scaling of hospital avoidance.

Funding: This article was funded by JADECARE project- HP-JA-2019 - Grant Agreement nº 951442 (2020- 2023), a European Union's Health Program 2014-2020.

PDF:



Article 4

Article 5 – The Assessment of Medical Device Software Supporting Health Care Services for Chronic Patients in a Tertiary Hospital: Overarching Study

TITLE: The Assessment of Medical Device Software Supporting Health Care Services for Chronic Patients in a Tertiary Hospital: Overarching Study

JOURNAL: Journal of Medical Internet Research (JMIR)

STATUS: Published 2022

PREPRINT: NA

DOI: <http://dx.doi.org/10.2196/40976>

ABSTRACT:

Background: Innovative digital health tools are increasingly being evaluated and, in some instances, integrated at scale into health systems. However, the applicability of assessment methodologies in real-life scenarios to demonstrate value generation and consequently foster sustainable adoption of digitally enabled health interventions has some bottlenecks.

Objective: We aimed to build on the process of premarket assessment of 4 digital health interventions piloted at the Hospital Clinic de Barcelona (HCB), as well as on the analysis of current medical device software regulations and postmarket surveillance in the European Union and United States in order to generate recommendations and lessons learnt for the sustainable adoption of digitally enabled health interventions.

Methods: Four digital health interventions involving prototypes were piloted at the HCB (studies 1-4). Cocreation and quality improvement methodologies were used to consolidate a pragmatic evaluation method to assess the perceived usability and satisfaction of end users (both patients and health care professionals) by means of the System Usability Scale and the Net Promoter Score, including general questions about satisfaction. Analyses of both medical software device regulations and postmarket surveillance in the European Union and United States (2017-2021) were performed. Finally, an overarching analysis on lessons learnt was conducted considering 4 domains (technical, clinical, usability, and cost), as well as differentiating among 3 different eHealth strategies (telehealth, integrated care, and digital therapeutics).

Results: Among the participant stakeholders, the System Usability Scale score was consistently higher in patients (studies 1, 2, 3, and 4: 78, 67, 56, and 76, respectively) than in health professionals (studies 2, 3, and 4: 52, 43, and 54, respectively). In general, use of the supporting digital health tools was recommended more by patients (studies 1, 2, 3, and 4: Net Promoter Scores of -3%, 31%, -21%, and 31%, respectively) than by professionals (studies 2, 3, and 4: Net Promoter Scores of -67%, 1%, and -80%, respectively). The overarching analysis resulted in pragmatic recommendations for the digital health evaluation domains and the eHealth strategies considered.

Conclusions: Lessons learnt on the digitalization of health resulted in practical recommendations that could contribute to future deployment experiences.

PDF:



Article 5

Article 6 – Prevention of Unplanned Hospital Admissions in Multimorbid Patients Using Computational Modelling: Observational Retrospective Cohort Study

TITLE: Prevention of Unplanned Hospital Admissions in Multimorbid Patients Using Computational Modelling: Observational Retrospective Cohort Study

JOURNAL: Journal of Medical Internet Research (JMIR)

STATUS: Published 2023

PREPRINT: NA

DOI: <http://dx.doi.org/10.2196/40846>

ABSTRACT:

Background: Enhanced management of multimorbidity constitutes a major clinical challenge. Multimorbidity shows well-established causal relationships with the high use of health care resources and, specifically, with unplanned hospital admissions. Enhanced patient stratification is vital for achieving effectiveness through personalized postdischarge service selection.

Objective: The study has a 2-fold aim: (1) generation and assessment of predictive models of mortality and readmission at 90 days after discharge; and (2) characterization of patients' profiles for personalized service selection purposes.

Methods: Gradient boosting techniques were used to generate predictive models based on multisource data (registries, clinical/functional and social support) from 761 nonsurgical patients admitted in a tertiary hospital over 12 months (October 2017 to November 2018). K-means clustering was used to characterize patient profiles.

Results: Performance (area under the receiver operating characteristic curve, sensitivity, and specificity) of the predictive models was 0.82, 0.78, and 0.70 and 0.72, 0.70, and 0.63 for mortality and readmissions, respectively. A total of 4 patients' profiles were identified. In brief, the reference patients (cluster 1; 281/761, 36.9%), 53.7% (151/281) men and mean age of 71 (SD 16) years, showed 3.6% (10/281) mortality and 15.7% (44/281) readmissions at 90 days following discharge. The unhealthy lifestyle habit profile (cluster 2; 179/761, 23.5%) predominantly comprised males (137/179, 76.5%) with similar age, mean 70 (SD 13) years, but showed slightly higher mortality (10/179, 5.6%) and markedly higher readmission rate (49/179, 27.4%). Patients in the frailty profile (cluster 3; 152/761, 19.9%) were older (mean 81 years, SD 13 years) and predominantly female 63/152, 41.4%, males). They showed medical complexity with a high level of social vulnerability and the highest mortality rate (23/152, 15.1%), but with a similar hospitalization rate (39/152, 25.7%) compared with cluster 2. Finally, the medical complexity profile (cluster 4; 149/761, 19.6%), mean age 83 (SD 9) years, 55.7% (83/149) males, showed the highest clinical complexity resulting in 12.8% (19/149) mortality and the highest readmission rate (56/149, 37.6%).

Conclusions: The results indicated the potential to predict mortality and morbidity-related adverse events leading to unplanned hospital readmissions. The resulting patient profiles fostered recommendations for personalized service selection with the capacity for value generation.

PDF:



Article 6

Article 7– Five years of Hospital at Home adoption in Catalonia: impact and challenges

TITLE: Five years of Hospital at Home adoption in Catalonia: impact and challenges

JOURNAL: Journal of the American Geriatrics Society (JAGS)

STATUS: Submitted 2023

PREPRINT: medRxiv

DOI: <https://doi.org/10.1101/2023.01.25.23284997>

ABSTRACT:

Background: Hospital at home (HaH) was increasingly implemented in Catalonia (7.7 M, Spain) achieving regional adoption within the 2011-2015 Health Plan. This study aimed to assess population-wide HaH outcomes over five years (2015-2019) in a consolidated regional program and provide context-independent recommendations for service quality assurance.

Methods: A mixed-methods approach was adopted, combining population-based retrospective analyses of registry information with qualitative research. HaH was compared with a conventional hospitalization group using propensity score matching techniques. We evaluated the 12-month period before the acute episode, the admission, and use of healthcare resources at 30 days after discharge. A panel of experts discussed the results and provided recommendations for monitoring AA services.

Results: The adoption of HaH steadily increased from 5,185 to 8,086 episodes/year (total episodes 31,901; mean age 73 (SD 17) years; 79% high-risk patients). Mortality rates were similar between HaH and conventional hospitalization within the episode [76 (0.31%) vs. 112 (0.45%)] and at 30-days after discharge [973(3.94%) vs. 1112(3.24%)]. Likewise, the rates of hospital re-admissions [2,003 (8.08%) vs. 1,625 (6.58%)] or ER visits [4,109 (16.62%) vs. 3,968 (16.03%)] 30 days after discharge were also similar between intervention and controls. The 27 hospitals assessed showed high variability in patients' age, multimorbidity, severity of episodes, recurrences, and length of stay of AA episodes. Recommendations aiming at enhancing service delivery were produced.

Conclusions: Besides confirming safety and value generation of HaH for selected patients, we found that this service is delivered in a case-mix of different scenarios, encouraging hospital-profiled monitoring of the service.

PDF:



Article 7

Article 8 – Health Circuit: a practice-proven adaptive case management approach for innovative healthcare services

TITLE: Health Circuit: a practice-proven adaptive case management approach for innovative healthcare services

JOURNAL: Journal of Medical Internet Research (JMIR)

STATUS: Submitted 2023

PREPRINT: medRxiv

DOI: <https://doi.org/10.1101/2023.03.22.23287569>

ABSTRACT:

Digital health tools may facilitate care continuum. However, enhancement of digital aid is imperative to prevent information gaps or redundancies, as well as to facilitate support of flexible care plans. The study presents Health Circuit, a digital health tool with an adaptive case management approach and analyses its healthcare impact, as well as its usability (SUS) and acceptability (NPS) by healthcare professionals and patients. In 2018-19, an initial prototype of Health Circuit was tested in a cluster randomized clinical pilot (n=100) in patients with high risk for hospitalization (Study I). In 2021, a pilot version of Health Circuit was evaluated in 104 high risk patients undergoing prehabilitation before major surgery (Study II). In study I, Health Circuit resulted in reduction of emergency room visits [4 (13%) vs 7 (44%)] and enhanced patients' empowerment ($p<0.0001$) and showed good acceptability/usability scores (NPS 31 and SUS 54/100). In Study II, NPS scored 40 and SUS 85/100. The acceptance rate was also high (mean score of 8.4/10). Health Circuit showed potential for healthcare value generation, good both acceptability and usability despite being a prototype system, prompting the need for testing a completed system in real-world scenarios.

PDF:



Article 8

PhD Thesis – Evaluation and digital transformation of integrated care services

TITLE: Evaluation and digital transformation of integrated care services

AUTHOR: Erik Baltaxe

YEAR: 2023

UNIVERSITY: Doctoral program in medicine and translational research, Faculty of medicine, University of Barcelona

ABSTRACT:

Around fifty million people in Europe suffer from multiple chronic diseases, and 60% of this population is over 65 years. This multimorbid population constitutes the costliest patients in the healthcare system accounting for around 75% of its total costs. While Integrated Care has emerged as a value-based approach to overcome health and social care needs of multimorbid patients, the practicalities of digitally enabled integrated care services involve well identified challenges, namely i) its deployment and adoption at large scale, and ii) the way to evaluate this large-scale deployment, where technological tools are also part of the intervention.

The current PhD thesis aims to address those issues by acknowledging that the use of well defined, standardized, and flexible evaluation tools is the most efficient way to generate custom key performance indicators to allow for long term follow-up of the services, as well as transferability among sites, and to explore granularities of the digital support to value-based integrated care services in Europe.

The research has explored the use of a comprehensive evaluation framework for digitally enabled integrated care interventions in real-life settings, aiming at bridging the gap between efficacy and effectiveness. Furthermore, the thesis investigates the pre-pandemic digital health ecosystem in Europe and the current new developments in regulatory policies governing said digital transformation. Finally, we describe the use of co-creation strategies to foster mature and sustainable digital health solutions supporting integrated care.

The thesis outcomes show that the use of the proposed evaluation frame generates quality data to support scalability and transferability of services by identifying tailored key performance indicators. Moreover, the thesis identified major challenges of digital transformation in terms of change management, interoperability, and health risk assessment for service selection. Actionable recommendation to overcome these barriers are presented, alongside regulatory aspects to be considered during the implementation of digital health in Integrated Care. Also, the studies carried out showed that the co-creation process was useful to overcome relevant implementation barriers, as well as to boost the role of facilitators of deployment. It is of note that lessons learnt from the thesis have plausible application beyond chronic care management. They should foster implementation of systems medicine aiming at generating personalized practices in clinical medicine.

PDF:



PhD Thesis Erik
Baltaxe