Istituti Clinici Scientifici Maugeri

Ottimizzazione della terapia cronica e trattamento dell'acuzie: come evitare l'ospedalizzazione

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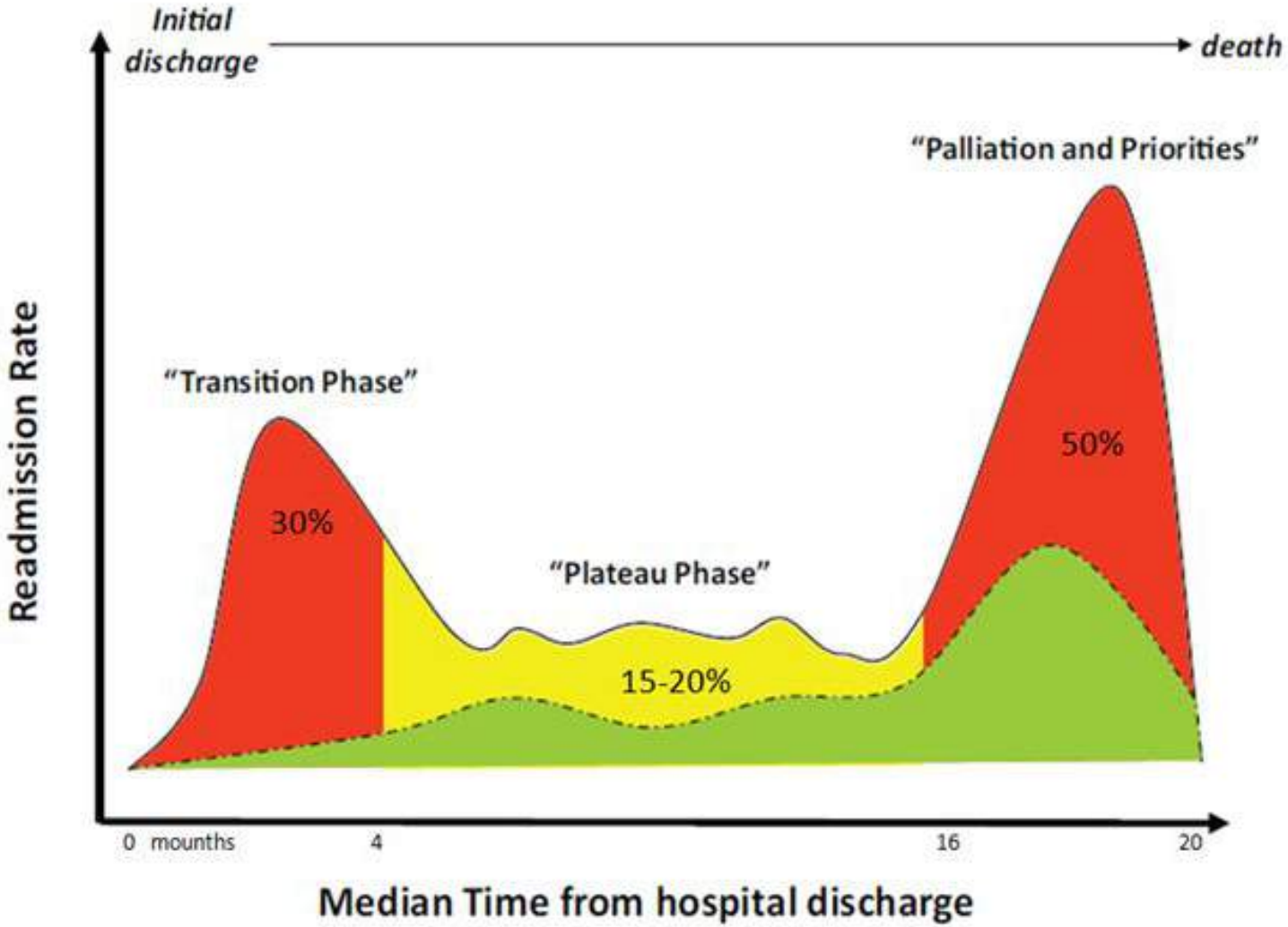
ICS Maugeri S.p.A SB IRCCS Lumezzane (BS), Italia

The Three-Phase Terrain of Heart Failure Readmissions.

D Akshay. Circulation Heart Failure 2012; 5:398-400



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Recommendations on lifestyle management

Recommendations	Class[a]	Level[b]
Improvement of lifestyle factors in addition to appropriate pharmacological management is recommended.[119–122,124,148–153]	I	A
Cognitive behavioural interventions are recommended to help individuals achieve a healthy lifestyle.[181–183]	I	A
Exercise-based cardiac rehabilitation is recommended as an effective means for patients with CCS to achieve a healthy lifestyle and manage risk factors.[151–153]	I	A
Involvement of multidisciplinary healthcare professionals (e.g. cardiologists, GPs, nurses, dieticians, physiotherapists, psychologists, and pharmacists) is recommended.[121,123,181,184]	I	A
Psychological interventions are recommended to improve symptoms of depression in patients with CCS.[126,157]	I	B

2019

Multidisciplinary interventions recommended for the management of chronic heart failure

Recommendations	Class[a]	Level[b]
It is recommended that HF patients are enrolled in a multidisciplinary HF management programme to reduce the risk of HF hospitalization and mortality.[309,314,315,316]	I	A
Self-management strategies are recommended to reduce the risk of HF hospitalization and mortality.[309]	I	A
Either home-based and/or clinic-based programmes improve outcomes and are recommended to reduce the risk of HF hospitalization and mortality.[310,317]	I	A

After good care in the acute phase we need to think to increase care during chronic phase.

Change management in chronic care

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ESC European Society of Cardiology
European Heart Journal (2023) 44, 4445–4447 https://doi.org/10.1093/eurheartj/ehad559
EDITORIAL
Heart failure and cardiomyopathies

Frailty: a new vital sign in heart failure comes of age

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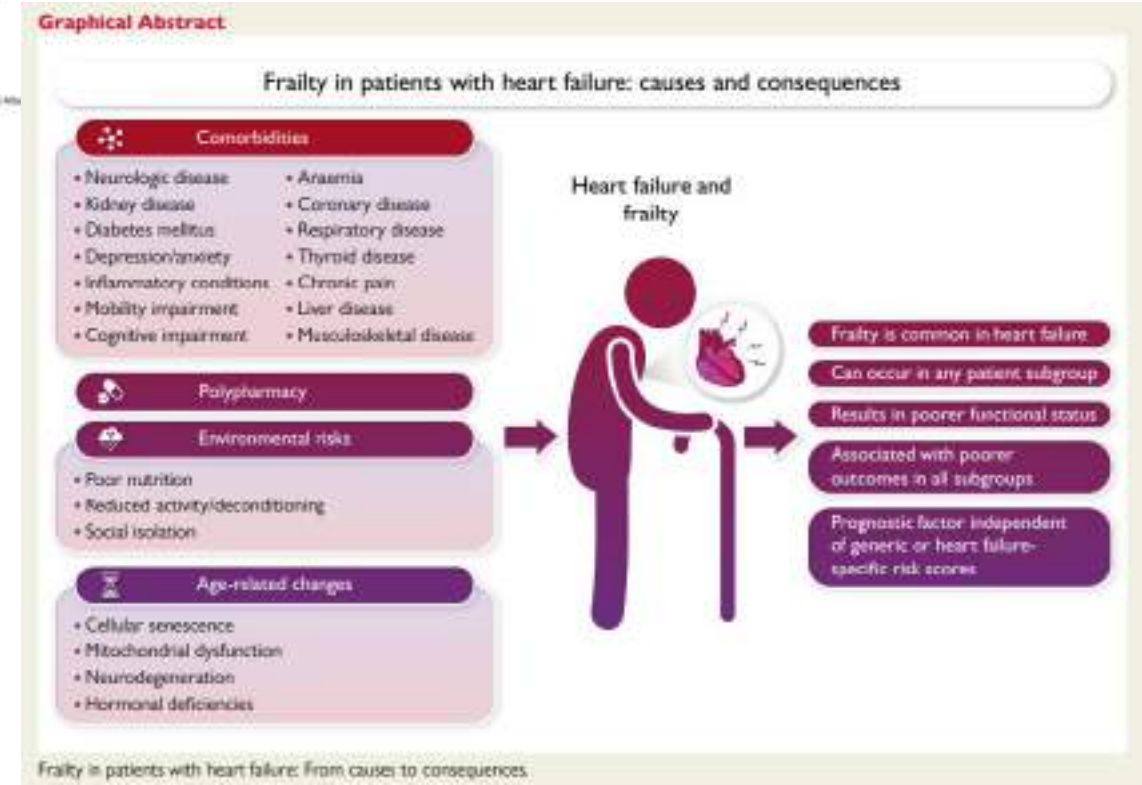
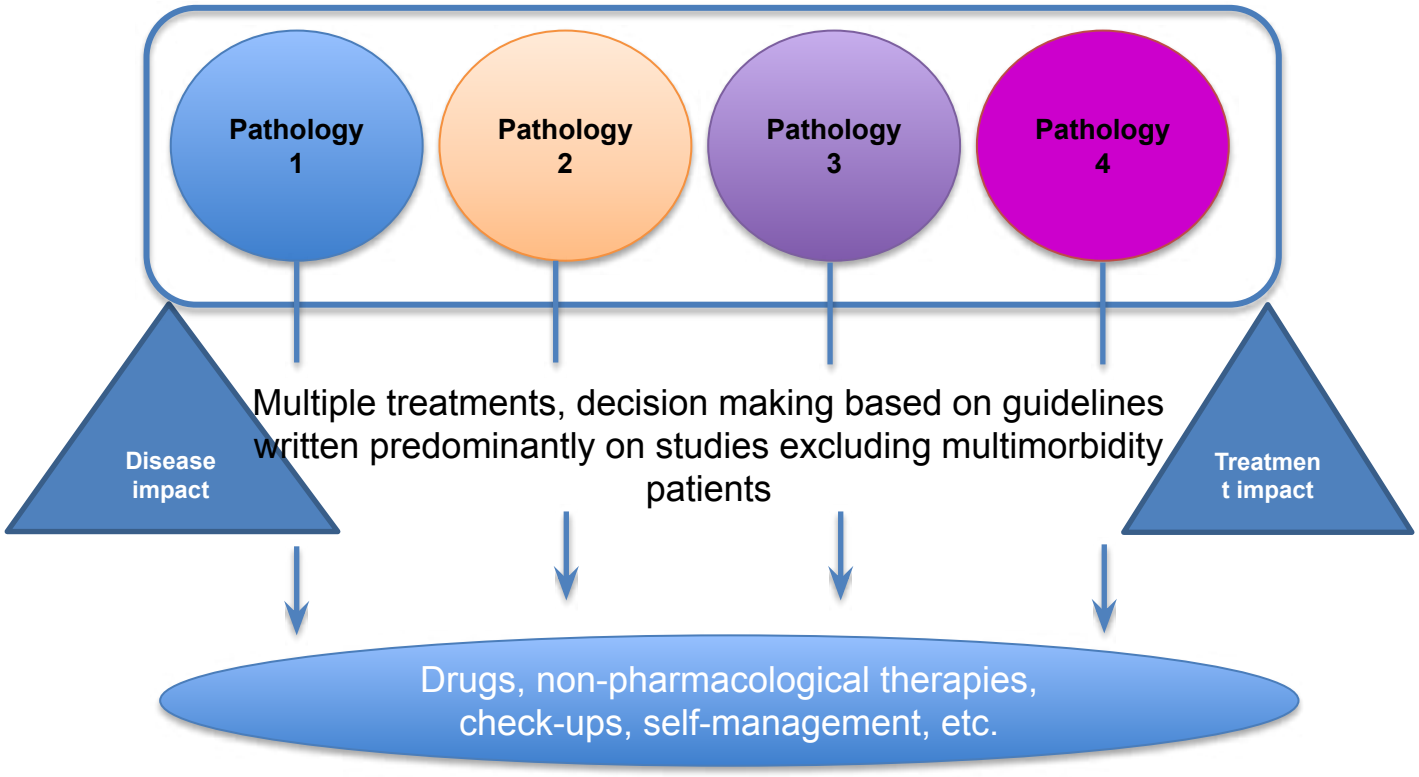
Identifying those HF patients who are frail also allows us to tailor follow-up (after hospitalizations, emergency department visits, or clinic encounters) and target transitional care (such as virtual hospitals at home), specialized clinics, and other adjuvant nonpharmacological interventions most appropriately towards our highest risk patients. However, this highlights another research need in the field: the evidence base for individual and health system interventions to manage frailty and improve outcomes is limited at this time, although it is a field of active study.



Frailty in patients with heart failure: From causes to consequences

Single Disease/Condition oriented approach

Fragmentation within the single service and between different services

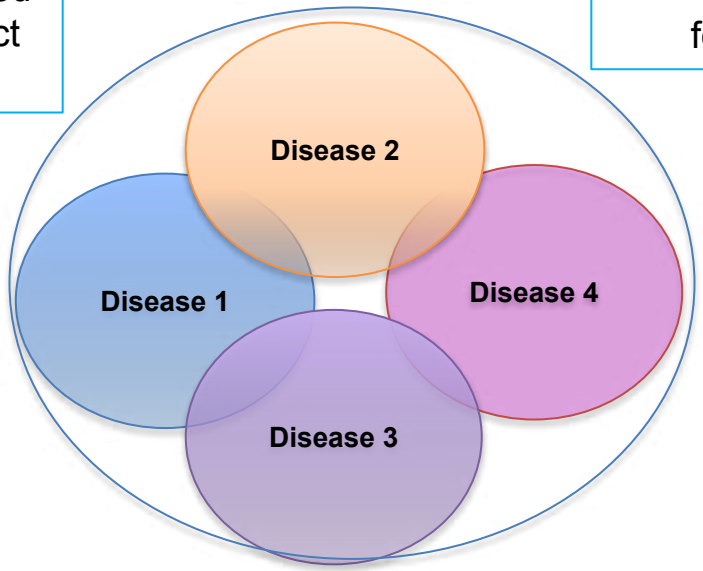


Modified from Cartabellotta A et al. Evidence, 2016; 8 (10): e1000154

Multimorbidity oriented approach

Interaction between pathology/conditions, related treatments and their impact on quality of life

Benefits and risks of clinical guidelines developed for individual pathologies



Improving the coordination between welfare services

Patient needs, treatment options, health priorities, lifestyles and personal goals

Improving the quality of life by reducing the impact of treatment, adverse events onset and unscheduled health interventions

Modified from Cartabellotta A et al. Evidence, 2016; 8 (10): e1000154

European Journal of Heart Failure (2017)
19, 1427–1443 doi:10.1002/ejhf.765

ESC European Society of Cardiology

Comparative effectiveness of transitional care services in patients discharged from the hospital with heart failure: a systematic review and network meta-analysis

Harriette G.C. Van Spall[1,2], Tahseen Rahman[2], Oliver Mytton[3], Chinthanie Ramasundarahettige[1], Quazi Ibrahim1, Conrad Kabali[4], Michiel Coppens[5], R. Brian Haynes[2], and Stuart Connolly[1]

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Table 2 Risk estimates for the outcome of all-cause death derived from network meta-analysis and conventional pairwise meta-analysis

Treatments	Network meta-analysis relative risk (95% CI)	Direct comparison relative risk (95% CI)
Usual care	1.00	1.00
Education alone	0.99 (0.40–2.46)	1.19 (0.30–4.74)
Pharmacist interventions	0.82 (0.56–1.20)	0.83 (0.53–1.30)
Telemonitoring	0.90 (0.68–1.19)	0.89 (0.56–1.41)
Telephone support	0.82 (0.62–1.08)	0.79 (0.61–1.02)
Nurse home visits	0.78 (0.62–0.98)	0.85 (0.73–0.99)
Nurse case management	0.86 (0.71–1.05)	0.84 (0.77–0.93)
Disease management clinics	0.80 (0.67–0.97)	0.71 (0.55–0.90)

CI, confidence interval.

Table 3 Risk estimates for the outcome of all-cause readmissions derived from network meta-analysis and conventional pairwise meta-analysis

Treatments	Network meta-analysis rate ratio (95% CI)	Direct comparison rate ratio (95% CI)
Usual care	1.00	1.00
Pharmacist interventions	0.90 (0.68–1.20)	0.90 (0.63–1.28)
Telemonitoring	0.82 (0.62–1.08)	0.76 (0.47–1.23)
Telephone support	0.86 (0.64–1.15)	0.94 (0.79–1.13)
Nurse home visits	0.65 (0.49–0.86)	0.64 (0.40–1.03)
Nurse case management	0.77 (0.63–0.95)	0.75 (0.57–0.99)
Disease management clinics	0.80 (0.66–0.97)	0.77 (0.67–0.88)

CI, confidence interval.

Mortalità

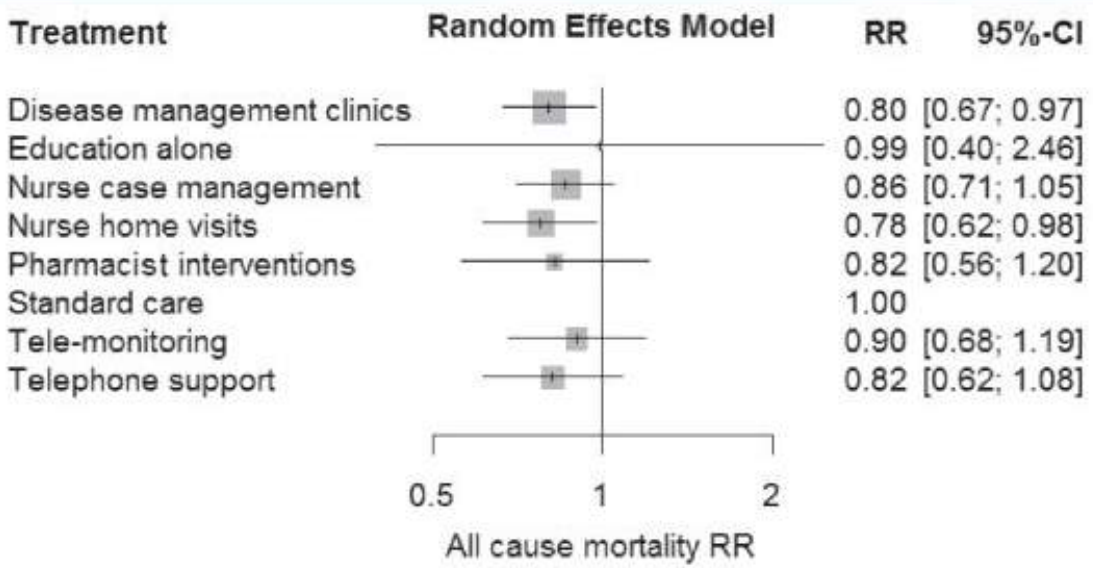

Figure 2 Comparative effectiveness of transitional care services in reducing all-cause mortality after hospitalization for heart failure. Results of the network meta-analysis are depicted in the forest plot. CI, confidence interval; RR, relative risk.

European Journal of Heart Failure (2017) 19, 1427–1443. https://doi.org/10.1002/ejhf.765

Reospedalizzazioni

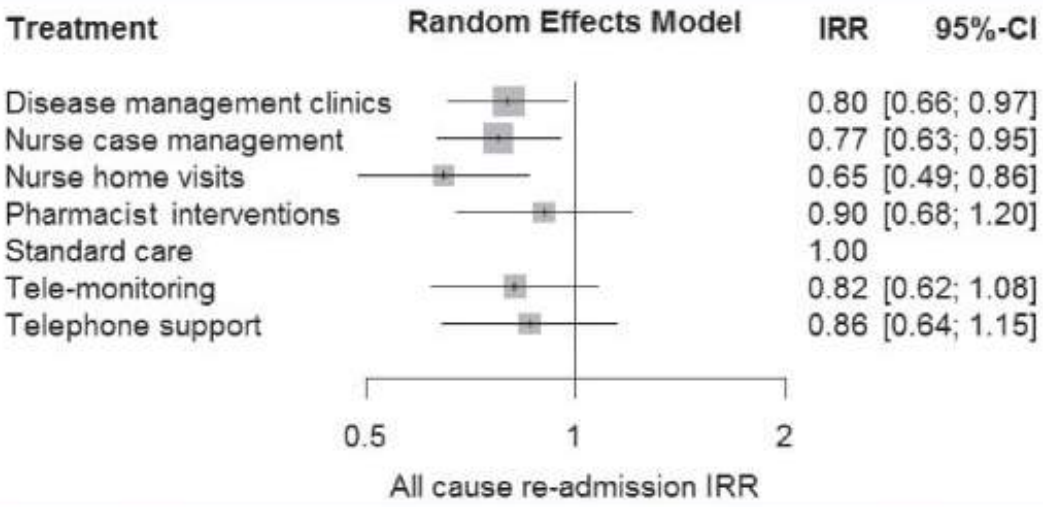

Figure 3 Comparative effectiveness of transitional care services in reducing all-cause readmissions after hospitalization for heart failure. Results of the network meta-analysis are depicted in the forest plot. CI, confidence interval; IRR, incident rate ratio.

European Journal of Heart Failure (2017) 19, 1427–1443. https://doi.org/10.1002/ejhf.765

THE LANCET

Safety, tolerability, and efficacy of up-titration of guideline directed medical therapies for acute heart failure (STRONG-HF): a multinational, open-label, randomised, trial

Alexandre Mebazaa[1,2], Beth Davison [1,3], Ovidiu Chioncel[4], Alain Cohen-Solal[1,5], Rafael Diaz [6], Gerasimos Filippatos [7], Marco Metra [8], Piotr Ponikowski [9], Karen Sliwa [10], Adriaan A Voors [11], Christopher Edwards[3], Maria Novosadova [3], Koji Takagi[3], Albertino Damasceno[12], Hadiza Saidu[13], Etienne Gayat[1,4], Peter S Pang [14], Jelena Celutkiene [15], Gad Cotter [1,3]

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[13]Murtala Muhammed Specialist Hospital, Bayero University Kano, Kano, Nigeria
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Lancet (2022) **400,** 1938–5. https://doi.org/10.1016/ S0140-6736(22)02076-1

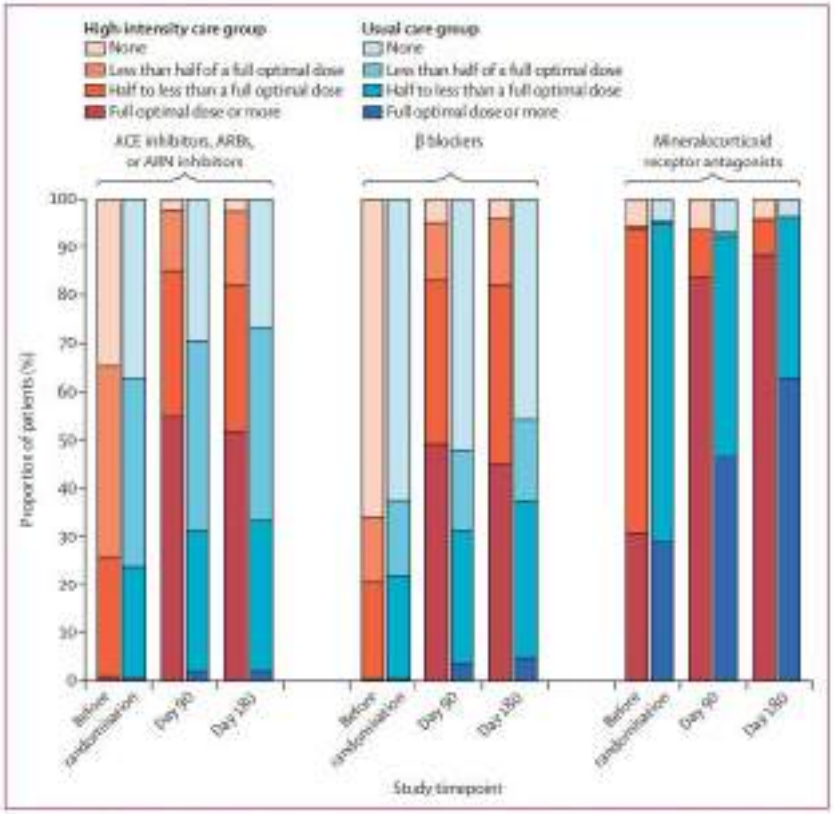

Figure 3: Oral guideline-directed medical therapies for heart failure prescribed, in high-intensity care and usual care groups by visit

Full optimal doses for each treatment are given in the appendix (p 5). ACE=angiotensin-converting enzyme. ARB=angiotensin receptor blocker. ARN=angiotensin receptor-neprilysin.

	High-intensity care group (n=542)	Usual care group (n=536)	Adjusted treatment effect (95% CI)	p value
(Continued from previous page)				
NT-proBNP, pg/mL¶				
Baseline	3258·4 (3087·5 to 3438·8)	3159·2 (2995·4 to 3332·0)	–	–
Day 90	1356·6 (1223·1 to 1504·6)	1729·5 (1559·6 to 1917·9)	–	–
Adjusted ratio of geometric means	0·436	0·564	0·77 (0·67 to 0·89)¶	0·0003

Data are n (%), n/N (%), mean (SD), adjusted mean change (SE), or geometric mean change with 95% CI (shown for NT-proBNP), unless otherwise indicated. eGFR=estimated glomerular filtration rate. LVEF=left ventricular ejection fraction. NT-proBNP=N-terminal pro-B-type natriuretic peptide. NYHA=New York Heart Association. *Least square means (SEs) and mean difference (95% CI) estimated based on an ANCOVA model with fixed terms for treatment, LVEF (≤40% vs >40%), geographical region, and baseline value. †Primary oedema scale: 0: complete absence of skin indentation with mild digital pressure in all dependent areas; 1+: indentation of skin that resolved over 10–15 s; 2+: indentation of skin is easily created with limited pressure and disappears slowly (15–30 s or more); and 3+: large areas of indentation easily produced and slow to resolve (>30 s). ‡Treatment effect presented as Mann-Whitney odds stratified by LVEF (≤40% vs >40%), geographical region, and baseline value; p value from van Elteren's test stratified by LVEF (≤40% vs >40%), geographical region, and baseline value; a Mann-Whitney odds value of >1·0 favours high-intensity care. §None: no rales after clearing with cough; rales <1/3: moist or dry rales heard in lower third of one or both lung fields that persist after cough; 1/3 to 2/3: moist or dry rales heard throughout the lower half to two-thirds of one or both lung fields; and >2/3: moist or dry rales heard throughout both lung fields. ¶Geometric mean (95% CI) presented at each visit; adjusted ratio of geometric means represents the ratio of the post-baseline value over the baseline value from an ANCOVA model of the log-transformed NT-proBNP with fixed terms for treatment, LVEF (≤40% vs >40%), geographical region, and baseline log-transformed NT-proBNP value. Treatment effect represents the ratio of the ratios in the two treatment groups adjusted for the specified covariates.

Table 2: Vital signs, signs and symptoms of heart failure, and laboratory measures (exploratory outcomes)

Lancet (2022) **400,** 1938–52. https://doi.org/10.1016/ S0140-6736(22)02076-1

	High-intensity care group (n=542)	Usual care group (n=536)	Adjusted treatment effect (95% CI)	Adjusted risk ratio (95% CI)	p value
Primary endpoint					
All-cause death or heart failure readmission by day 180*	74/506 (15·2%)	109/502 (23·3%)	8·1 (2·9 to 13·2)	0·66 (0·50 to 0·86)	0·0021
Secondary endpoints					
Change from baseline to day 90 in EQ-5D VAS†	10·72 (0·88)	7·22 (0·90)	3·49 (1·74 to 5·24)	NA	<0·0001
All-cause death by day 180*	39/506 (8·5%)	48/502 (10·0%)	1·6 (−2·3 to 5·4)	0·84 (0·56 to 1·26)	0·42
All-cause death or heart failure readmission by day 90*	55 (10·4%)	72 (13·8%)	3·4 (−0·4 to 7·3)	0·73 (0·53 to 1·02)	0·081
Prespecified exploratory endpoints					
Cardiovascular death by day 180*	32/506 (6·9%)	44/502 (9·3%)	2·4 (−1·2 to 6·1)	0·74 (0·47 to 1·16)	0·19
Cardiovascular death by day 90*	17 (3·3%)	28 (5·4%)	2·1 (−0·3 to 4·6)	0·60 (0·33 to 1·09)	0·086
All-cause death by day 90*	23 (4·3%)	30 (5·7%)	1·4 (−1·2 to 4·0)	0·76 (0·45 to 1·29)	0·28
Heart failure readmission by day 180*	47/506 (9·5%)	74/502 (17·1%)	7·6 (3·0 to 12·1)	0·56 (0·38 to 0·81)	0·0011
Heart failure readmission by day 90*	36 (6·9%)	48 (9·5%)	2·5 (−0·8 to 5·8)	0·67 (0·43 to 1·04)	0·13
Finkelstein-Schoenfeld hierarchical composite‡	..	..	1·28 (1·13 to 1·46)	NA	0·0002
Proportion of comparisons where group is superior§	40·4%	29·4%	..	..	..
Proportion of comparisons where groups are tied	30·2%	NA	..	..	..
Sensitivity analyses					
All-cause death or heart failure readmission by day 180, excluding COVID-19 deaths*	69/506 (14·1%)	108/502 (23·0%)	8·9 (3·9 to 14·0)	0·61 (0·46 to 0·82)	0·0005
All-cause death by day 180, excluding COVID-19 deaths*	33/506 (7·1%)	47/502 (9·8%)	2·7 (−1·0 to 6·4)	0·72 (0·47 to 1·12)	0·15

Data are n (adjusted Kaplan-Meier %), n/N (down-weighted adjusted Kaplan-Meier %), or mean (SD), unless otherwise stated. For 180-day outcomes, results for patients in cohort 1 are down-weighted proportional to half its sample size. For 90-day outcomes, cohort 1 is fully weighted. LVEF=left ventricular ejection fraction. NA=not applicable. VAS=visual analogue scale. *Kaplan-Meier estimated cumulative risks adjusted for LVEF (≤40% vs >40%) and geographical region using Mantel-Haenszel weights are shown for each treatment group. Treatment effect is the adjusted risk difference between treatment groups. †Analysis of change in EQ-5D VAS is based on available data and excludes patients from Mozambique because of the unavailability of a linguistically validated translation of the EQ-5D VAS in that country (ie, analysis includes n=461 from the high-intensity care group and n=454 the from usual care group). Statistics are estimated from an ANCOVA model with fixed terms for treatment, LVEF (≤40% vs >40%), geographical region, and baseline value. Treatment effect is the adjusted mean difference between treatment groups. ‡Treatment effect is the Mann-Whitney odds adjusted for LVEF (≤40% vs >40%) and geographical region, using Mantel-Haenszel weights. p value calculated from van Elteren's test stratified by LVEF (≤40% vs >40%) and geographical region, using modified ridit scores. A Mann-Whitney odds value of >1·0 favours high-intensity care. §Proportion of 78 666 total pairwise patient comparisons within strata where outcome in given treatment group is superior.

Table 3: Primary, secondary, and exploratory analyses

Multidisciplinary and proactive approach

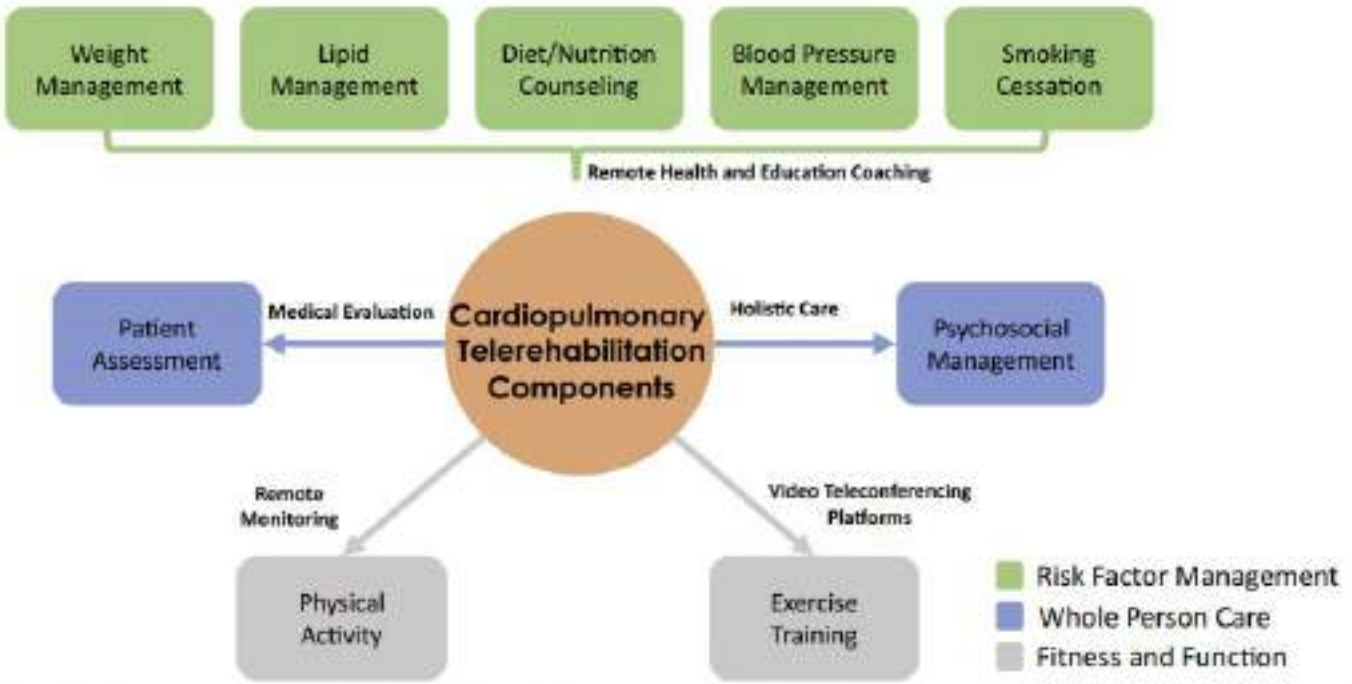

Fig. 2. Key components of cardiopulmonary rehabilitation are vital to center-based and home-based programs. These secondary prevention strategies incorporate elements from risk factor management to whole person care to fitness and function. These interventions are achieved remotely through use of information and communication technology.

Phys Med Rehabil Clin N Am 32 (2021) 263–276
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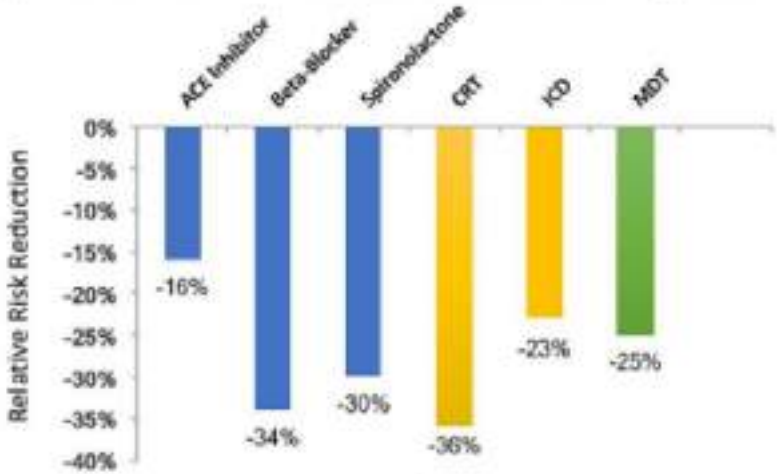
Multidisciplinary Team

Education in Heart

HEART FAILURE

Multidisciplinary team approach to heart failure management

Impact of Interventions on All Cause Mortality in Heart Failure



Morton G, et al. Heart 2018;104:1376–1382

Algoritms and artificial Intelligence

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Europace (2022) **24**, 234–244
doi:10.1093/europace/euab170

Combining home monitoring temporal trends from implanted defibrillators and baseline patient risk profile to predict heart failure hospitalizations: results from the SELENE HF study

What's new?

- In 918 patients with implantable defibrillators, we developed and validated an algorithm to predict heart failure (HF) hospitalizations using automatic, daily remote monitoring without patient interaction.
- Seven temporal trends contributed to the algorithm: diurnal and nocturnal heart rates, ventricular extrasystoles, atrial tachyarrhythmia burden, heart rate variability, physical activity, and thoracic impedance.
- To individualize predictive power of the algorithm, we tested the combination of the temporal trends with a baseline risk-stratifier (Seattle HF Model).
- The sensitivity of the algorithm (including baseline risk-stratifier) in predicting first HF hospitalizations was 65.5% with a median alerting time of 42 days.
- False alert rate (0.69 per patient-year) and unexplained alert rate (0.63 per patient-year) were remarkably lower than in other published algorithms, which may increase actionability of alerts and reduce workload for the attending physicians.

Cardiac rehabilitation for heart failure: 'Cinderella' or evidence-based pillar of care?

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Abstract

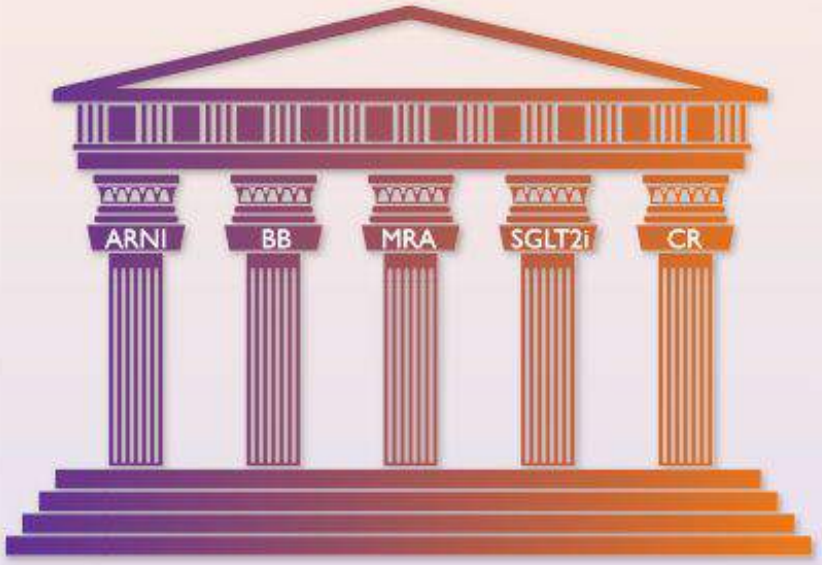
Cardiac rehabilitation remains the 'Cinderella' of treatments for heart failure. This state-of-the-art review provides a contemporary update on the evidence base, clinical guidance, and status of cardiac rehabilitation delivery for patients with heart failure. Given that cardiac rehabilitation participation results in important improvements in patient outcomes, including health-related quality of life, this review argues that an exercise-based rehabilitation is a key pillar of heart failure management alongside drug and medical device provision. To drive future improvements in access and uptake, health services should offer heart failure patients a choice of evidence-based modes of rehabilitation delivery, including home, supported by digital technology, alongside traditional centre-based programmes (or combinations of modes, 'hybrid') and according to stage of disease and patient preference.

Graphical Abstract

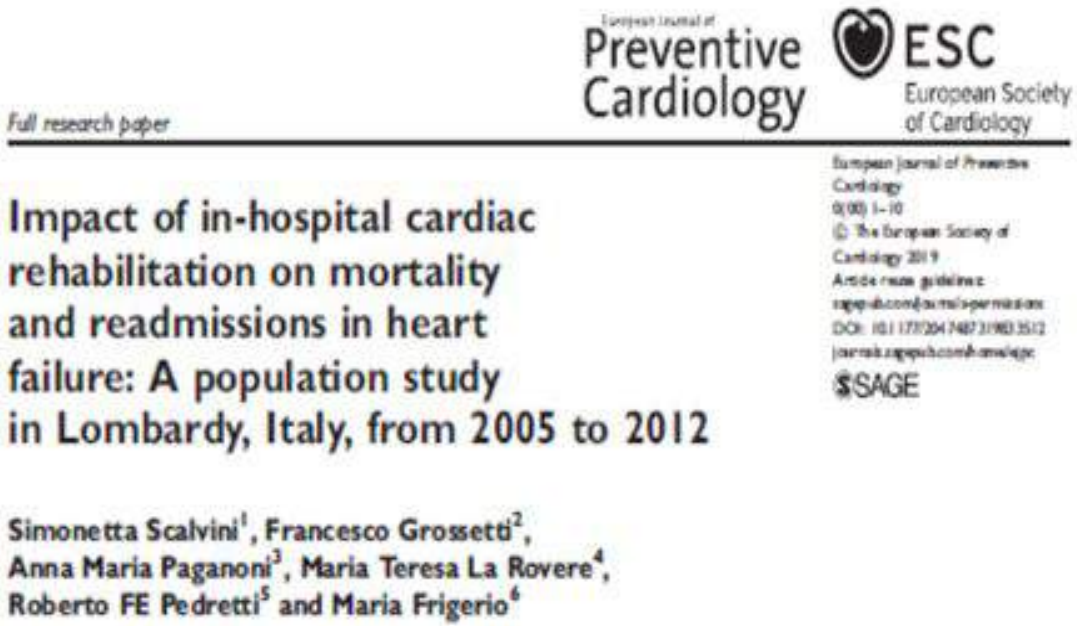
Cardiac rehabilitation for heart failure (HF) improves health-related quality of life and contributes to reduced hospitalization and is Class I / level A evidence by international (US & EU) Guidelines

Despite this, referral to cardiac rehabilitation for HF is suboptimal and currently ranges from **5% to 50%** across countries

Cardiac rehabilitation should be the 5th pillar in HF management alongside drug and medical device provision



Choice of cardiac rehabilitation delivery models (centre-based/home-based ± digitally supported) should be developed and be available to patients in the future



Full research paper

European Journal of Preventive Cardiology

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Impact of in-hospital cardiac rehabilitation on mortality and readmissions in heart failure: A population study in Lombardy, Italy, from 2005 to 2012

Simonetta Scalvini[1], Francesco Grossetti[2], Anna Maria Paganoni[3], Maria Teresa La Rovere[4], Roberto FE Pedretti[5] and Maria Frigerio[6]

European Journal of Preventive Cardiology
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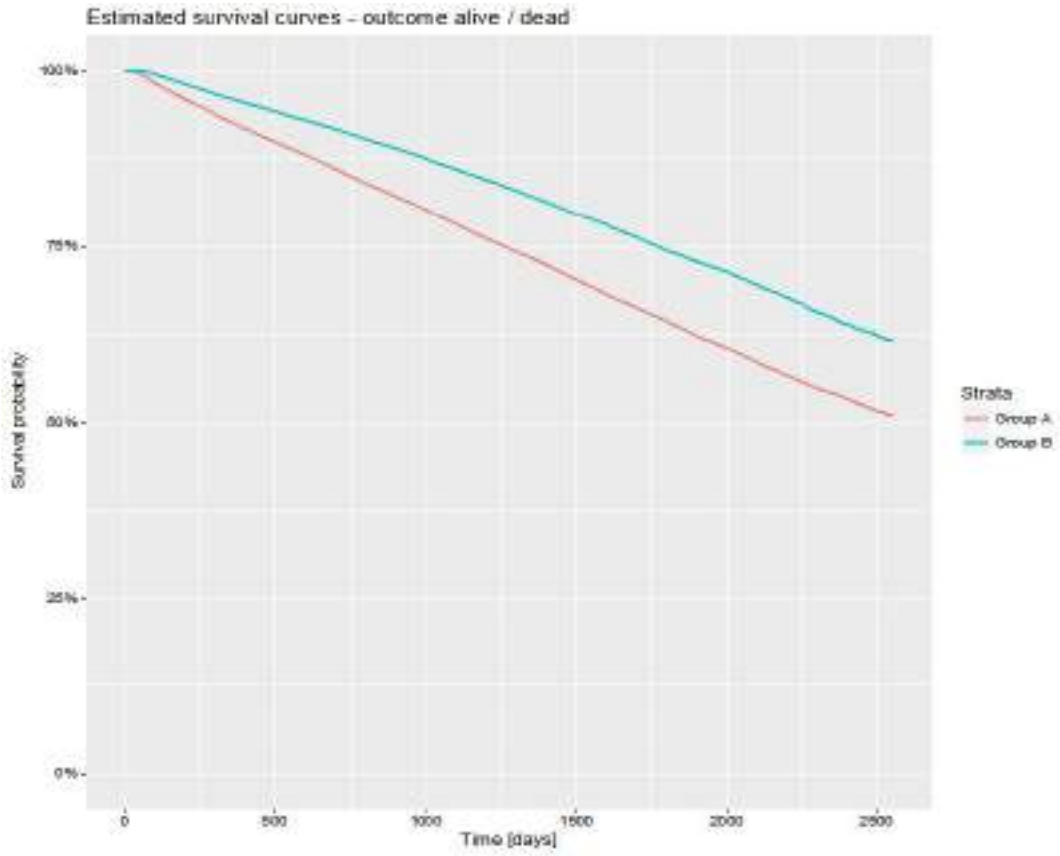
Pazienti che hanno avuto almeno un ricovero in cardiologia riabilitativa entro 30 gg da un precedente ricovero in acuto n=39709/104552 (29%)

3.26 ± 1.78 ricoveri precedenti il ricovero riabilitativo

European Journal of Preventive Cardiology (2019) 26(8), 808-817. https://doi.org/10.1016/j.ijcard.2021.02.016

Curve di sopravvivenza stimate dal modello multivariato

Riduzione del 31% delle reospedalizzazioni e del 43% della mortalità



European Journal of Preventive Cardiology (2019) 26(8), 808-817. https://doi.org/10.1016/j.ijcard.2021.02.016

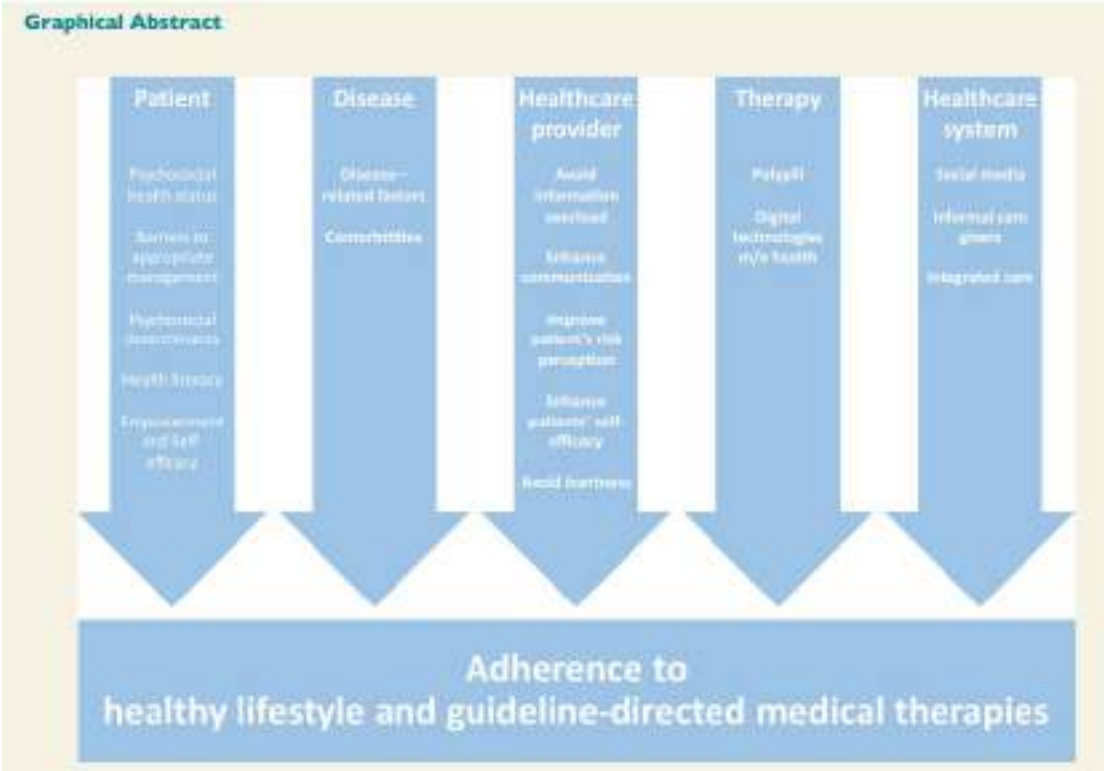
ESC European Society of Cardiology

European Journal of Preventive Cardiology (2022) **00**, 1–18
https://doi.org/10.1093/eurjpc/zwac204

Roberto F. E. Pedretti[1*†], Dominique Hansen[2,3†], Marco Ambrosetti[4], Maria Back[5,6], Thomas Berger[7], Mariana Cordeiro Ferreira[8], Véronique Cornelissen[9], Constantinos H. Davos[10], Wolfram Doehner[11,12,13,14], Carmen de Pablo y Zarzosa[15], Ines Frederix[16,17,18], Andrea Greco[19], Donata Kurpas[20], Matthias Michal[21,22], Elena Osto[23], Susanne S. Pedersen[24,25], Rita Esmeralda Salvador[26], Maria Simonenko[27], Patrizia Steca[28], David R. Thompson[29], Matthias Wilhelm[30‡], and Ana Abreu[31‡]

How to optimize the adherence to a guideline-directed medical therapy in the secondary prevention of cardiovascular diseases: a clinical consensus statement from the European Association of Preventive Cardiology

Graphical Abstract



ESC European Society of Cardiology
European Journal of Preventive Cardiology (2022) 00, 1–18
https://doi.org/10.1093/eurjpc/zwac204

Table 1 Take-home messages and consensus statements

- In the secondary prevention of CVD, it is crucial to optimize the adherence to therapy since most CVD risk factors and lifestyle measures are far from optimally controlled in many patients.
- Considering the multifactorial process that can lead to suboptimal adherence to treatment, secondary CVD prevention should be deployed in a multidisciplinary setting or context.
- In general, a low self-efficacy, poor health literacy and risk perception, and certain psychosocial issues (e.g. depression, anxiety, cognitive decline, poor social support and socio-economic status) predict a low adherence to therapy. Hence, these factors should be screened at entry of a secondary prevention programme and targeted accordingly.
- For each CVD risk factor or condition separately, additional specific predictors for a low adherence to therapy are established, and should thus be taken into account by healthcare providers.
- To optimize the adherence to therapy, it is important to work on its five dimensions simultaneously, including: the patient, the disease, the healthcare provider, the therapy, and the healthcare system.

ESC European Society of Cardiology
European Journal of Preventive Cardiology (2022) 00, 1–18
https://doi.org/10.1093/eurjpc/zwac204

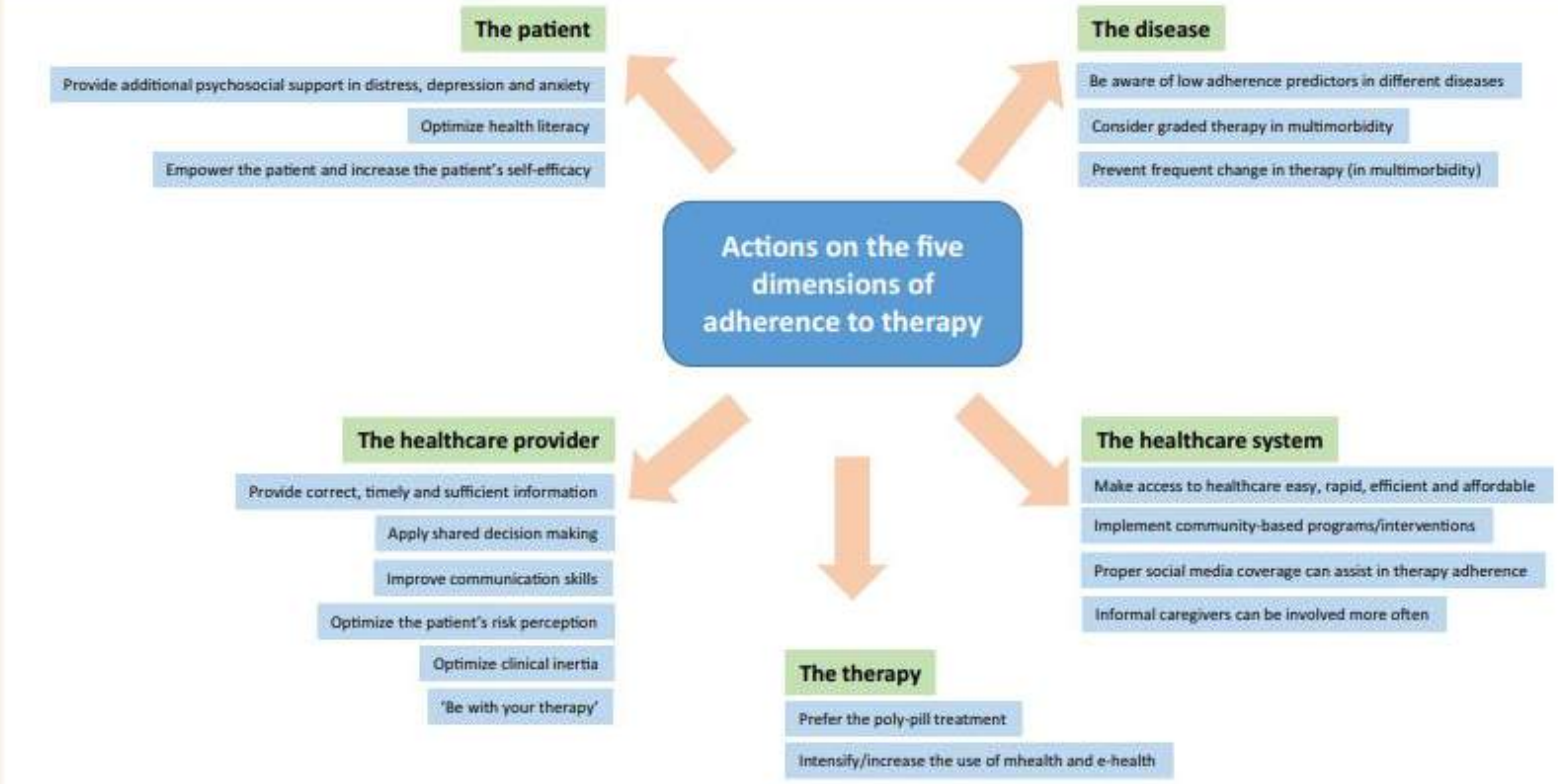


Figure 1 How to optimize therapy adherence in cardiovascular disease.

RESEARCH Open Access

Collaborative chronic care model implementation within outpatient behavioral health care teams: qualitative results from a multisite trial using implementation facilitation

Jennifer L. Sullivan[1,2*], Bo Kim[1,3], Christopher J. Miller[1,3], A. Rani Elwy[4,5], Karen L. Drummond[6,7], Samantha L. Connolly[1,3], Rachel P. Riendeau[1] and Mark S. Bauer[1,3]

Table 1 Codebook of collaborative chronic care model elements, definitions, and examples

CCM element	Definition
Organization and leadership support	Providing resources and involvement to the BHIP teams. It can come from various levels within the organization including executive level leaders as well as more direct line supervisors and managers in mental health specialty care services. *Example:* dedicating time to BHIP team meetings and incentivizing attendance; celebrating BHIP team successes; ensuring that BHIP teams are fully staffed and have access to the supports needed to enact the other CCM elements.
Work role redesign	Providing care that anticipates patients' needs and preferences through redesign processes within an interdisciplinary team structure. *Example:* in many randomized trials, a care manager role is established to conduct phone-based assessments with patients, place reminder calls, and follow up after appointments to ensure continuity of care.
Patient self-management support	Enhancing Veterans' self-management skills to help them work toward wellness outside of treatment sessions. *Example:* treatment contracts addressing self-management steps or coping skills for patients to use between appointments.

Table 1 Codebook of collaborative chronic care model elements, definitions, and examples

CCM element	Definition
Provider decision support	Making sure the treatment team or the providers have access to needed clinical expertise. *Example:* provision of treatment manuals, medication algorithms, and streamlined access to specialty consultation (in cases where there is a concern outside of their particular area of expertise).
Clinical information systems	Using electronic/automated mechanisms to enhance evaluation and coordination of care, with an emphasis on caring for patient populations or panels. *Example:* a BHIP team may have an established registry or panel of patients for whom the team is responsible. Once a registry is established, the team can track outcomes across the whole team's caseload to provide targeted feedback to providers.
Community linkages	Facilitated or systematic relationships outside of VA to support care delivery *Example:* routine use of local or web-based peer support services located outside of the clinical setting (e.g., Alcoholics Anonymous, National Alliance on Mental Illness)

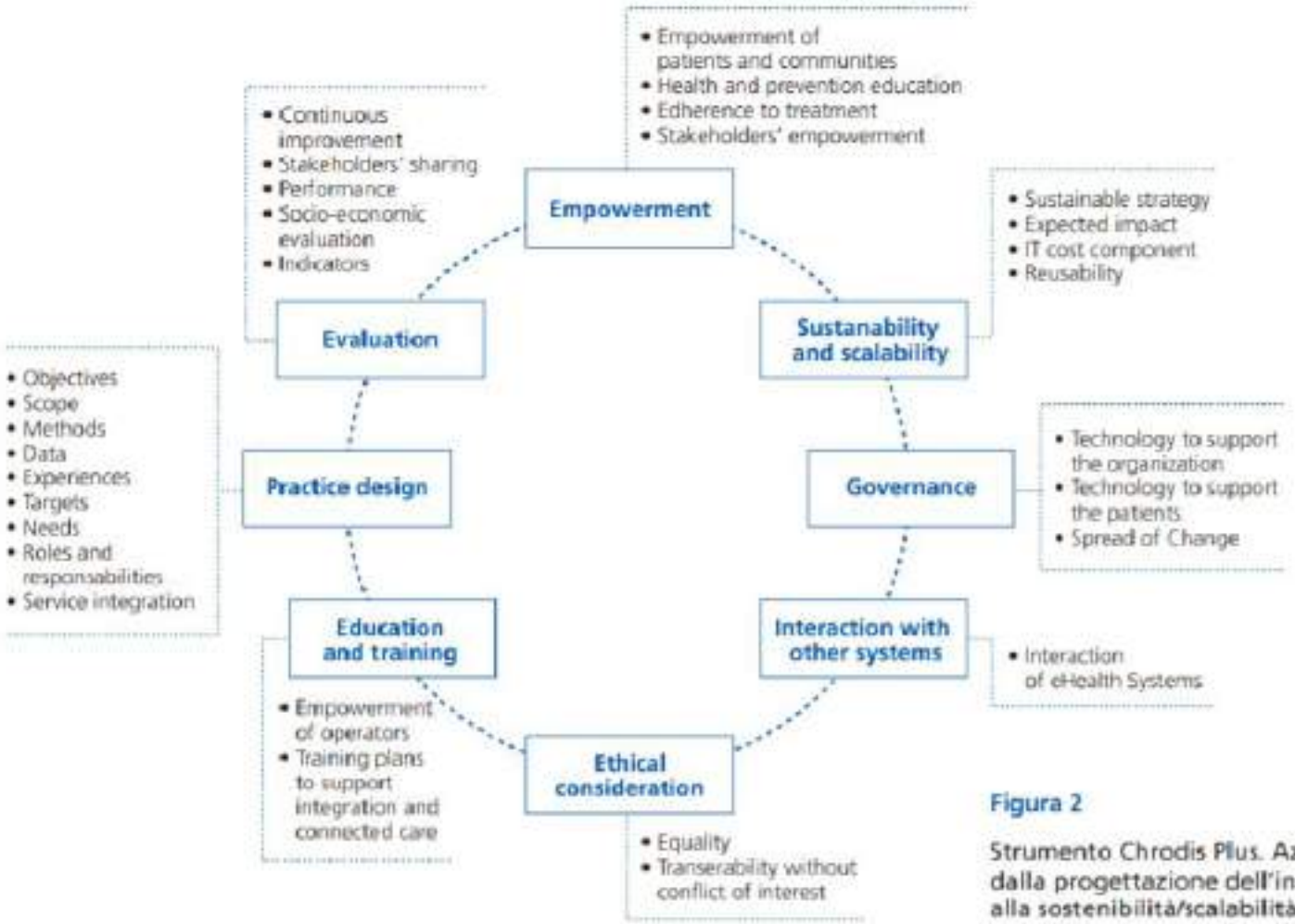


Figura 2

Strumento Chrodis Plus. Azioni che vanno dalla progettazione dell'intervento fino alla sostenibilità/scalabilità.

Practical outpatient management of worsening chronic heart failure

Nicolas Girerd[1], Nathan Mewton[2], Jean-Michel Tartière[3], Damien Guijarro[4], Patrick Jourdain[5,6], Thibaud Damy[7], Nicolas Lamblin[8], Antoni Bayes-Génis[9], Pierpaolo Pellicori[10], James L. Januzzi[11], Patrick Rossigno[11], and François Roubille[12], on behalf of a panel of multidisciplinary experts and the Heart Failure Working Group of the French Society of Cardiology

[1]Centre d'Investigation Clinique- Plurithématique Inserm CIC-P 1433, Inserm U1116, CHRU Nancy Brabois, F-CRIN INI-CRCT (Cardiovascular and Renal Clinical Trialists), Université de Lorraine, Nancy, France; [2]Hôpital Cardiovasculaire Louis Pradel Hospices Civils de Lyon Heart Failure Department Clinical Investigation Center Inserm 1407 CarMeN Inserm 1060, University Claude Bernard Lyon, Bron, France; [3]CHITS, Department of Cardiology, Hôpital Sainte-Musse, Toulon, France; [4]CHU Nantes, CNRS, INSERM, l'institut Du Thorax, Université de Nantes, Nantes, France; [5]Covidom Regional Telemedicine Platform, Assistance Publique-Hôpitaux de Paris, Paris, France; [6]Cardiology Department, University Hospital of Bicêtre, Assistance Publique-Hôpitaux de Paris, Kremlin Bicêtre, France; [7]Réseau Cardiogen, Department of Cardiology, Centre Français de Référence de l'Amylose Cardiaque (CRAC), CHU d'Henri-Mondor, Créteil, France; [8]Department of Cardiology, CHU de Lille, Université de Lille, Lille, France; [9]CIBERCV, Servicio de Cardiología, Hospital Germans Trias i Pujol, Universitat Autònoma de Barcelona, Barcelona, Spain; [10]Robertson Centre for Biostatistics, Institute of Health and Wellbeing, University of Glasgow, Glasgow, UK; [11]Cardiology Division, Massachusetts General Hospital, Baim Institute for Clinical Research, Harvard Medical School, Boston, MA, USA; and [12]PhyMedExp, Université de Montpellier, INSERM, CNRS, Cardiology Department, CHU de Montpellier, France

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doi:10.1002/ejhf.2503

Category	Maintenance furosemide equivalent dose (mg)*	IV Furosemide dose		SC Furosemide infusion dose	If inadequate urine output (<500ml) after 90 min of infusion	Oral potassium supplement during the furosemide infusion	Parallel Intervention	Monitoring
		Bolus mg**	Infusion mg/hr During 2 to 3 hours***					
Low dose	≤ 40	20	20	40 mg over 5 hours				**Day hospital setting** • Monitor HR & BP, every hour • Quantify diuresis and natriuresis **At-home hospitalization setting** • Monitoring 2 to 3 times a day • Monitor HR & BP prior and 5 minutes after the bolus **Following the infusion** • After the IV diuretic session, in all patients, monitor creatinine and potassium levels within 7 days of IV diuretics infusion
Standard dose	41-160	Numeric equivalent of maintenance diuretic dose	20	2/3 of numeric equivalent + 40 mg				
High dose	161-300	200	20	160 mg	Additional 200 mg bolus of furosemide and/or (thiazide diuretic† or 100 mg potassium canrenoate)	**K⁺> 4 mmol/L** No potassium supplement **K⁺ 3.7 to 4.0,** 20 mEq**** if creatinine <20 mg/L **K⁺ 3.4 to 3.6,** 40 mEq if creatinine <20 mg/L, 20 mEq if creatinine 20-28, 10 mEq if creatinine >28 **K⁺ 3.1 to 3.3** 40 mEq if creatinine <20 mg/L, 30 mEq if creatinine 20-28, 20 mEq if creatinine >28 **If K⁺ <3.1,** achieve potassium >3.1 before diuretic infusion.	Continue guideline directed medical therapy (RAASi/ SGLT2i /ARNi) Consider increasing / initiating MRAs and/or thiazide in case of diuretic resistance	
Mega dose	≥ 301	200	20	160 mg				

Dose of IV furosemide depends on the maintenance diuretic dose.
Infusions were administered over 3h. **In home hospital setting, only bolus are usually performed.**
* Total daily dose expressed in the equivalent of milligrams of oral furosemide.
** Bolus infusion, consider prescribe higher dose in patient with low eGFR.
† Metolazone, 1.25 mg to 10 mg, hydrochlorothiazide 12.5 mg to 50 mg. IV intravenous, HR: Heart Rate, BP: Blood pressure, RAASi: renin-angiotensin-aldosterone system inhibitor, SGLT2i: sodium-glucose transporter 2 inhibitors, ARNi: angiotensin receptor neprilysin inhibitors
*** Infusion is usually not possible in the setting of at-home hospitalization
**** 10 mEq approximately corresponds to 400 mg of potassium ion and 780 mg of potassium chlorur

Figure 4 Ambulatory intravenous (IV) diuretics protocol according to maintenance loop diuretic dose. These doses are general guidelines that need to be adapted to renal function. Patients with estimated glomerular filtration rate <30 ml/min/1.73 m2 usually need higher (usually doubled) diuretic dose. ARNi, angiotensin receptor–neprilysin inhibitor; BP, blood pressure; HR, heart rate; MRA, mineralocorticoid receptor antagonist; RAASi, renin–angiotensin–aldosterone inhibitor; SGLT2i, sodium–glucose cotransporter 2 inhibitor.

Home monitoring in heart failure: illusione o speranza?

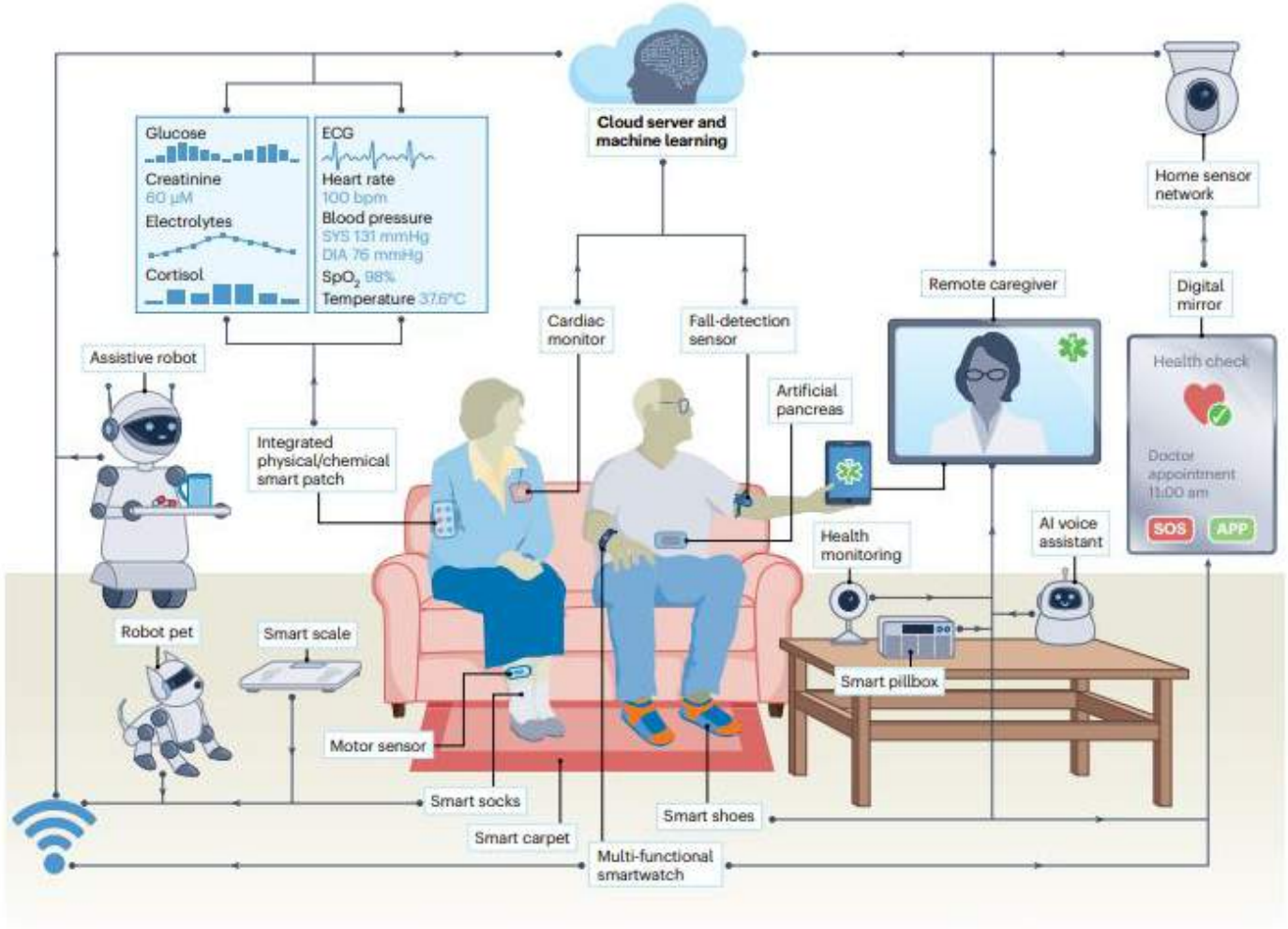

Fig. 2 | The future of geriatric healthcare in the home setting. A vision of future home-centered geriatric care, powered by digital technologies and devices. A network of internet-connected sensors on the body and distributed around the home, monitors the health conditions of older adults and transmits rich dynamic data to cloud servers. The data are then analyzed by machine learning algorithms to coordinate with the remote caregiver and with autonomous wearable therapeutic devices toward optimal health care. Such care is supported by virtual visits with the physician, voice-controlled personal assistants and social and assistive robots. AI, artificial intelligence; DIA, diastolic; SpO_2, oxygen saturation; SYS, systolic.

Nature Medicine (2023) **29**, 1623–1630.https://doi.org/10.1038/s41591-023-02391-8

Reviews in Cardiovascular Medicine

Rev. Cardiovasc. Med. **2022**; 23(2): 045
http://doi.org/10.31083/j.rcm2302045

Review

Mobilizing artificial intelligence to cardiac telerehabilitation

Jin Su[1,†], Ye Zhang[1,†], Qi-qi Ke[1], Ju-kun Su[1], Qiao-hong Yang[1,*]

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*Correspondence: yqiaohong@163.com (Qiao-hong Yang)
†These authors contributed equally.

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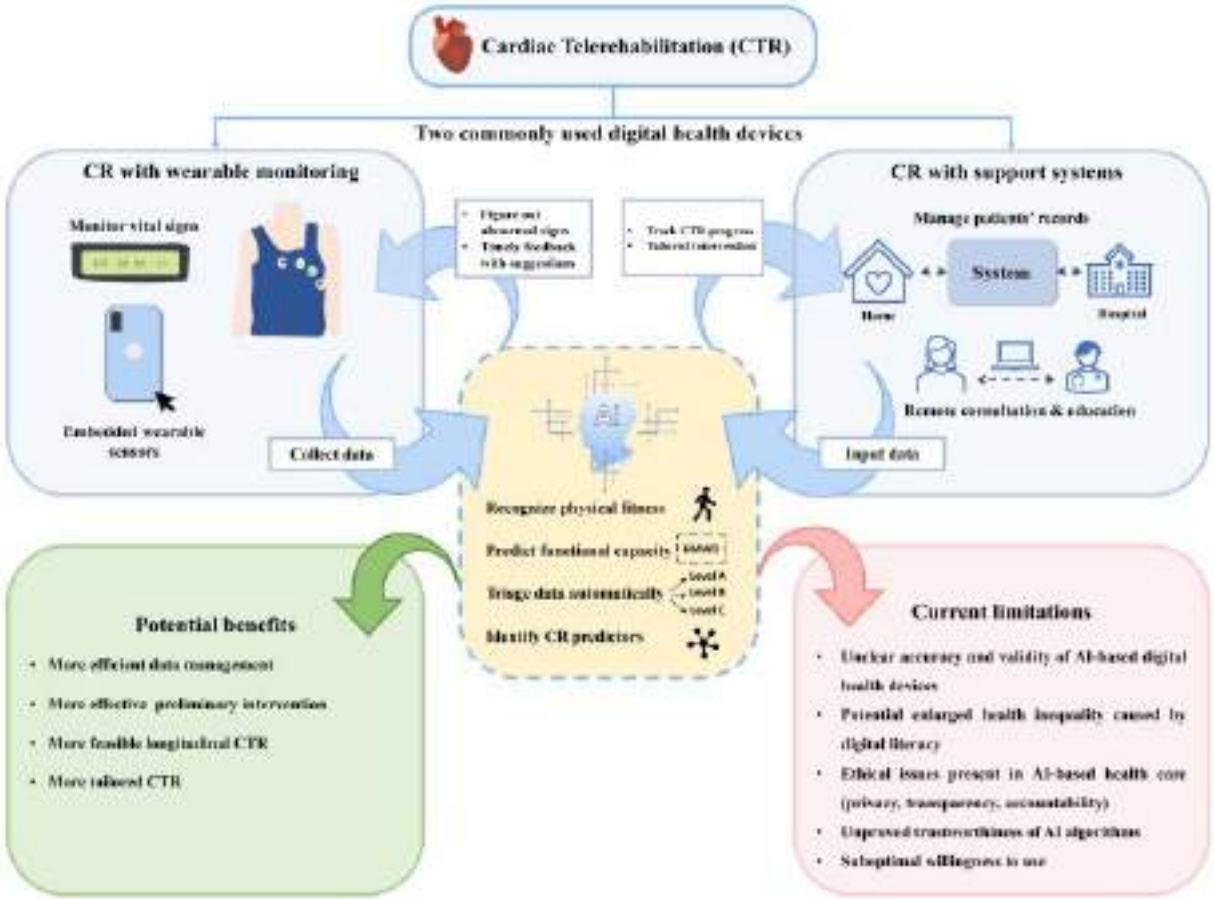
Submitted: 26 November 2021 Revised: 3 January 2022 Accepted: 12 January 2022 Published: 25 January 2022



ESC European Society of Cardiology

European Heart Journal (2023) **44**, 2911–2926
https://doi.org/10.1093/eurheartj/ehad280

FASTTRACK CLINICAL RESEARCH
Heart failure and cardiomyopathies

Telemonitoring for heart failure: a meta-analysis

Niels T.B. Scholte [1†], Muhammed T. Gürgöze [1†], Dilan Aydin[1†], Dominic A.M.J. Theuns [1], Olivier C. Manintveld [1], Eelko Ronner [2], Eric Boersma [1], Rudolf A. de Boer [1], Robert M.A. van der Boon [1], and Jasper J. Brugts [1*]

[1]Department of Cardiology, Thorax Centre, Erasmus MC, University Medical Centre Rotterdam, Dr. Molewaterplein 40, Rotterdam, South Holland 3015 GD, The Netherlands; and
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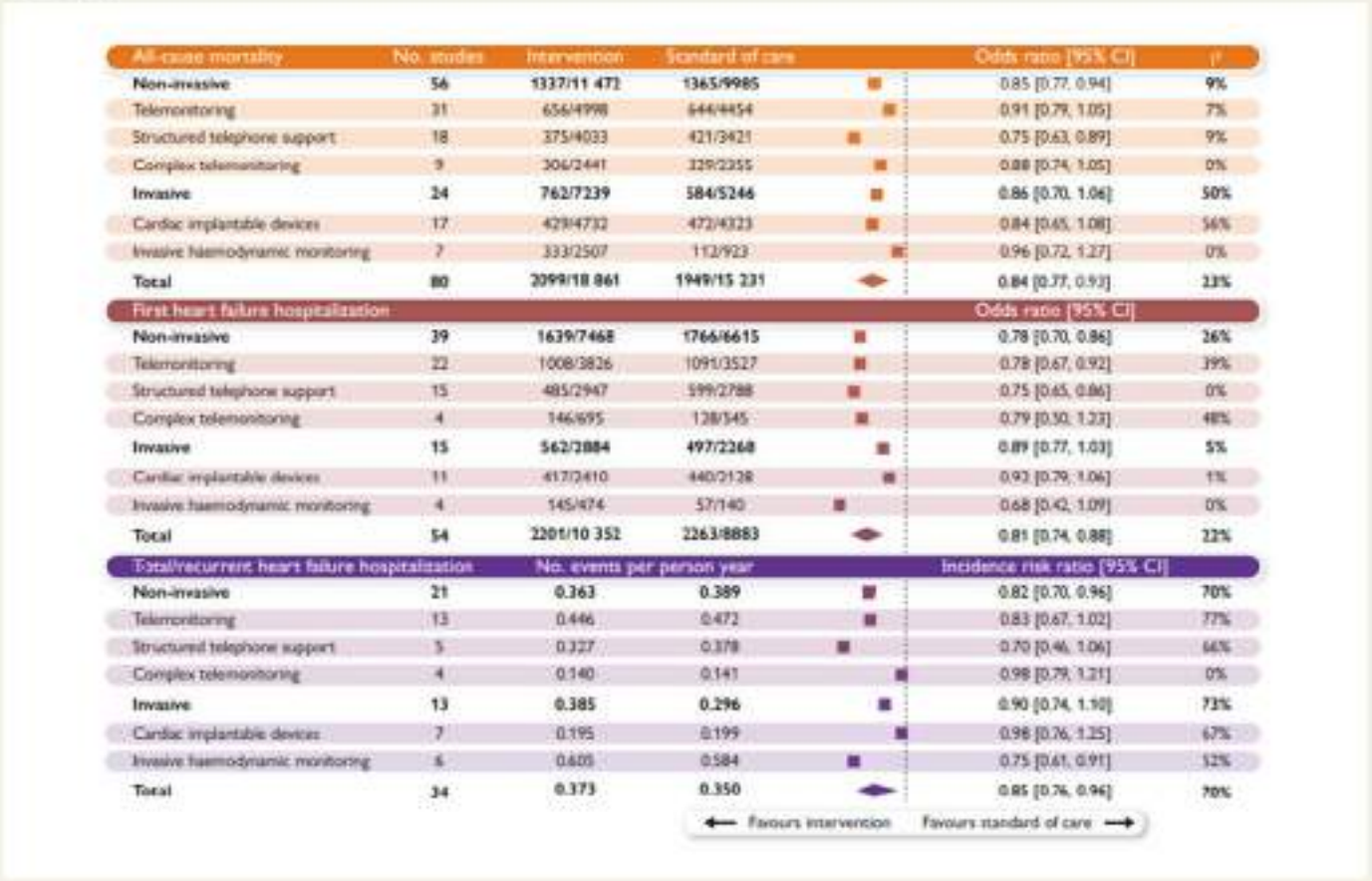
Received 19 December 2022; revised 28 April 2023; accepted 29 April 2023; online publish-ahead-of-print 18 May 2023

Take Home Message

Home telemonitoring systems can aid in outpatient management and lower all-cause mortality and heart failure hospitalization rates. This type of monitoring should therefore be strongly considered and may be integrated into current heart failure health care systems worldwide.



All-cause mortality	No. studies	Intervention	Standard of care	Odds ratio [95% CI]	I^2
Non-invasive	**56**	**1337/11 472**	**1365/9985**	0.85 [0.77, 0.94]	**9%**
Telemonitoring	31	656/4998	644/4454	0.91 [0.79, 1.05]	7%
Structured telephone support	18	375/4033	421/3421	0.75 [0.63, 0.89]	9%
Complex telemonitoring	9	306/2441	329/2255	0.88 [0.74, 1.05]	0%
Invasive	**24**	**762/7239**	**584/5246**	0.86 [0.70, 1.06]	**50%**
Cardiac implantable devices	17	429/4732	472/4323	0.84 [0.65, 1.08]	56%
Invasive haemodynamic monitoring	7	333/2507	112/923	0.96 [0.72, 1.27]	0%
Total	**80**	**2099/18 861**	**1949/15 231**	0.84 [0.77, 0.93]	**23%**
First heart failure hospitalization				**Odds ratio [95% CI]**	
Non-invasive	**39**	**1639/7468**	**1766/6615**	0.78 [0.70, 0.86]	**26%**
Telemonitoring	22	1008/3826	1091/3527	0.78 [0.67, 0.92]	39%
Structured telephone support	15	485/2947	599/2788	0.75 [0.65, 0.86]	0%
Complex telemonitoring	4	146/695	128/545	0.79 [0.50, 1.23]	48%
Invasive	**15**	**562/2884**	**497/2268**	0.89 [0.77, 1.03]	**5%**
Cardiac implantable devices	11	417/2410	440/2128	0.93 [0.79, 1.06]	1%
Invasive haemodynamic monitoring	4	145/474	57/140	0.68 [0.42, 1.09]	0%
Total	**54**	**2201/10 352**	**2263/8883**	0.81 [0.74, 0.88]	**22%**
Total/recurrent heart failure hospitalization		**No. events per person year**		**Incidence risk ratio [95% CI]**	
Non-invasive	**21**	**0.363**	**0.389**	0.82 [0.70, 0.96]	**70%**
Telemonitoring	13	0.446	0.472	0.83 [0.67, 1.02]	77%
Structured telephone support	5	0.327	0.378	0.70 [0.46, 1.06]	66%
Complex telemonitoring	4	0.140	0.141	0.98 [0.79, 1.21]	0%
Invasive	**13**	**0.385**	**0.296**	0.90 [0.74, 1.10]	**73%**
Cardiac implantable devices	7	0.195	0.199	0.98 [0.76, 1.25]	67%
Invasive haemodynamic monitoring	6	0.603	0.584	0.75 [0.61, 0.91]	52%
Total	**34**	**0.373**	**0.350**	0.85 [0.76, 0.96]	**70%**

Favours intervention — Favours standard of care

Summary results for all-cause mortality, first heart failure hospitalization, and total/recurrent heart failure hospitalizations divided in invasive home telemonitoring systems and non-invasive home telemonitoring systems and total. I^2 represents heterogeneity between studies. CI, confidence interval.

Conclusions

Our meta-analysis revealed that overall hTMS are effective in reducing HFH and improve survival. Non-invasive hTMS reduce all endpoints, whereas in invasive hTMS, only IHM reduces recurrent HFHs significantly. Therefore, telemonitoring should be strongly considered and may be integrated in current HF healthcare systems worldwide. For optimal impact, the implementation of hTMS should ultimately be tailored to the individual HF patient and based on compatibility with current healthcare systems.

European Heart Journal (2023) **44**, 2911–2926.https://doi.org/10.1093/eurheartj/ehad280

HEART FAILURE

Optimal postdischarge management of chronic HF

- A personalized hospital-discharge programme, founded on individuals' needs and risk profiles, might be the best approach to plan the follow-up care of patients with chronic HF.

- Information and communication technologies will be helpful to disseminate clinical information to all health-care professionals in real time, and thus reduce the time and duplication of procedures and improve the overall care and health of patients.

- Telemedicine has been used to support integrated care in the management of chronic diseases and, in particular, to provide education to improve self-management, enable information transfer (such as by telemonitoring), facilitate contact with health-care professionals (such as via telephone support and follow-up), and improve electronic records.

Scalvini, S. & Giordano, A. *Nat. Rev. Cardiol.* advance online publication 20 November 2012; doi:10.1038.nrcardio.2012.161

EDITORIAL

How can multidisciplinary management with remote monitoring improve the outcome of patients with chronic cardiac diseases?

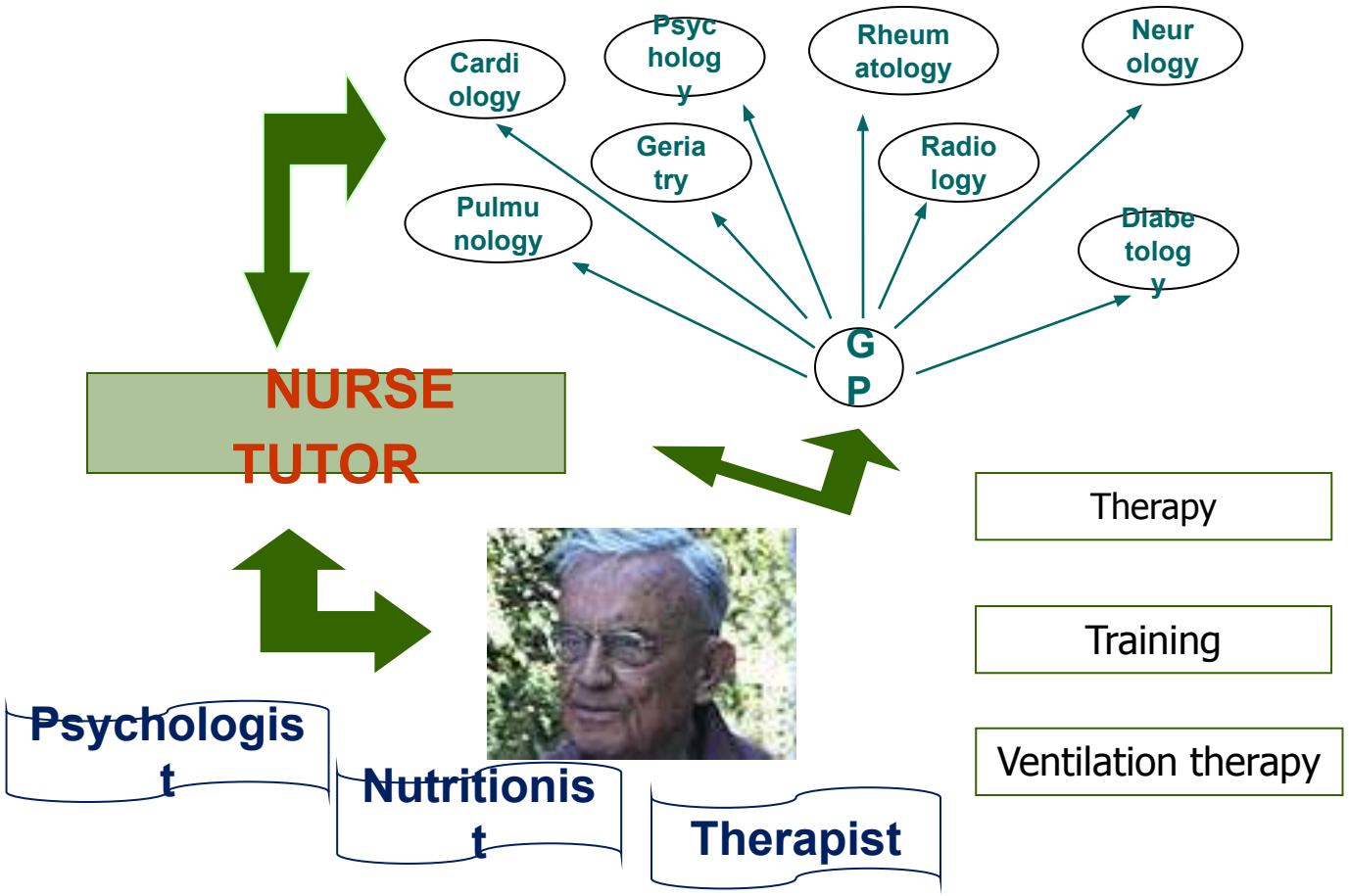
Simonetta Scalvini[a], Laura Comini[b] and Palmira Bernocchi[a]

Standards for telemedicine need a continuous monitoring for accuracy in technology, safety instructions and easy access for patients. Implementation of the system should run in parallel with its standardization and harmonization, which are the key issues for optimizing e-health and telemedicine.

An original research on the empirical foundations of telemedicine interventions for chronic disease management [17] underlines that telemedicine changes the inputs of the traditional medical care process, encouraging patients to manage their own health; this could have a significant effect on outputs and could be translated into a reduction in use of health services utilizations (hospital readmissions, readmissions, length of hospital stay etcetera) and sometimes mortality.

The question is no longer whether disease management programs work, but rather which type or component of disease management programs works best and efficiently in the context of each healthcare system or country.

The current Information and Communication Technology and remote monitoring system could provide an efficient mode for managing a growing number of complex patients and promote a real integration between hospital-based care and home care.


Cardi ology
Psyc holog y
Rheum atology
Neur ology
Geria try
Radio logy
Pulmu nology
Diabe tolog y
G P
NURSE TUTOR
Therapy
Training
Ventilation therapy
Psychologis t
Nutritionis t
Therapist

Maugeri Centre for Telehealth and Telecare: A real-life integrated experience in chronic patients

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Simonetta Scalvini MD[1,2], Palmira Bernocchi[1], Emanuela Zanelli[2], Laura Comini[3] and Michele Vitacca[4]; on behalf of the Maugeri Centre for Telehealth and Telecare (MCTT)

The Maugeri Model

From Hospital…

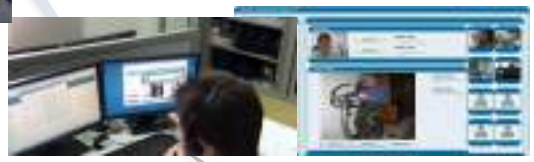
…To Home

Multidisciplinary management with remote monitoring and telephone support

Trained and dedicated team, including specialists, GPs and nurses

Patient and Caregiver

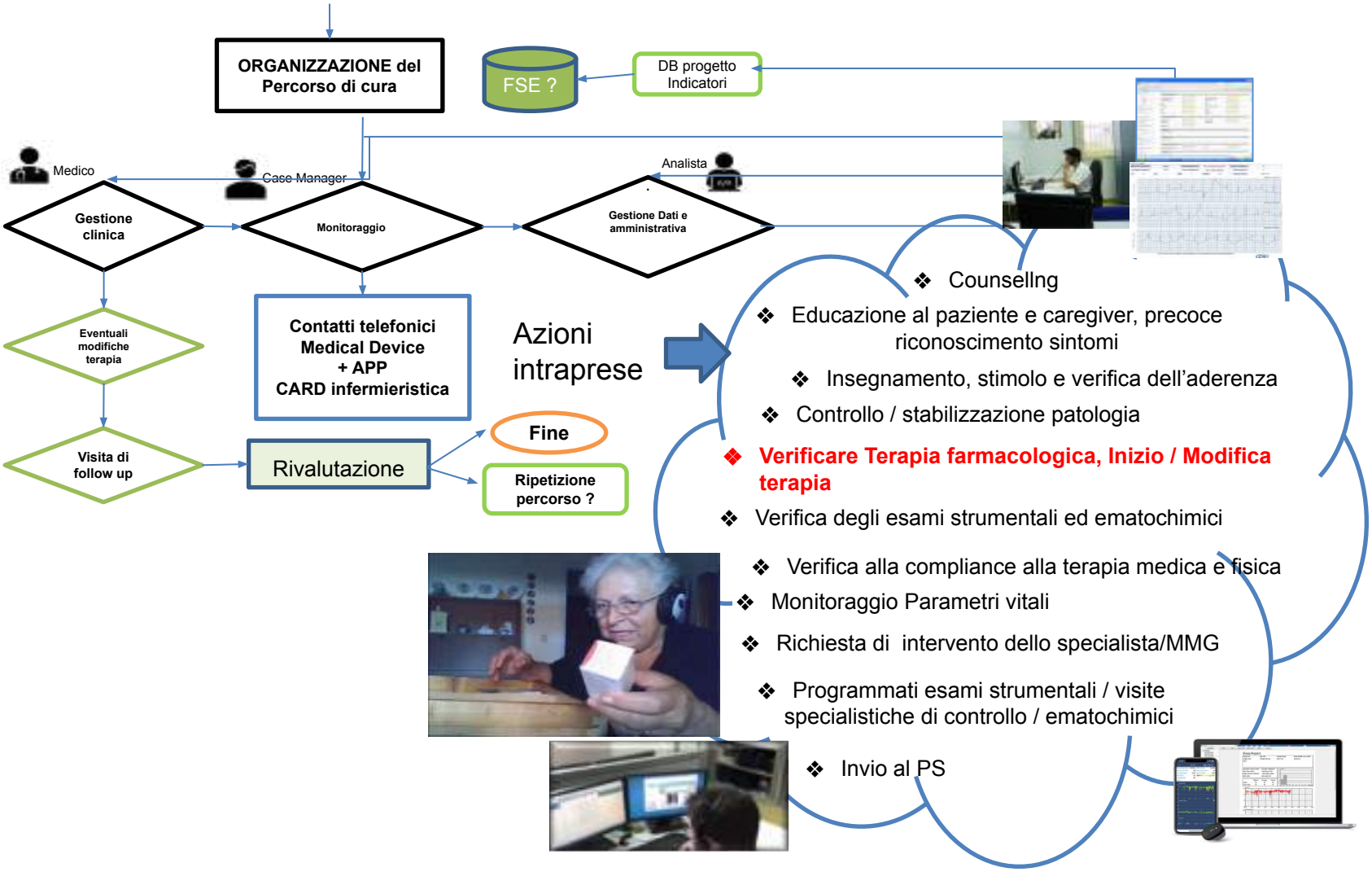
Adherence to therapy



Videoconference and Teleriabilitation

Telemedicine Service Centre

Telemonitoring


ORGANIZZAZIONE del Percorso di cura
FSE ?
DB progetto Indicatori
Medico
Case Manager
Analista
Gestione clinica
Monitoraggio
Gestione Dati e amministrativa
Eventuali modifiche terapia
Contatti telefonici Medical Device + APP CARD infermieristica
Visita di follow up
Rivalutazione
Fine
Ripetizione percorso ?
Azioni intraprese
Counsellng
Educazione al paziente e caregiver, precoce riconoscimento sintomi
Insegnamento, stimolo e verifica dell'aderenza
Controllo / stabilizzazione patologia
Verificare Terapia farmacologica, Inizio / Modifica terapia
Verifica degli esami strumentali ed ematochimici
Verifica alla compliance alla terapia medica e fisica
Monitoraggio Parametri vitali
Richiesta di intervento dello specialista/MMG
Programmati esami strumentali / visite specialistiche di controllo / ematochimici
Invio al PS

Education & Practice

Maugeri Centre for Telehealth and Telecare: A real-life integrated experience in chronic patients

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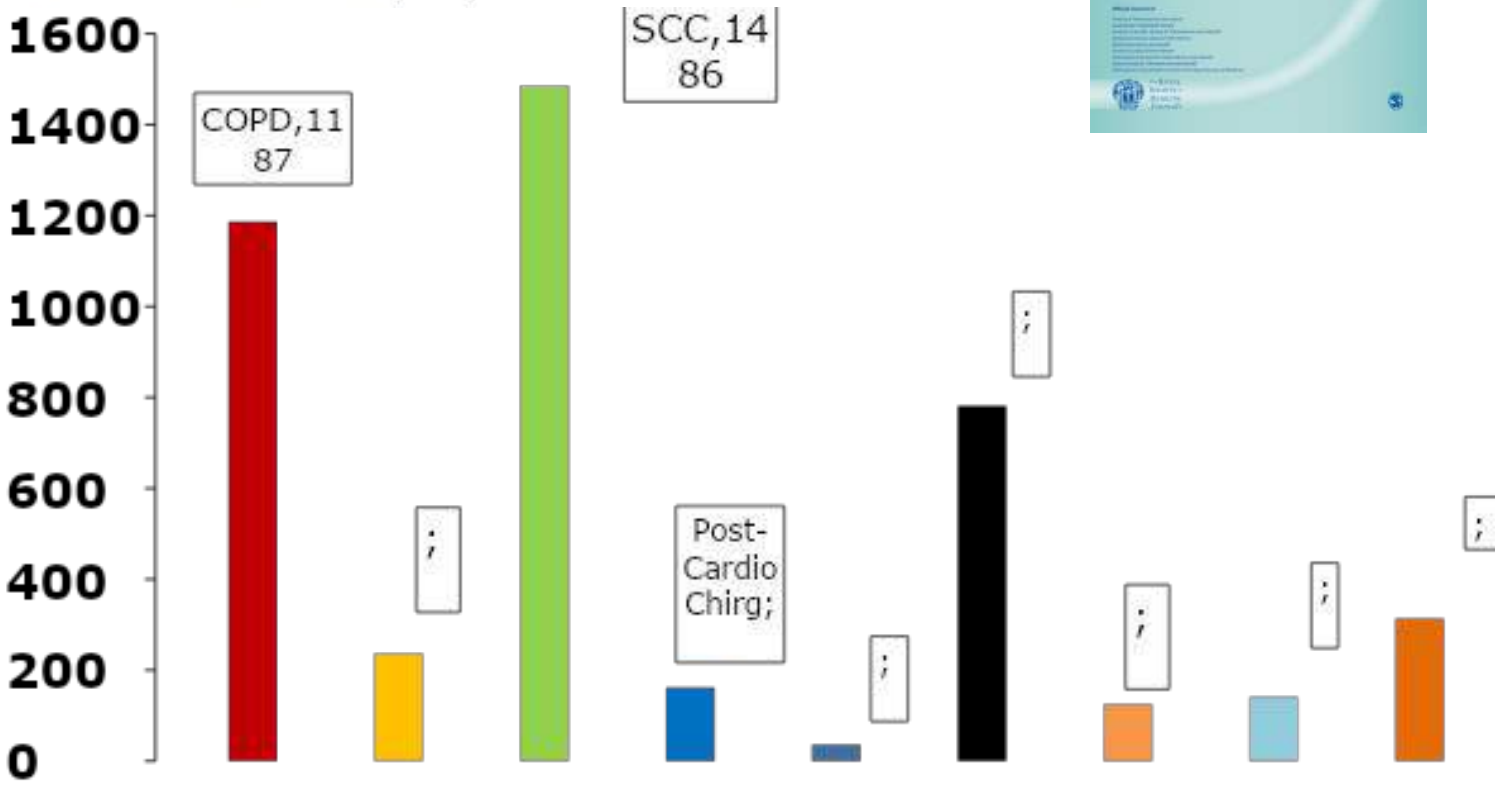
Simonetta Scalvini MD[1,2], Palmira Bernocchi[1], Emanuela Zanelli[2], Laura Comini[3] and Michele Vitacca[4]; on behalf of the Maugeri Centre for Telehealth and Telecare (MCTT)



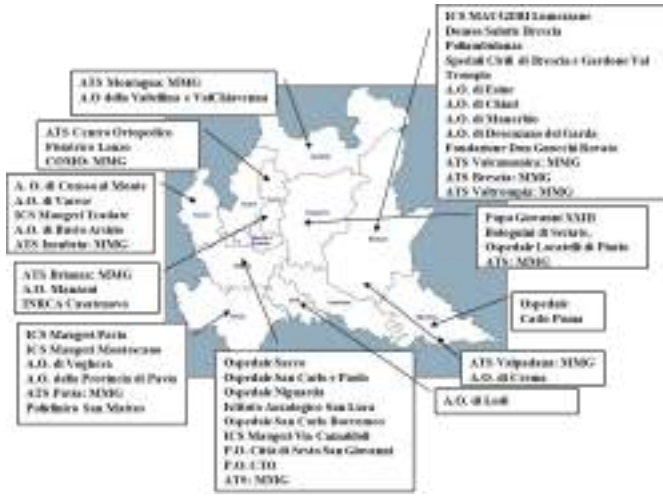
	RESPIRATORY DISEASES	NEUROLOGICAL DISEASES		CARDIOVASCULAR DISEASES	
	SEVERE COPD & CRI	**ALS/NMD**	**POST-STROKE**	**CHF**	**POST-CARDIAC SURGERY**
General description	**INTEGRATED AND MULTIDISCIPLINARY SERVICE: a structured physician-nurse approach supported by telemonitoring**				
Objectives	Reduce hospital readmissions	Continuum of care/Palliative care	Continuum of care	Reduce hospital readmissions	Alternative to in-hospital rehabilitation
Starting dates	10/09/2010	28/05/2008	30/05/2009	11/05/2006	11/05/2006
Target population	Chronic patients after hospital discharge	ALS /NMD patients after hospitalization	Chronic patients after hospital discharge	Chronic patients after hospital discharge	Secondary prevention
Coverage % of patients discharged	25%	45%	5%	23%	7%
Funders	Lombardy Region	Lombardy Region	Health Ministry Research	Lombardy Region	Lombardy Region
Inclusion Criteria	Patients in III-IV GOLD class with in the last year at least: I. Hospitalization for COPD in the previous six months or 2. ER access for COPD or 3. New prescription of long term oxygen therapy at home 4. Starting of NIV	All patients with ALS – confirmed with the El Escorial criteria –that were referred to the hospital for rehabilitation	1. At least one hospitalization for stroke within previous six months 2. Hemiparesis from cerebral ischemia or cerebral hemorrhage with a functional deficit .	Patient in II-III or IV NYHA Classes 1. At least one hospitalization for CHF within previous six months 2. LVSD with EF <40% or ≥40% with diastolic dysfunction	1. Euro SCORE 2 between 0 and 5 2. No major complications after surgery, and 3. Haemoglobin value 8.5 g/dL. 4. Availability of a caregiver at home.

9,8 Million Inhabitants - 17b€ healthcare expenditure - 17% of the Italian total spending

Regione Lombardia

Regional Social-Health Plan

- Gradual shift from Hospital to Home through the deployment of some **experimental projects supported by telemedicine**



Post ictus (Maugeri+ MIUR)

Tele-SLA (Maugeri + AISLA)

Prevenzione cadute (Maugeri + Ministero)

SUMMA: 2° opinion ai MMG

NRS: scompenso cardiaco e BPCO

SCC+BPCO (Maugeri/CCM)

Post COVID (Maugeri/MIRATO)

2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2020 2021

CRITERIA

chf telemonitoring
home rehabilitation

PIANO URBANO

chf/copd telemonitoring
home rehabilitation
palliative care

RADICI

diabetes
home artificial nutrition

icd monitoring

EVOLVO

chf/copd telemonitoring
home rehabilitation
image transfer
GP teleconsultation

TELEMACO

Scompenso
+ diabete Telemechron
(Maugeri + Regione

Case Manager:

Professionista che fornisce e/o coordina i servizi sociali e sanitari, per una gestione clinica di un target di popolazione di utenti, come quelli con scompenso cardiaco e comorbidità, dall'ammissione alla dimissione, creando un **modello unico di assistenza centrato sul singolo paziente.**

Il Case Manager in telemedicina:

PAROLE CHIAVE:

- **Competenza**:
conoscenza, abilità, comportamento (modo d'agire)

- **Coaching**:
attività in cui si stimolano i processi di crescita sia individuale che di gruppo

- **Counceling**:
processo di interazione tra due persone con l'obiettivo di far raggiungere al paziente l'autonomia necessaria per prendere decisioni personali o risolvere problematiche che lo coinvolgono

Dalla dimissione attua strategie per "allenare" (coaching) i pazienti con patologie croniche allo scopo di fornire loro:

- ***Educazione***
- ***Motivazione***
- ***Supporto***
- ***Partecipazione attiva***
- ***Consapevolezza***

Ottimizzazione dell'aderenza ai trattamenti: Il ruolo dell'infermiere CASE MANAGER

- **Educa** il paziente e/o caregiver sulla natura della malattia, sui cambiamenti di stile di vita richiesti e sulle realistiche aspettative dei potenziali benefici terapeutici
- **Fornisce istruzioni** sull'uso corretto dei dispositivi e aiuta i pazienti a comprendere meglio i potenziali benefici dei trattamenti.
- **Offre consigli pratici** sulla gestione delle molteplici terapie, aiutando il paziente a pianificare le somministrazioni del farmaco personalizzando in base ai diversi stili di vita.
- **Può aiutare** i pazienti al riconoscimento dei sintomi e a determinare se è necessario una modifica del dosaggio di un farmaco (sempre in accordo con il team medico)

Per ottenere l'empowerment del paziente

In questa relazione il paziente è sempre attivo e partecipativo

- La cura di sé è un processo decisionale attivo, cognitivo, deliberato che ci permette di sostenere e migliorare la nostra salute.

- Nel contesto delle malattie croniche, il processo «cura di sé» può essere diviso in due categorie principali: **mantenimento** e **gestione**

Self care management

- Si riferisce ad un processo di monitoraggio di routine dei parametri vitali, dei sintomi e dell'aderenza alla terapia
- Va oltre l'aderenza al trattamento indirizzando la valutazione ed il riconoscimento del sintomo, le successive decisioni da prendere e l'eventuale trattamento.
- **Il goal è rispondere al sintomo prima che si abbia un peggioramento e l'ospedalizzazione.**

Fase Intra-Ospedaliera

SEGNALAZIONE/ VALUTAZIONE INIZIALE

- Anamnesi e valutazione dei criteri d'inclusione
- Terapia farmacologica
- Contesto sociale e familiare
- Esami strumentali / visite specialistiche eseguite

DEFINIZIONE OBIETTIVI

- Come prevenire eventi
- Collaborazione con i vari specialisti (medico, nutrizionista, terapista, ecc)
- Rilevare criticità del paziente

SEDUTA EDUCAZIONALE 1

- Presentazione del progetto/CONSENSI
- Prevenzione / suggerimenti pratici
- Corretto stile di vita (es. alimentazione equilibrata, attività fisica, ecc
- Consegna diario infermieristico/brochure/dispositivi

SEDUTA EDUCAZIONALE 2

- Chiarimenti eventuali dubbi
- Importanza monitoraggio PV/ riacutizzazioni/ criticità
- Programmazione 1° contatto telefonico / videoconferenza
- Consegna eventuali dispositivi

La seduta educazionale

IL MOMENTO IN CUI SI CREA UN RAPPORTO FONDAMENTALE DI FIDUCIA TRA INFERMIERE E PAZIENTE/CAREGIVER, UN'ALLEANZA TERAPEUTICA FONDAMENTALE PER RAGGIUNGERE L'OBIETTIVO:

IL BENESSERE DEL PAZIENTE

Fase Domiciliare

CONTATTI PROGRAMMATI

- Verificare Terapia farmacologica ed educazione alla terapia
- Concordare con pz/caregiver la data del contatto telefonico programmato
- Programmare esami strumentali / visite specialistiche di controllo

CONTATTI PROGRAMMATI / OCCASIONALI

- Controllo parametri rilevati/stabilizzazione patologia
- Collaborazione e condivisione obiettivi comuni
- Come prevenire eventi
- Collaborazione con i vari specialisti (medico, nutrizionista, terapista, ecc)
- Rilevare criticità del paziente

IN PRESENZA DI EVENTI/ INSTABILIZZAZIONI

- VALUTARE SEGNI E SINTOMI
- Applicare linee operative
- Accorgimenti stabilizzazione patologia, evitare / gestire riacutizzazioni
- Importanza monitoraggio parametri (PA, FC, SATUR, DIURESI, PESO, ESPETTORATO, ecc)
- Rilevare criticità
- Contattare lo specialista di riferimento/MMG

CONTATTI / COMPILAZIONE DELLE SCHEDE TELEMATICHE

- Rinforzo educazionale
- Chiarimenti eventuali dubbi
- Modifiche/inizio nuova terapia /richiesta esami ematici/strumentali
- Programmazione contatto telefonico / videoconferenza
- VERIFICA APPRENDIMENTO/ADERENZA

La videoconferenza: come ci si approccia al paziente?

- Con l’ascolto (domande aperte)
- Spronando il paziente a scegliere attivamente
- Definendo o ridefinendo gli obiettivi
- Utilizzando strumenti per promuovere l’adesione
- Con l’empatia
- Sostenendo l’autonomia del paziente
- Con rinforzi positivi sui punti deboli dei pazienti (E’ aderente alla terapia? E’ aderente al regime dietetico? Fa attività fisica) **RIEDUCAZIONE SANITARIA**

Educazione sanitaria al paziente:

ADERENZA-ALFABETIZZAZIONE AL REGIME TERAPEUTICO E ALL'ATTIVITA' FISICA

- Consigli sulla terapia farmacologica:
- effetti
- dosi ed orari di somministrazione
- effetti collaterali
- autosomministrazione

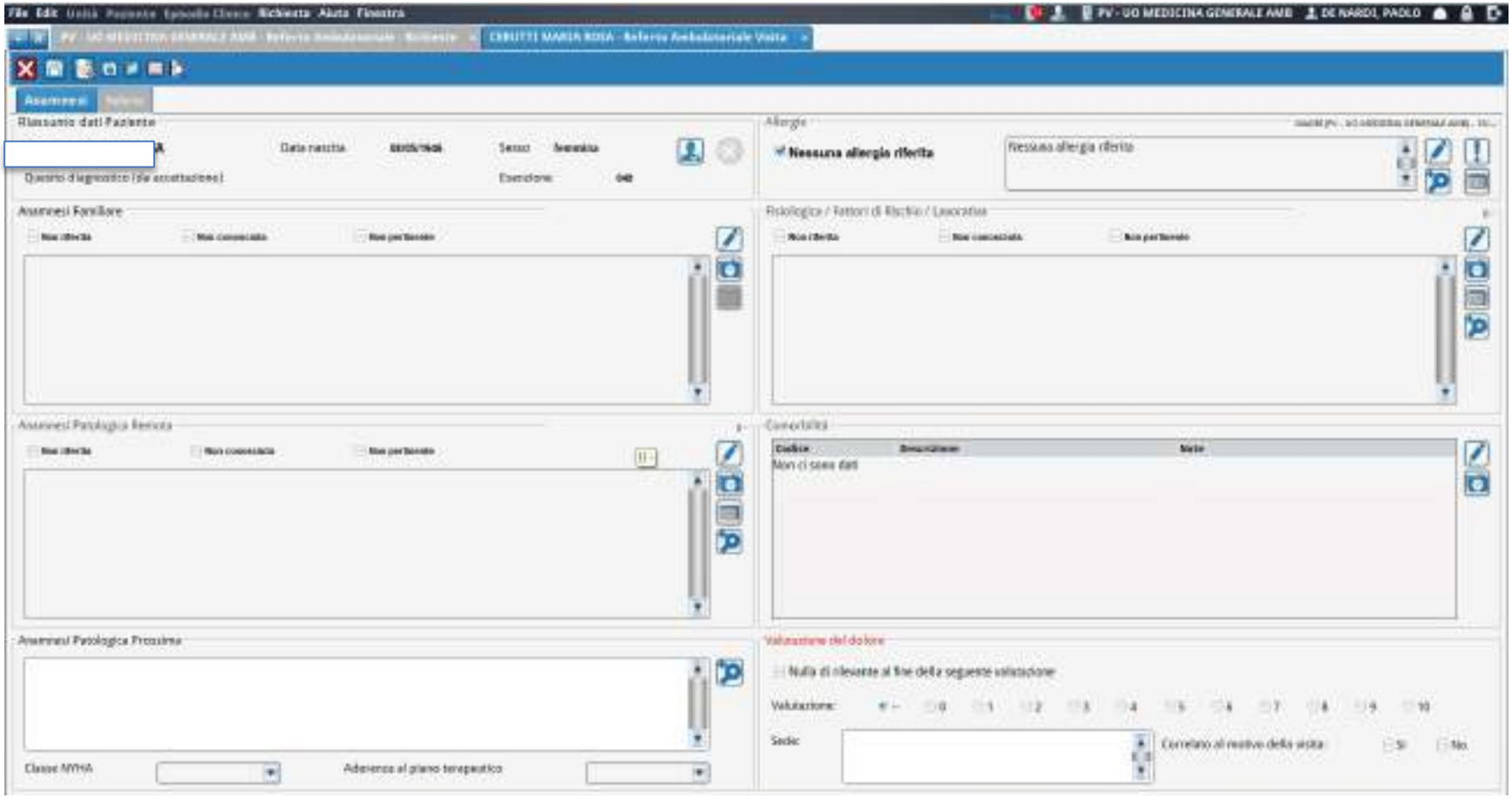
Fase Follow-up

Valutazione finale e visita specialista:

- Verifica nei 6 mesi del percorso
- Esecuzione degli esami strumentali e questionari come da percorso
- Ulteriore rafforzo educazionale al paziente e/o al caregiver, valutazione obiettivi raggiunti e non
- Compilazione database
- Archiviazione documenti

La tecnologia a supporto

Elementi chiave: cartella clinica ospedaliera



Monitoraggio dei parametri vitali a distanza

Piattaforma online per il monitoraggio e l'analisi dei parametri vitali del paziente da parte dei clinici.

App per la gestione dei dati e la comunicazione con i clinici.

Devices portatili che comunicano tramite tecnologia wireless con lo smartphone.

CardioDial contenente una SIM

1. Registrazione del tracciato

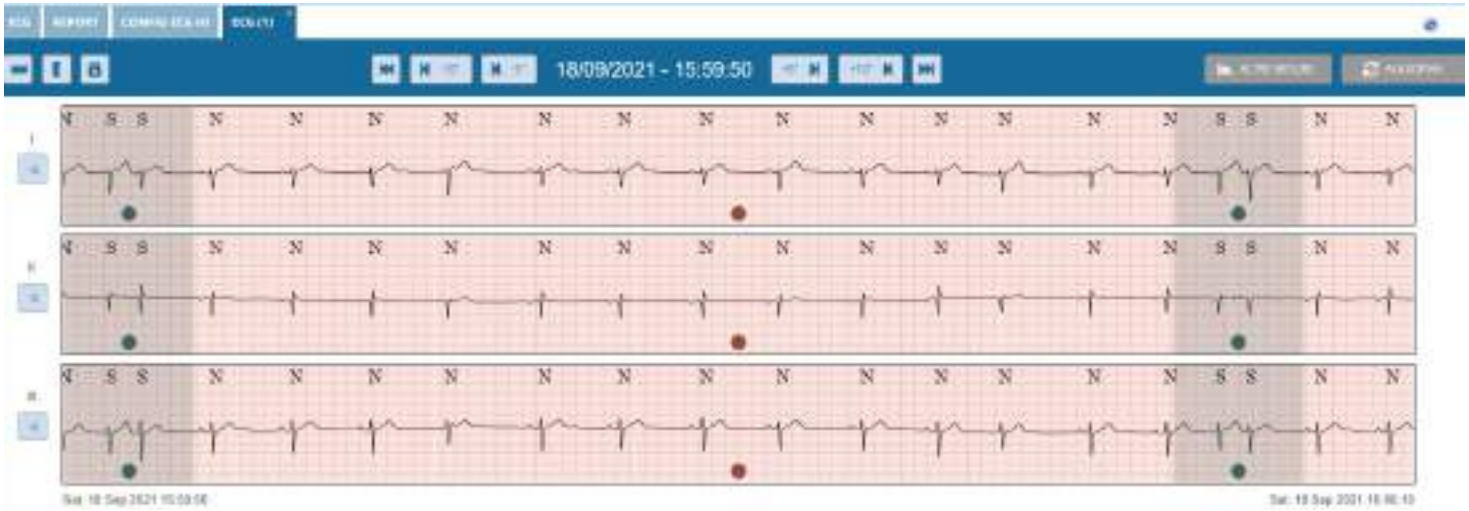
2. Invio del tracciato tramite rete Internet

3. Ricezione del tracciato su piattaforma web

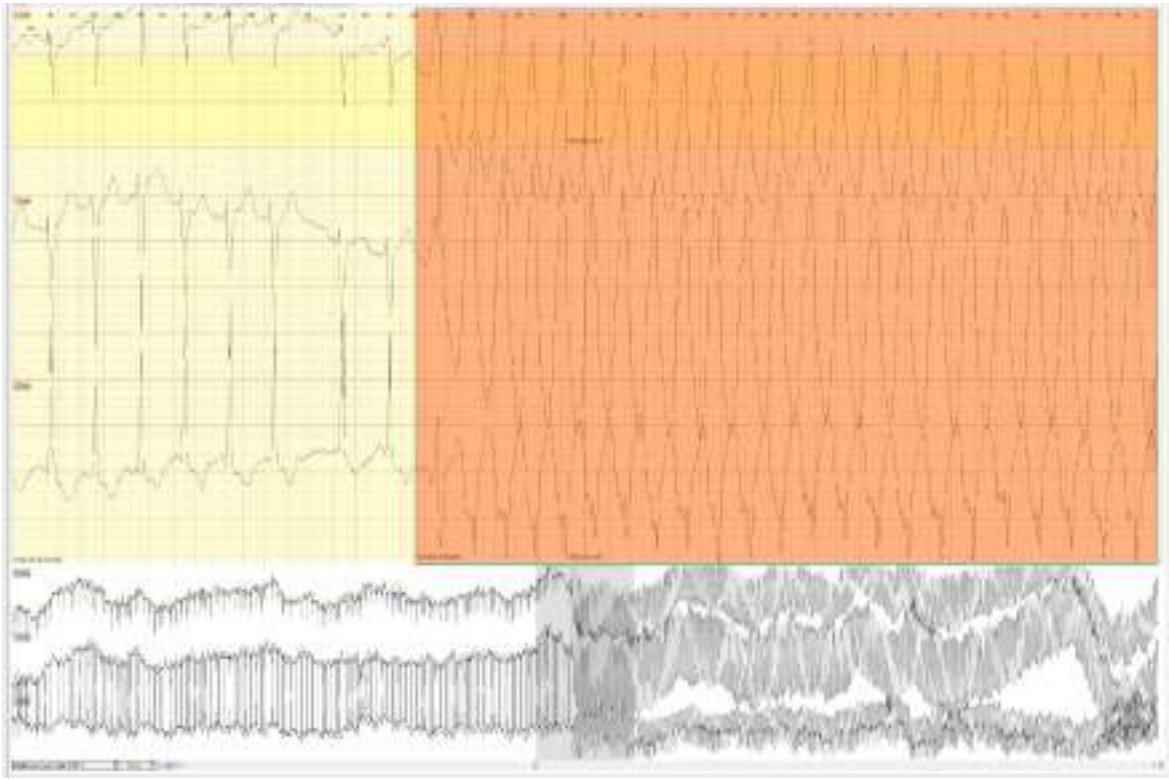
I problemi:

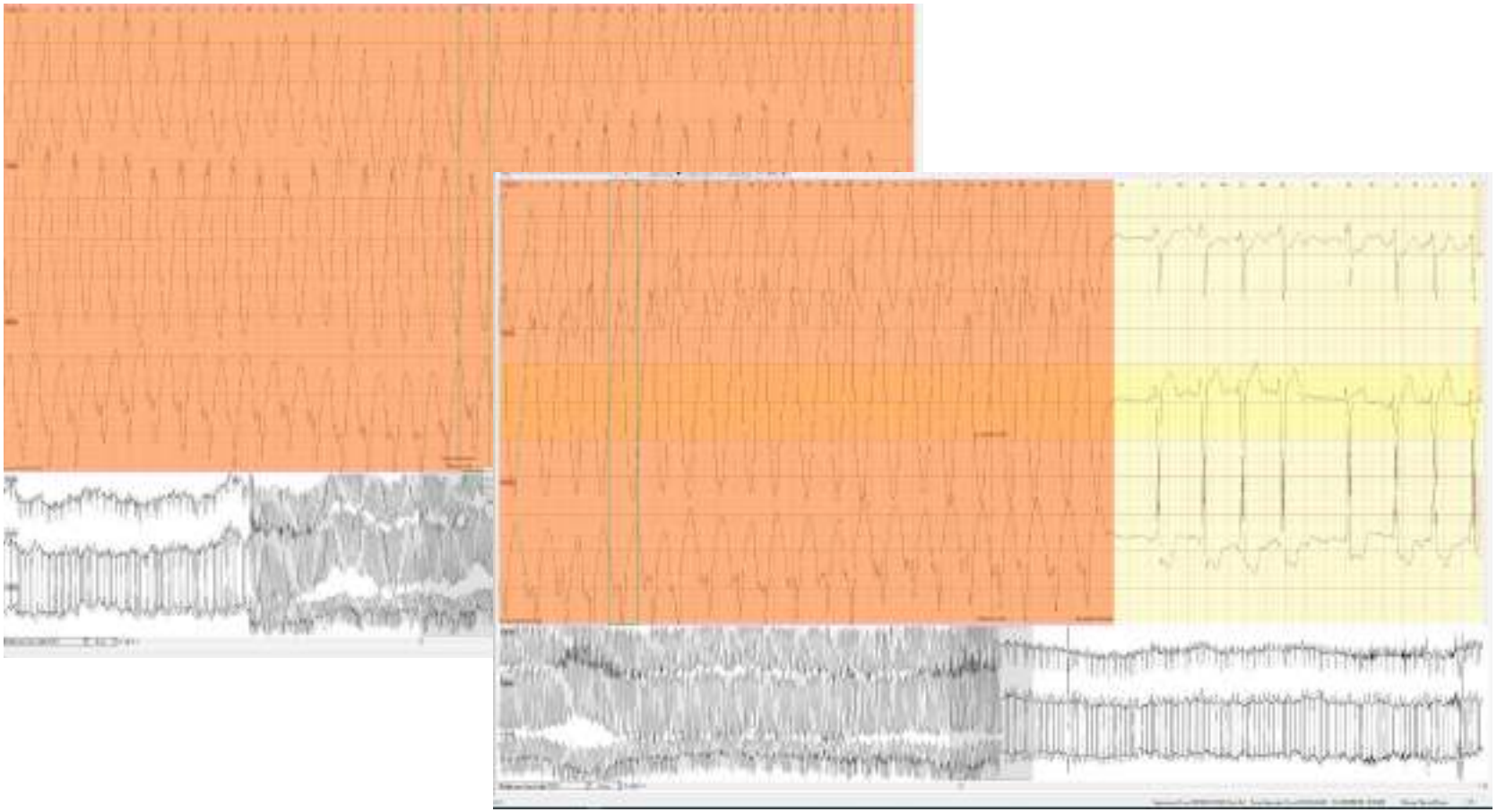
- Rete mobile (è stato necessario utilizzare una SIM in roaming);
- Impossibile da usare durante le attività della vita quotidiana.

ECG portatile Hi (H&S)



- Alla registrazione eseguita il 04/03 durante attività fisica si presenta un tratto (dalle 09:13:30 alle 09:16:26) di **tachicardia a QRS larghi** (TV? Flutter atriale a conduzione aberrante? FC max 205 bpm alle 09:15:55) per cui si contatta paziente che riferisce episodio di astenia e comparsa di scotomi luminosi durante attività fisica per cui si è dovuto fermare per circa 10 min. **Tracciato visionato dalle cardiologhe di riferimento che contattano l'aritmologo che consiglia ricovero per il 08/03/2023 per le cure del caso**.





Fattori di successo

- Non improvvisarsi
- Definire il team multidisciplinare
- Sviluppare un piano di lavoro condiviso con le parti in causa, con obiettivi semplici, misurabili, sostenibili, realizzabili, pianificabili
- Garantire uno stretto coordinamento e continuità tra i professionisti, facilitando la comunicazione.