APPROPRIATE CARE PATHWAY

D7.1 "HOSPITAL CARE MANAGEMENT"

AUTHORS: Elena Procaccini

Tamara Alhambra

Siok Swan Tan

Issue: April 2019

Co-funded by
the Health Programme
of the European Union

"This publication is part of the project '664689/APPCARE' which has received funding from the European Union's Health Programme (2014-2020)."

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Background

Ageing problems are a common challenge for European health systems. Frail elderly people are often in need of long term care and their chronic conditions require a complex response from a wide range of health professionals. An especially vulnerable group is the hospitalized older people. Among this group, around 30 to 60% develops functional decline and the risk of readmission and hospital-related adverse outcomes is substantial, particularly in the first few days after discharge.

To achieve high-quality geriatric care and minimization of the need for hospitalization, an optimum management of geriatric syndromes and an integrated, coordinated system of care is needed. Currently, a supply-oriented approach and the fragmentation in the organization of the elderly care often do not allow providing care appropriately and, at the right time and place.

APPCARE (Appropriate care for frail elderly patients: a comprehensive model), a project granted under the HEALTH Programme of the European Union, is aimed at creating a new model for the management of frail elderly people to demonstrate how an innovative and comprehensive management of complex and co-morbid clinical situations, may maintain patient's functional status in its clinical trajectory, optimizing health care systems.

1.2 Scope of the document

According to the Work Package 5 APPCARE model, this document will describe the implementation of the hospital care model in the three pilot sites, reporting the final results regarding implementation and evaluation (effect and process) of the hospital care module. This document will feed the overall impact assessment foreseen in WP10 tasks.

1.2 Reference documents

APPCARE D5.1 APPCARE model

1.3 Distribution list

This document is a public and official deliverable that will be upload on the Participant Portal (for European Commission approval) and on the APPCARE project website at the following link

http://www.app-care.org/deliverables/

1.4 History of changes

Version	Date	Main changes
APPCARE D7.1 _B.1	6TH February 2019	Table of content
APPCARE D7.1 _B.2	22nd February 2019	First draft to be completed by partners
APPCARE D7.1_B.3	9th April 2019	Contributions from partners
APPCARE D7.1_B4	30th July 2019	Review of visibility policy requirements

1.5 Glossary

Acronym	Definition
APPCARE	APPropriate CARE for frail elderly patients: a comprehensive model
BRASS	The Blaylock Risk Assessment Screening Score
CAM	Confusion Assessment Method
CGA	Comprehensive Geriatric Assessment
CIRS	Cumulative Illness rating Scale
COPD	Chronic Obstructive Pulmonary Disease
CVD	Cardio Vascular Disease
D x.x	Deliverable reference number
ED	Emergency Department

EMC	Erasmus Medical Center Rotterdam
GANTT	Generalized Activity Normalization Time Table
GP	General Practitioner
LHA9	Local Health Authority n°9 Treviso
SPMSQ	Short Portable Mental Status Questionnaire
UVEG	University of Valencia Polibienestar Research Institute
WP	Work Package

2. APPCARE model for hospital care

2.1 General requirements

Inclusion criteria:

- Patients ≤ 75 years old coming from E.D. or admittance area NOT in election.

The APPCARE MODEL for the hospital care must include:

- Standardized application of the Comprehensive Geriatric Assessment (including pre-morbid Barthel Index – health status 2 week before the acute event), within 48 hours after the hospital admittance;
- Assessment of the social and environmental context of the patient (in particular, the living condition – alone, home-assisted by relatives or informal caregivers, homecare assistance with formal caregivers, nursing home);
- 48h intensive care (short term observation period);
- Geriatric team has the responsibility of the patient during his stay, and it is in charge of diagnosis, and clinical plan of the patient;
- The discharge must include diagnosis (according to International classification ICD9) + co-morbidity and indication on where the patient is addressed (home, homecare assistance, nursing home and other structures, etc.).

2.2 Hospital care model - Treviso adaptation

The APPCARE model was implemented in the Treviso Regional Hospital Ca' Foncello, with patients enrolled both in the Emergency Room and in the Geriatric Department, where specific unit for short observation period are active.

INCLUSION CRITERIA:

- Patients ≥ 75 years old, admitted from the Emergency Department (E.D.), referring for acute medical conditions.
- Will be excluded patients whose hospital admission is elective (programmed hospitalization for interventions).
- Will be excluded patients discharged directly from ED to other destinations (Intensive Care Units, Surgical or other Specialized Units), or patients dismissed at home.

GERIATRIC SHORT INTENSIVE CARE OBSERVATION PERIOD

In the local adaptation, the Short Observation Period will include the following characteristics:

- **DURATION OF STAY**: 48 hours.
  - ✓ Patients will be given the **diagnostic and therapeutic procedures** needed.
- **COMPREHENSIVE GERIATRIC ASSESSMENT (CGA**), to evaluate the patient's status at hospital admission.
- **ASSESSMENT OF THE PATIENT'S SOCIAL AND ENVIRONMENTAL CONTEXT** (preliminary to the discharge programme)
  - ✓ Living conditions – home assistance, homecare assistance, nursing home.
  - ✓ Need for social services
- **PERSONALIZED DISCHARGE PLANNING** will be tailored for each patient before dismission, considering the living conditions before hospital admission, and the feasibility of a safe dismission from hospital.
- **DISCHARGE:** Patients not admitted to a Hospital ward after the 48 hours period, receive a **medical letter** addressed to the GP and the patient itself, including medical advice, list of medications and a guide to post-hospital care (territorial services).

Hospital care: the Comprehensive Geriatric Assessment (T0)

VARIABLE	INSTRUMENTS
Severity of disease	HALM'S CRITERIA
Co-morbidity	CIRS
Delirium	CAM (every day during observation period)
Cognitive status	SPMSQ (at patient's dismission)
Functional status (2 weeks before hospitalization)	BARTHEL INDEX
Functional Status (during hospital stay)	BARTHEL INDEX
Pressure ulcers risk	BRADEN
Discharge planning	BRASS INDEX
Dementia	CDR (Clinical Dementia Rating) - at admittance T0

DISCHARGE BASED ON CLINICAL JUDGMENT:

- Patient referred to Geriatric Unit, Specialized medical or surgical wards or ICU
- Patient dismissed at home or in Nursing Homes:
  - ✓ Activation of home care assistance
  - ✓ Organization of first admission in Nursing Home

2.3 Hospital care model - Valencia adaptation

In the Valencia pilot site, the Hospital Care Model was implemented at the Hospital Universitario y Politécnico LA FE (Valencia, Spain).

INCLUSION CRITERIA: Patients +75 coming from E.R. or admittance area, with NO severe cognitive impairment and NO living in residential care facilities.

The Hospital Care Model was based on Comprehensive Geriatric Assessment through with all participants were assessed with the following measures:

ASSESSMENT OF	MEASURES
Comorbidity	CIRS
Functional Status	Barthel Index
Risk of pressure ulcer	Braden Scale
Dementia	SPMSQ
Discharge Planning	Brass Index
Routine physiological measurements	Mean arterial pressure Heart rate Respiratory rate Sodium (serum) (if available in patient file) Potassium (serum) (if available in patient file) Creatinine (if available in patient file) Hematocrit (if available in patient file) White blood cell count (if available in patient file)

Professionals at the hospital LA FE were responsible for the Hospital Care Model implementation. These professionals conducted the Comprehensive Geriatric Assessment to each participant. Moreover, during each participant stay at hospital, professionals from the hospital also formulated clinical and care plan for each participant in the APPCARE study.

At discharge, a diagnosis (according to International classification ICD9), a co-morbidity assessment and an indication on where the participant was transferred (home, homecare assistance, nursing home and other structures, etc.) was provided. Up to one months after hospital discharge, further assessments were conducted to all participants at their homes. These assessments were performed by professionals from Polibienestar – UVEG team and were intended to follow-up each participant on the medical variables and to also assessed them with other bio-psycho-social and environmental context variables. according to the results of this holistic assessment, participants were referred to Coordinated Care Model or to Preventive Care Model.

2.4 Hospital care model - Rotterdam adaptation

Patients receiving the hospital care model were predominantly recruited from the geriatric ward of 4 hospitals: Erasmus Medical Center (Rotterdam), Havenziekenhuis (Rotterdam), Amphia hospital (Breda) and Vlietland hospital (Schiedam). In addition, some patients were recruited at the daycare center of the Erasmus Medical Center and at the outpatient clinic of the Havenziekenhuis.

INCLUSION CRITERIA: Patients >= 70 years old entering the geriatric ward.

During the stay in the hospital, attention was given to the following:

- A Comprehensive Geriatric Assessment (CGA) during hospital stay, including the following elements:
    - The assessment of the social and environmental context of the patient.
    - A broad Medical assessment during hospital stay
- The Geriatric team was responsible for the patient during his stay and formulated a diagnosis and related clinical and care plan for the patient during the stay, but also for the period after dismissal
- At discharge, a diagnosis (according to International classification ICD9), a co-morbidity assessment and an indication on where the patient should be transferred (home, homecare assistance, nursing home and other structures, etc.) was provided. Coordinated and preventive care models which have been developed in agreement to existing guidelines by experts in the frame of the APPCARE project were discussed with the patient and his/her family and informal care givers during the hospital stay and (provided permission by the patient) shared with the patient's general physician.

Assessments that support the Comprehensive General Assessment:

a) Routine medical measurements at T0 integrated in the routine care:

ASSESSMENT OF	**MEASURES**
Severity of disease	HALM's CRITERIA
Comorbidity	CIRS
Delirium	Clinical judgement (using CAM)
Functional Status	BARTHEL INDEX
[Pre-morbid conditions	See Patient Questionnaire (below)]
Risk of pressure ulcer	BRADEN (6 items)
Dementia	MMSE
Discharge Planning	According to local protocol

b) Routine physiological measurements at T0 integrated in the routine care:

- Temperature

- Mean arterial pressure
- Heart rate
- Respiratory rate
- Glasgow Coma Scale *(if necessary in Acute Care*)
- Sodium (serum) *(if available in patient file*)
- Potassium (serum) (*if available in patient file*)
- Creatinine (i*f available in patient file*)
- Hematocrit (*if available in patient file*)
- White blood cell count (*if available in patient file*)

c) Assessment of bio-psycho-social and environmental context at T0 by a Patient Questionnaire

VARIABLES in Patient Questionnaire (baseline)	**MEASURES in Patient Questionnaire (baseline)**
Living condition before hospital admission	Alone, home-assisted by relatives or informal caregivers, homecare assistance with formal care givers, nursing home (UHCE study E and F)
Demographic and socio-cultural context	UHCE study F1-F14; G1
Frailty	Tilburg Frailty Index (TFI); and SHARE study 4 items FI EN ES (UHCE A1-15; D2 D4)
Disability via IADL and ADL	Groningen Activity Restriction Scale (GARS) (UHCE C7)
Use of aids	UHCE study C5
Physical activity and limitations	SHARE study FI and ES; and GALI single item (UHCE B6; C3)
Fear and Risk of falling	UHCE-study (A16-18); and Falls Self-efficacy Scale (FES-I = UHCE C6)
Premorbid health conditions	UHCE study C4
Polypharmacy	Medication Risk Questionnaire (MRQ-10); UHCE study A19-A28)
Healthy life styles (smoking; alcohol use; BMI)	AUDIT C (alcohol); UHCE study B1-B5; C1- C2)
Loneliness	Jong Gierveld 6 item (UHCE D1)
Health-related QoL	SF-12v2 Health Survey (UHCE D5-D11)

In addition to patients receiving the Rotterdam context-adapted APPCARE hospital care model, a control group was recruited. This control group was recruited from a random sample of 3,000 non-institutionalized

citizens ≥70 years who live in the municipality of Rotterdam. We sent out a mailing obtained from the Municipal Personal Records Database (Gemeentelijke basisadministratie persoonsgegevens; GBP). Similar to the patients receiving the hospital care model, the bio-psycho-social and environmental context of these citizens were assessed by a questionnaire at baseline and 6 months later.

2.5 Assessment to be performed

This section describes the minimum set of assessments performed with the enrolled patients during the APPCARE model hospital module. All pilot sites committed to assess this core set using the same agreed instruments, in order to feed the APPCARE common database. In addition to this, each single partner decided to add other measurements according to their specific context and to the resources available.

Patients were assessed both from the clinical point of view and from the preventive point of view.

a. Clinical plan

The following measurement had been performed during the hospital stay to assess the clinical status of the patients

VARIABLE	INSTRUMENTS	PREDICTIVE VALUE
Co-morbidity	CIRS	Stratify patients per co-morbidity
Dementia	SPMSQ	To be fulfilled at discharge to assess cognitive status
Pre-morbid conditions	BARTHEL INDEX	Premorbid functional status (2 weeks before hospital admittance)
Functional Status	BARTHEL INDEX	Functional status at admittance and discharge
Pressure ulcer	BRADEN	Risk of developing pressure ulcer
Discharge planning	BRASS INDEX	Assessment of homecare needs after discharge

It was recommended to perform this assessment within 48 hours from the hospital admittance.

b. Prevention plan

According to the D5.1 APPCARE model, the following common measurement had been performed during the hospital stay or immediately after to assess physical functionality of the patients (with particular regard to the risk of falls) and the risk related to polypharmacy.

VARIABLE	INSTRUMENTS
Physical functionality	Short Physical Performance Battery (SPPB) (link)
Risk of falling	Falls Self-efficacy Scale (FES-I) (link) Questions: • Did you fall in the past 12 months? • Are you afraid of falling?
Polypharmacy	Medication Risk Questionnaire (MRQ-10) (link)

3. APPCARE hospital care model results

3.1 Treviso site

In Treviso, a total of 2.498 patients were enrolled from December 2016 until June 2018. 42,5% of them had been dismissed after the short term observation period, while the remaining 57,5% had been admitted in the geriatric department. Treviso site is experiencing a very deep reorganizational changes which will lead to a complete redesign of the hospital in the next 10 years: those changes and lack of staff slowed and even stopped for a while the project implementation.

The following tables will present some comparisons of the two groups (dismissed patients and inpatients):

Table a: general data

		Total patients	**Short-intensive care patients**	**Inpatients**	**p<.05**
Age (years)		84,53	82,07	86,35	.003
Gender %	M F	41,6 58,3	42,4 57,6	41,4 58,6	n.s.
Length of stay (days)		6,64	1,05	10,77	
Drug at home (n°)		5,63	5,16	5,97	n.s.
Drug at dismission (n°)		6,58	5,52	7,50	n.s.
Barthel Index -pre admission		69,6	84,4	58,60	.000
Barthel Index -in hospital		57,21	81,43	39,26	.000
Braden score		16,89	19,17	15,19	.000
Brass score		14,84	10,42	18,08	.000

Table b: social and environmental context

		Total patients	Short-intensive care patients	Inpatients	p<.05
Living condition	**Home** **Homecare assistance** **Nursing home**	81,6% 9,7% 8,6%	91,9% 4,8% 3,2%	74,1% 13,3% 12,6%	.000
Social Service	**No** **Yes**	98,5% 1,1%	99,1% 0,9%	98,3% 1,3%	n.s.

Table c: cognitive state delirium and dementia

		Total patients	Short-intensive care patients	Inpatients	p<.05
CAM (%)	**None** **Acute onset and fluctuating discorse** **Inattention** **Disorganized thinking** **Altered level of consciousness**	63,2 10,0 12,7 9,4 4,3	88,7 4,7 4,8 0,5 1,3	44,5 14,0 18,6 16,0 6,6	.000
SPMSQ (average)		3,18	1,85	4,38	.000
CDR (average)		1,02	0,46	1,44	.000

Table d: physiological data and stability

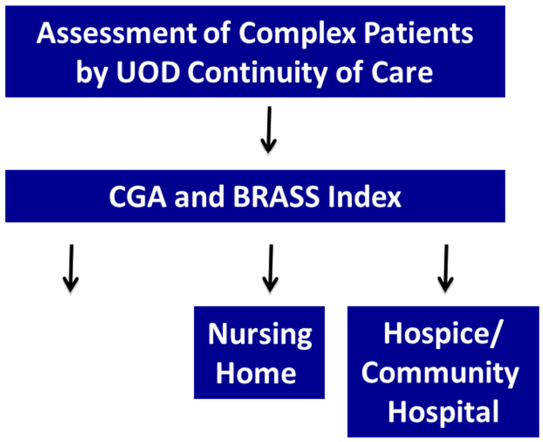
		Total patients	Short-intensive care patients	Inpatients	p<.05
Halm's criteria	**Instable %** **Stable%**	46,2 53,6	20,60 79,40	65,3 34,6	.000
Temperature (C°)		36,48	36,35	36,57	.000
SBP (mmHg)		139,53	143,61	136,50	.022
HR (bpm)		84,56	79,17	88,58	.002
SatO2%		94,42	96,64	92,79	.000
RF		18,80	16,54	20,49	.000

Table e: discharge setting

%	Total patients	Short-intensive care patients	Inpatients
Other	1,1	0	1,9
Homecare	10,0	5,9	13,4
Social service	0,5	0,4	0,7
Social service and homecare	0,2	0	0,3
Home	66,2	89,8	50,3

Nursing home	8,1	2,9	12,2
Death	10,1	0,7	17,7
Voluntary discharge	0	0	0
POLO	0,2	0	0,4
Long-term care	0	0	0
Hospice	1,8	0	3,2

One of the main positive aspects of the APPCARE implementation is the prompt measurement of Comprehensive Geriatric Assessment. CGA at the entrance helped professionals to have a more precise prognostic stratification and create an appropriate diagnostic-therapeutic path - deciding the most appropriate investigations and treatments for each patients, adapting therapeutic path to its clinical trajectory. Furthermore, it helped and fasted the organization of different discharge setting according to the scheme below



In this way we can have fast but well-planned discharge.

The main critical point related to the APPCARE hospital deployment is related to the fact that the huge effort that the project has requested to the staff would not be sustainable in the long term, so an increase in personnel and, therefore, in costs would be necessary.

3.2 Valencia site

In the Valencia pilot site, a total of 223 older adults received the Hospital Care Model at LA FE Hospital in Valencia (Spain). Of those:

- 68% (n= 152) received a geriatric clinical follow up at home up to one month after hospital discharge

- Among the reasons for NOT receiving (32%; n=71) a geriatric clinical follow up at home up to one month after hospital discharge were:
    - 44% (n=31) death
    - 42% (n=30) drop out
    - 14% (n=10) cannot be located

Of those receiving the holistic assessment (Hospital Care Model + geriatric clinical follow up at home up to one month after hospital discharge):

- 61% (n=93) meet the inclusion criteria for one of the care interventions (Coordinated Care Model or Preventive Care Model)
- 66% (n=61) entered one of the care interventions (Coordinated Care Model or Preventive Care Model)

	Participants included in the APPCARE Hospital Care Module	**Participants receiving the holistic assessment** (Hospital Care Model + geriatric clinical follow up at home up to one month after hospital discharge)	**Participants meeting the inclusion criteria for care interventions** (Coordinated Care Model or Preventive Care Model)	**Participants included in the care interventions** (Coordinated Care Model or Preventive Care Model)
N	223	152	93	61
%		68%	61%	66%

At the end, the Physical Exercise Pathway and measurements originally planned was not activated due to lack of resources to implement the related coordinated care plan.

3.3 Rotterdam site

In Valencia and Rotterdam informed consent was requested by medical ethical committee; this is because they sample more data than the ones included in the original research proposal: although this ensured the rights of patients, it made the inclusion procedures more difficult. The main problem encountered in the Rotterdam pilot site had been related to patients recruitment in hospital settings, as the patients arrived too much compromised, so it was not possible to get the necessary informed consent.

137 participants were recruited from Hospital Care phase, as established in the APPCARE project. These participants were recruited from the geriatric ward of 4 hospitals: Erasmus Medical Center (Rotterdam), Havenziekenhuis (Rotterdam), Amphia hospital (Breda) and Vlietland hospital (Schiedam). In addition, some patients were recruited at the daycare center of the Erasmus Medical Center and at the outpatient clinic of the Havenziekenhuis, according to the following timetable:

Hospital	Started 2016	Started 2017	Start 2018
Erasmus MC	Inpatient ward	Daycare admissions	
Amphia	Inpatient ward		
Vlietland		Inpatient ward	
Maasstad		Inpatient ward	
Havenpolikliniek			Outpatient clinic

On the other hand, even though the original research protocol did not foresee a comparative group, Rotterdam pilot site recruited a comparison group from a random sample of 865 non-institutionalized citizens ≥70 years who live in the municipality of Rotterdam.

	Total Patients assessed	Patients meeting inclusion criteria	Patients included in the follow up
N Rotterdam	**1.002**	**286**	**207**
% Rotterdam	**100.0**	**28.5**	**72.4**
N Hospital Care Model	**137**	**137**	**79**
% Hospital Care Model	**100.0**	**100.0**	**57.7**
N Community sample	**865**	**149**	**128**
% Community sample	**100.0**	**17.2**	**85.9**

In doing this, the Rotterdam team benefit from the experiences collected from the previous EU project Urban Health Center 2.0[1], with the aim of integrating the results of both actions in common recommendations. By comparing this additional measurements to the characteristics of really old and really frail patients that were not admitted to the hospital, we can find additional directions for Europe how to prevent these hospital admissions.

[1] https://www.rotterdamuas.com/research/projects-and-publications/innovations-in-care/integrated-care/urban-health-centre-2.0/project/

4. APPCARE hospital care preliminary findings

The APPCARE model of hospital care had been implemented in the three pilot sites, as they met the inclusion goals although with some adjustment with the respect to the original plan. The principal reason is the difficulties of enrolment due to the following main aspects, that must be taken into account for future sustainability of the action:

1. Generally speaking, in whole Europe hospital and health care strategies are changing. In a way that now only the more frail and complex patients are admitted: so numbers go down while the complexity of patients increases.

2. In Valencia and Rotterdam informed consent was requested by medical ethical committee; this is because they sample more data than the ones included in the original research proposal: although this ensured the rights of patients, it made the inclusion procedures more difficult

3. Treviso site is experiencing a very deep reorganizational changes which will lead to a complete redesign of the hospital in the next 10 years: those changes slowed and even stopped for a while the project implementation

4. In addition to this, a lack of proactive attitude among professionals in applying the APPCARE protocols was registered. This represented a very big obstacle very difficult to control especially for partners operating with external hospitals.

Although the quite significant deviation from the original plan, the additional sample data collected in Valencia & Rotterdam will provide valuable information on the medical, psychological and social predictors of hospital admissions (also thanks to the integration with the UHCE project results and recommendations): On the other hand, the Treviso huge number of data may allow further analysis with specific subgroups to be compared, such as for instance patients accessing the Short Term Observation vs. patients admitted to regular department, or patients compliant with follow up vs. non-compliant patients, etc. These are extra but very useful information for future of community and hospital care in Europe.