

Deliverable

D3.1: EURIPHI Health Regions Survey Integrated care

WP	3	Identification and analysis of candidate service delivery issues and defining initial criteria for a value-based assessment applying MEAT value-based procurement framework for person-centred integrated care
Task	3.1	Identification of the initial list of procurement demands

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¹ Dissemination level: **PU**: Public; **CO**: Confidential, only for members of the consortium (including the Commission Services); **EU-RES**: Classified Information: RESTREINT UE (Commission Decision 2005/444/EC); **EU-CON**: Classified Information: CONFIDENTIEL UE (Commission Decision 2005/444/EC); **EU-SEC** Classified Information: SECRET UE (Commission Decision 2005/444/EC)

² Type of the deliverable: **R**: Document, report; **DEM**: Demonstrator, pilot, prototype; **DEC**: Websites, patent fillings, videos, etc.; **OTHER**; **ETHICS**: Ethics requirement; **ORDP**: Open Research Data Pilot

³ Creation, modification, final version for evaluation, revised version following evaluation, final

Deliverable abstract

Deliverable D3.1 reports on work undertaken in WP3 up to M8. The ultimate goal of WP3 is to gain insights and organise the demand side around a small set of Procurement Objectives to address the identified integrated care service delivery issues and to assist Euriphi care delivery organisations and Public Procurement Organisations in the related procurement processes which will start with an Open Market Consultation (OMC).

WP3 focuses on 5 topics that are specifically relevant for integrated care service innovation and that have been chosen during the proposal phase already:

- Stroke
- Dementia
- COPD
- Multimorbidity
- Aortic Stenosis

Work included a systematic analysis of delivery shortcomings and their translation into “Integrated care Procurement Objectives” (ICPOs) as presented in Chapter 3 of this document. This was followed by a survey addressed to collect feedback from the procurement and care delivery organisations involved in Euriphi to understand their priorities in relation to the identified initial procurement objectives. Results revealed a reduction of the initial long list of 36 ICPOs to a shorter list of 13 ICPOs that again were subject to a survey addressed to regions, PPOs and care delivery organisations across Europe. Results from the second survey and consultation with the Euriphi Advisory Board will reveal 3-4 ICPOs that will inform the OMC in October 2019 and will later in the project be used to apply the MEAT value-based procurement methodology to future innovative solution PPIs.

Deliverable Review

Reviewer #1: Yves Verboven			Reviewer #2: Cristina Macovei		
Answer	Comments	Type*	Answer	Comments	Type*
Is the deliverable in accordance with					
the Description of Action?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> M <input type="checkbox"/> m <input type="checkbox"/> a	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> M <input type="checkbox"/> m <input type="checkbox"/> a
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Is the quality of the deliverable in a status					
that allows it to be sent to European Commission?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> M <input type="checkbox"/> m <input type="checkbox"/> a	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> M <input type="checkbox"/> m <input type="checkbox"/> a
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* Type of comments: M = Major comment; m = minor comment; a = advice

1. Introduction and overall WP3 approach

The aim of WP3 in Euriphi is to undertake a series of activities to gain insights and organise the demand side around a small set of Integrated Care Procurement Objectives (ICPO) that address existing care delivery shortcomings. WP3 will assist the care delivery organisations and Public Procurement Organisations (PPOs) in the related procurement processes which will start with an Open Market Consultation (OMC) in October 2019.

Work commenced with a systematic desk-top research analysis with the aim to identify existing care delivery shortcomings across care delivery pathways for the following topics:

- Stroke
- Dementia
- COPD
- Multimorbidity
- Aortic Stenosis

Care delivery shortcomings were then analysed and translated into Integrated Care Procurement Objectives. Altogether, more than 35 Integrated Care Procurement Objectives were elicited and defined. Each ICPO is not a technical specification (as this will be developed at a later stage in the project) but describes what an innovative solution would need to deliver in order to address one or more care delivery shortcoming(s).

This was followed by an online survey (LimeSurvey) designed to elicit feedback from the PPOs and care delivery organisations involved in Euriphi:

- to understand their priorities in relation to the some of the identified procurement objectives,
- to identify if a PPO and/or care delivery organisation had already implemented an innovative solution to address one of the ICPOs elicited from the desk-top research exercise, and
- to gather any additional potential procurement objectives, we have not identified, and which may be a priority for their organisation on the existing topics or other integrated care topics.

A background document was prepared to provide information on the overall project's objectives, together with the specific objectives and activities of WP3 on Integrated Care. The survey was divided into a series of questions relating to each of the 5 topics, namely Stroke, Dementia, COPD, Multimorbidity and Aortic Stenosis. The questions required the respondents to rate on a scale of 1-5 each ICPO in relation to their organisation's priority for future procurement activity/ investment as well as provide information on any existing innovative solutions which they had already implemented to address an ICPO.

Survey results revealed a reduction of the initial long list of ICPOs to a shorter list of 13 priority ICPOs. These again were subject to a survey addressed to regions, PPOs and care delivery organisations across Europe in order to collect a broader view on demands for innovative solutions in the area of integrated care across Europe. Survey results are currently analysed and will, together with the results of a consultation with the Euriphi Advisory Board, inform the selection of 3-4 ICPOS that will in turn inform the Open Market Consultation in October 2019 and will later in the project be used to apply the MEAT value-based procurement. The OMC will reveal whether the defined procurement objectives can be addressed by a product or solution readily on the market (available at scale) or whether there needs to be a push from the demand side.

The overall WP3 approach and its relation to other work packages in Euriphi is summarised in Figure 1 overleaf. D3.1 reports activities and results for T3.1 and concludes with the shortlist of 13 Integrated Care Procurement Objectives that will be described in detail and published in an open online platform with the framework of T3.2.

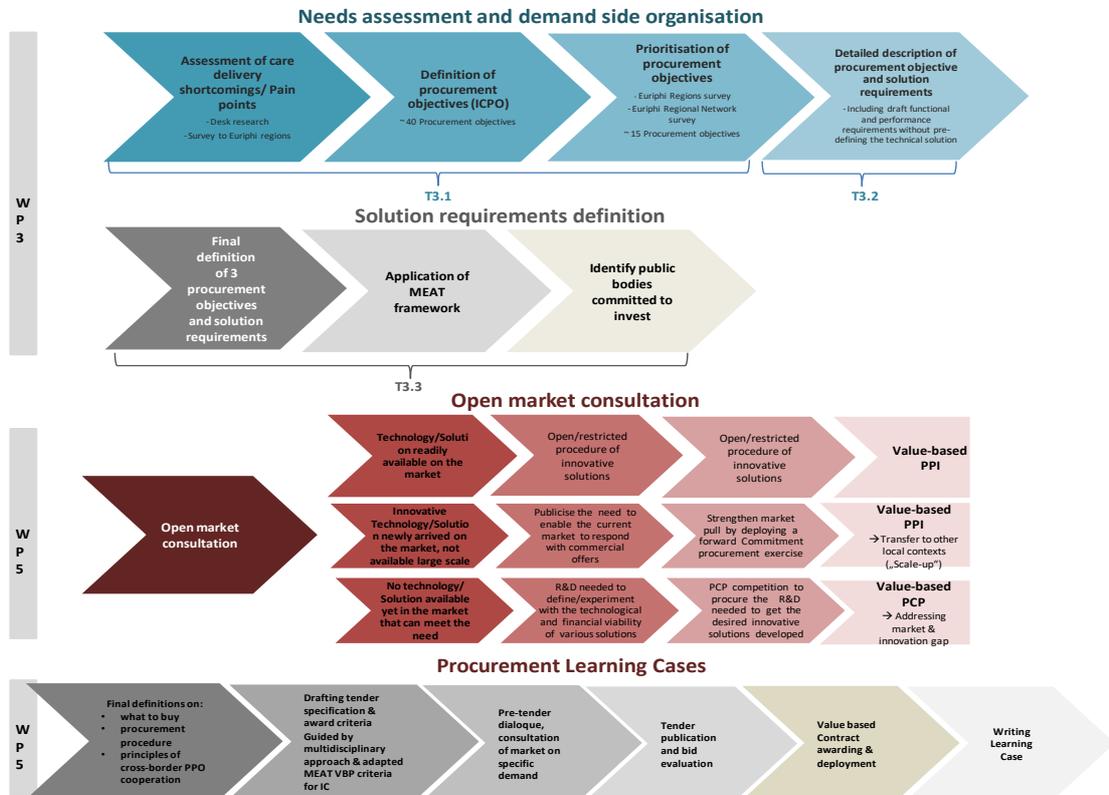


Figure 1. Overall WP3 approach and relation to other WPs

Once the Open Market Consultation has taken place, the Adapted VBP framework for Integrated Care will be applied within the framework of WP5. For all identified areas of PPI, a test case learning will be conducted running the full cross-border procurement process resulting not in a purchase but a learning report as input to finalize cross-border procurement guidance and the MEAT Value based PPI.

2. Analysis of care delivery shortcomings and definition of initial list of procurement objectives

Care delivery shortcomings and procurement objective definition for Stroke

Overview

Stroke is a complicated, heterogeneous condition with acute onset but complex and enduring treatment and follow-up. Consequently, stroke care is complex and covers a whole spectrum of care including acute care, rehabilitation and long-term care with in-hospital, outpatient and community-based care. Stroke care is thus per definition multidisciplinary and the integration of care is of particular concern⁴.

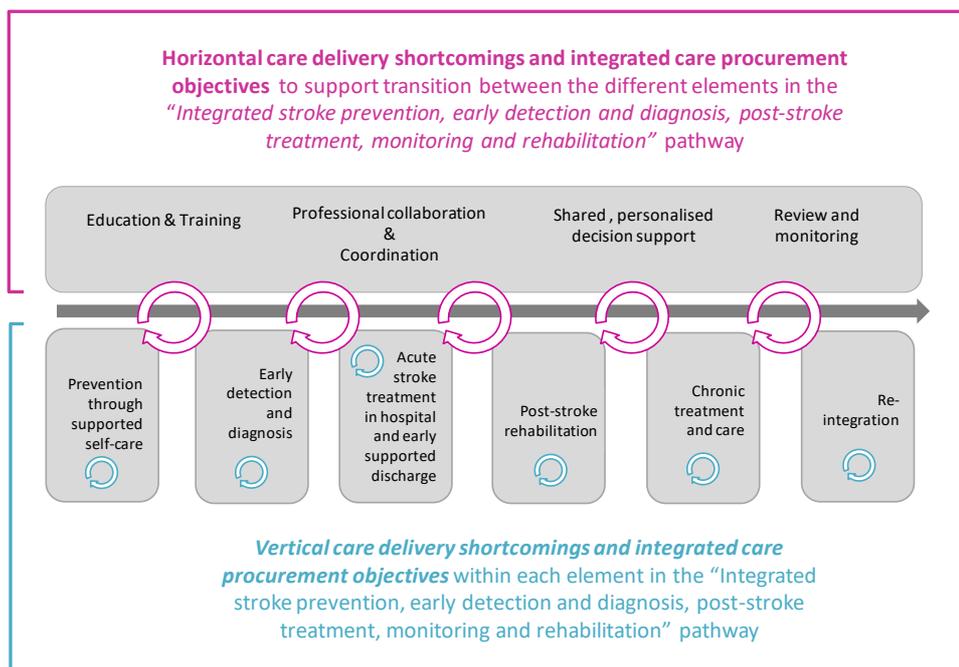


Figure 2. Integrated care pathway for stroke

Prevention through supported self-care

Rationale

Prevention is a key topic and many traditional risk factors for stroke are well researched by now although investigation of novel or emerging risk factors as well as the modifications in risk factors for the general population remains areas of active research⁵. A multitude of epidemiologic studies have identified numerous individual factors of stroke such as hypertension (being the most important modifiable risk factor for stroke), cigarette smoking, diabetes, atrial fibrillation and carotid stenosis⁶, many of them being interrelated. Many people with diabetes for example also have high blood pressure, high blood cholesterol and are overweight — increasing their risk even more. Diets high in saturated fat, trans fat and cholesterol can raise blood cholesterol levels. Diets high in sodium (salt) can increase blood pressure. Diets with high calories can lead to obesity⁷⁸. Investing in stroke prevention

⁴ Int J Integr Care. 2012 Oct-Dec; 12: e193. Economic evidence on integrated care for stroke patients; a systematic review. Johanneke F.M.M Tummers, Augustinus J.P Schrijvers, Johanna M.A Visser-Meily

⁵ Boehme, A. et al. (2017). Stroke Risk Factors, Genetics, and Prevention. Circ Res. 2017 Feb 3; 120(3): 472–495.

⁶ Goldstein, L. B. et al. Guidelines for the Primary Prevention of Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. Stroke 42, 517–584 (2011).

⁷ <https://www.strokeassociation.org/en/about-stroke/stroke-risk-factors/stroke-risk-factors-you-can-control-treat-and-improve>

⁸ Boehme, A. et al. (2017). Stroke Risk Factors, Genetics, and Prevention. Circ Res. 2017 Feb 3; 120(3): 472–495.

through diet or behavioural changes is thus crucial to public health⁹. Studies show that there is a causal link between chronically high salt consumption and increased blood pressure, including hypertension. Diet changes thus may influence stroke development through multiple mechanisms, including effects on blood pressure, blood lipids, thrombosis and coagulation, oxidative stress, systemic inflammation, endothelial function, glucose and insulin homeostasis, gut microbiome, and body weight¹⁰. However, research results are controversial as other studies suggest that for example higher cholesterol intake has no association with the overall stroke risk. Age and body mass index affect the relationship between dietary cholesterol intake and stroke risk¹¹. However, the association between higher dietary cholesterol and stroke risk in males remains unclear. Of the dietary approaches for stroke prevention, available evidence from prospective studies suggests that a diet rich in fruit and vegetables and reduced in sodium and processed (sodium-preserved) meats may reduce the risk of stroke¹². However, also in this regard there is still some uncertainty regarding the effects of a Mediterranean-style diet on clinical endpoints and CVD risk factors for both primary and secondary prevention. The quality of evidence for the modest benefits on CVD risk factors in primary prevention is low or moderate, with a small number of studies reporting minimal harms. There is a paucity of evidence for secondary prevention. The ongoing studies may provide more certainty in the future¹³.

Another major modifiable risk factor is physical inactivity that is associated with many poor health effects, including stroke. People who are physically active have a lower risk of stroke and stroke mortality than those who are inactive^{14 15}.

It is decisive to involve the patient as early as possible in any early prevention strategies as lifestyle changes are recognised to be the best approach in stroke prevention and risk management¹⁶. Prevention begins with making the public aware of stroke risk factors and providing information about how they can positively influence their individual (modifiable) risks. Apart from adopting a healthy lifestyle, regular control of blood pressure and controlling diabetes are important prevention strategies. How to get individuals to change their behaviour and lifestyle have multiple theories and are very complex. There is a current and profound discussion among social epidemiologists about how to address all this complexity and how much influence social determinants have (thus, most of the responsibility and opportunity would not even lie on individuals but in society).

People who have had a stroke or a TIA are at increased risk of future stroke, especially in the first few months following a TIA or a stroke^{17 18}. Research shows that patients who suffer a recurrent stroke have poorer outcomes than those who suffer a first stroke^{19 20}. The risk for a recurrent stroke is six times greater than the first stroke, indicating the importance of secondary stroke prevention²¹ and timely secondary prevention has proven to be effective in reducing recurrent stroke in patients with stroke or a TIA²².

Demand side

Currently, stroke poses a tremendous medical and socio-economic burden in Europe. Approximately 900,000 Europeans suffer an ischemic stroke each year²³. About 25% of men and 20% of women can expect to suffer a stroke if they live to be 85 years old⁵. Five percent of all stroke patients die within

⁹ Larsson, S. et al. Dietary Approaches for Stroke Prevention. *Stroke*. 2017;48:2905-2911.

¹⁰ Larsson, S. et al. Dietary Approaches for Stroke Prevention. *Stroke*. 2017;48:2905-2911.

¹¹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5986647/> Dietary cholesterol intake and stroke risk: a meta-analysis 2018)

¹² Larsson, S. et al. Dietary Approaches for Stroke Prevention. *Stroke*. 2017;48:2905-2911.

¹³ https://www.cochrane.org/CD009825/VASC_mediterranean-style-diet-prevention-cardiovascular-disease (2019)

¹⁴ Boehme, A. et al. (2017). Stroke Risk Factors, Genetics, and Prevention. *Circ Res*. 2017 Feb 3; 120(3): 472-495.

¹⁵ Zhou ML, Zhu L, Wang J, Hang CH, Shi JX. The inflammation in the gut after experimental subarachnoid hemorrhage. *J Surg Res*. 2007;137:103-108. doi: 10.1016/j.jss.2006.06.023.

Roger VL, Go AS, Lloyd-Jones DM, et al; American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Executive summary: heart disease and stroke statistics—2012 update: a report from the American Heart Association. *Circulation*. 2012;125:188-197. doi: 10.1161/CIR.0b013e3182456d46.

¹⁷ Warlow C, Sudlow C, Dennis M, et al. *Stroke*. 2003;36:1211-24.

¹⁸ Rothwell PM, Giles MF, Chandratheva A, et al. Effect of urgent treatment of transient ischaemic attack and minor stroke on early recurrent stroke (EXPRESS study): a prospective population-based sequential comparison. *Lancet* 2007;370:1432-42.

¹⁹ RUPAL OZA, MD; KRISTEN RUNDELL, MD; and MIRIAM GARCELLANO. Recurrent Ischemic Stroke: Strategies for Prevention

²⁰ Yi-Long Wang et al. Recurrent Stroke was Associated with Poor Quality of Life in Patients with Transient Ischemic Attack or Minor Stroke: Finding from the CHANCE Trial

²¹ Burn, J. et al. Long-term risk of recurrent stroke after a first-ever stroke. The Oxfordshire Community Stroke Project. *Stroke*. 1994 Feb;25(2):333-7.

²² van Bussel EF. The process flow and structure of an integrated stroke strategy. *Int J Integr Care*. 2013 Apr-Jun; 13: e025

²³ Béjot, Y., Bailly, H., Durier, J. & Giroud, M. Epidemiology of stroke in Europe and trends for the 21st century. *Presse Médicale* 45, e391-e398 (2016).

the first week²⁴. The overall mortality of stroke is up to 30%²⁵ making stroke a leading cause of death in developed countries. Moreover, up to half of the patients remain permanently disabled²⁶. Currently more than 6 million Europeans live with the effects of stroke²⁷. This leads to enormous costs for treatment and rehabilitation amounting to €38 billion each year in Europe²⁸. In extrapolation, by 2025 more than 1.5 million strokes are expected to occur in Europe each year, increasingly targeting younger people²⁹.

A key issue for prevention is how to inform society about effective prevention strategies and to best reach people at risk, especially in areas with low levels of health literacy. People with little education, low social status, foreigners and those with low health literacy are less likely to have knowledge about prevention strategies, symptoms, tend to see their doctor less often for prevention reasons and are less likely to be reached by traditional media prevention campaigns.

Care delivery shortcomings/ "Pain points"

Existing tools are too simple, not personalised and lack integration: Current approaches to nutrition and supplementation are often based on single advice without lasting support. Current tools mainly focus on diet, take a quite simple approach, do not sufficiently personalise according to patient characteristics and lack the support required to be successfully adopted by the majority of those at risk / patients. Available approaches seem not to have considered that some goals are easier to achieve than others and that some goals need to be prioritised over others. Such nutritional support is mainly stand-alone and not yet, as it should be, well integrated with day-to-day activities. Many studies also only report results for all strokes combined and there are limited data on diet in relation to different types of a stroke³⁰. Where physical activity is addressed, this is mainly in isolation from diet. Most activity trackers also lack the accuracy necessary for medical decision making and lack integration functionalities towards EHRs or medical records.

Socio-economic disparities exist: Across Europe primary and secondary prevention strategies are not working well enough to control hypertension that is one of the main controllable risk factors for a stroke³¹. Existing racial disparities in stroke incidence highlight the importance of stroke prevention interventions aimed at minority groups³². Current efforts to reach patients with risk factors for stroke depend on public awareness campaigns and the action of GPs. In some countries like Sweden, pharmacies offer for example "drop-in" hypertension measurements. In the first case, effects will only result if patients themselves are able to recognise whether they may be at risk. In the case of GP and/or pharmacy interaction, a GP can use specific knowledge of hypertension risk factors to advise - and warn - a patient.

Lack of bi-directional connectivity of devices: Connectivity is another issue with most products on the market. If connectivity is available it is unidirectional, only supporting transferring values out of the device. Any input, including adaptation to therapy parameters, therefore needs to be manually set. There are innovative, medical grade devices, but these tend to be costly and therefore only suited to research use rather than widespread adoption.

No real harnessing of ICT and technology features in health promotion: ICT „tools“ today do not take real advantage of ICT but print information (perhaps in PDF) for clinicians and patients. Online tools we have found are limited to a single language domain, and not integrated even with health records.

Putting the scope of responsibility only in individuals to change their behaviour is futile, as social determinants and social aspects affect individual's capacity to change their behaviour.

²⁴ Koennecke, H.-C. et al. Factors influencing in-hospital mortality and morbidity in patients treated on a stroke unit. *Neurology* 77, 965–972 (2011).

²⁵ see footnote 1

²⁶ Hankey, G. J. Long-Term Outcome after Ischaemic Stroke/Transient Ischaemic Attack. *Cerebrovasc. Dis.* 16, 14–19 (2003).

²⁷ Truelsen, T., Ekman, M. & Boysen, G. Cost of stroke in Europe. *Eur. J. Neurol.* 12, 78–84 (2005).

²⁸ Nichols, M., Townsend, N., Scarborough, P. & Rayner, M. European cardiovascular disease statistics. (2012).

²⁹ see footnote 1

³⁰ Larsson, S. et al. Dietary Approaches for Stroke Prevention. *Stroke.* 2017;48:2905-2911.

³¹ "The burden of stroke in Europe." Report by King's College London for the Stroke Alliance for Europe (SAFE). ISBN 978-1-5272-0858-2

³² Howard G, Moy CS, Howard VJ, McClure LA, Kleindorfer DO, Kissela BM, Judd SE, Unverzagt FW, Soliman EZ, Safford MM, Cushman M, Flaherty ML, Wadley VG; REGARDS Investigators*. Where to focus efforts to reduce the black-white disparity in stroke mortality: incidence versus case fatality? *Stroke.* 2016;47:1893–1898. doi: 10.1161/STROKEAHA.115.012631.

Early detection and diagnosis

Rationale

Estimating stroke risk based on an individual's particular combination of risk factors, particularly for a first stroke event, is an important component of primary care³³ and patients indicate a preference for knowing their stroke risk³⁴, although they are not often aware of their particular needs.

Functional outcome is highly time-dependent, making fast diagnosis and treatment initiation³⁵. It's also critical to diagnose a stroke in progress because the treatment for stroke depends on the type of stroke, and, in some cases, the location of the injury to the brain³⁶. Other conditions with similar symptoms to stroke and transient ischemic attack (TIA) will need to be ruled out to diagnose stroke³⁷.

The experience of a Transient Ischemic Attack (TIA) has to be regarded as a wake-up call as about 15% of major strokes are preceded by a TIA³⁸.

Early detection is of great importance as patients are not aware of their own needs and do not usually express demand.

Demand side

Early detection of patients at risk of developing a stroke is a particular challenge for public health policies. Because patients are not aware of their own needs and do not usually express demand, market forces do not apply and the provision of early detection services is a classic case of market failure. Early detection is an extremely valuable intervention to pursue.

However, many risk factors are currently undertreated in the population. Likely, this can be attributed to the lack of personalized treatment incentives. In Europe today, although there are some screening programs being run to detect hypertension as one modifiable stroke risk factor, most cases of for example hypertension are detected late, as a side effect of other action: the patient's blood pressure is measured not to detect hypertension but for other reasons, a process sometimes referred to as opportunistic screening. To avert the risks of hypertension and thus a stroke, it is important to reach those with elevated blood pressure earlier than today, so that treatment is initiated in a timely fashion and the incidence of complications reduced. Apart from screening for high BP, early detection can be a welcome additional outcome of risk assessment aimed at prevention of hypertension.

The problems of late detection are greatest in areas with a low density of doctors, where patients tend to have much less frequent contact with their GP or with the healthcare system generally.

Care delivery shortcomings/"Paint points"

Risk assessment online tools we have found are limited to a single language domain, and not integrated even with local health records or professional platforms and records. A survey of the state of the art in the market showed the use of pull media only and no interface with health systems either to draw risk parameters or to deliver assessment results back into the relevant systems.

The operation of current risk assessment models is imperfect: The ASCVD risk assessment for example was found to overestimate hypertension risk in adults, both for those without diabetes overall, and across socio-demographic subgroups³⁹. Another tool, SCORE⁴⁰, can be used by health professionals to assess their patients, but it is not integrated into their own systems and relies on manual entry of patient parameters by the health professional. Further to this, these tools in most cases "tend to use 'snap-shot' measurements of risk factors taken at the time of assessment – such as cholesterol levels and blood pressure – to predict the patient's overall risk of cardiovascular disease. They do not account for a patient's medical history and how their risk factors have changed over time, nor do they differentiate the risk by specific heart and circulatory diseases, such as heart attacks, strokes, heart

³³ Amelia K. Boehme, Charles Ezenwa, Mitchell S.V. Elkind, Stroke Risk Factors, Genetics, and Prevention, Circulation Research Compendium on Stroke.

³⁴ Powers BJ, Danus S, Grubber JM, Olsen MK, Oddone EZ, Bosworth HB. The effectiveness of personalized coronary heart disease and stroke risk communication. Am Heart J. 2011;161:673–680. doi: 10.1016/j.ahj.2010.12.021.

³⁵ Zerna, C., Jeerakathil, T. and M. Hill. Telehealth for Remote Stroke Management. Canadian Journal of Cardiology. Volume 34, Issue 7, p. 889- 896. 2018.

³⁶ Florida Hospital Neuroscience Institute. Stroke Guidebook.

³⁷ <https://www.cooperhealth.org/services/stroke-program/stroke-diagnosis>

³⁸ Florida Hospital Neuroscience Institute. Stroke Guidebook.

³⁹ Rana, Jamal S. et al. "Accuracy of the Atherosclerotic Cardiovascular Risk Equation in a Large Contemporary, Multiethnic Real-World Population." Journal of the American College of Cardiology 67.18 (2016): 2118–2130. PMC. Web. 1 Oct. 2018.

⁴⁰ <https://www.escardio.org/Education/Practice-Tools/CVD-prevention-toolbox/SCORE-Risk-Charts>

failure or abnormal heart rhythms.”⁴¹ Another shortcoming of such score assessments is that they measure a 5 or 10 year risk for patients and thus under-estimate the life-time risk for younger patients, who are increasingly affected by a stroke⁴².

Lack of personalized treatment incentives: Former epidemiologic studies have identified major overarching causes of stroke such as hypertension, cigarette smoking, diabetes, dyslipidemia, atrial fibrillation and carotid stenosis⁴³. While general recommendations can be given to patients to treat these conditions, it is currently unknown how a given patient is individually affected by these risk factors. Importantly, most of the risk factors are currently undertreated in the population. Likely, this can be attributed to the lack of personalized treatment incentives.

Lack of knowledge of stroke triggers: Much is known about long-term stroke risk factors, less however about short-term risk factors, or triggers, for stroke⁴⁴.

Patients are often not reached early enough: Elevated blood pressure (BP, HBP) and some of the other stroke risk factors are often without symptoms. As a consequence, many people suffer from hypertension without being aware of it, and their condition is not treated and thus they are at risk to develop a stroke. To avert the risks of hypertension, it is important to reach those with elevated blood pressure earlier than today, so that treatment is initiated in a timely fashion and the incidence of complications reduced. Treatment of hypertension, whether through medication or lifestyle changes, remains one of the most effective strategies in reducing stroke risk, but hypertension remains undertreated in the community⁴⁵.

Acute stroke treatment in hospital and early supported discharge

Rationale

Treatment depends on the kind of stroke and the timing. For ischemic strokes, the clot-dissolving drug called tissue plasminogen activator (tPA) to treat stroke can stop a stroke in progress and reduce disability from stroke by breaking up a blood clot that might be stopping the flow of blood to the brain. However, it must be given within 3 to 4.5 hours after symptoms start. The sooner tPA is given, the greater the possibility of a better outcome after stroke. Early detection by the patients themselves is thus crucial. For hemorrhagic stroke, medication is used to control high blood pressure. Other medicine may be given to reduce the brain swelling that follows a stroke. Surgery may be needed depending on the cause and type of the hemorrhage.

There have been advances in the therapy of ischemic stroke in the past decades. Overall therapy success, however, is still poor. For ischemic stroke, the most favourable current treatment paradigm is the time-based dissolution of the obstructing blood clot by a drug. Unfortunately, up to 20% of patients arrive with an unknown time from stroke onset, and most patients present too late in the hospital to receive treatment. Thus, only about 10% patients can receive the state-of-the-art treatment. Lastly, of these 10% only about one in 10 can expect to have a successful dissolution of the blood clot.

Latest studies show that mechanical removal of the blood clot (mechanical thrombectomy) leads to much better outcome. Only about 1% of patients, however, are eligible for this treatment under current paradigms. In contrast to thromboembolic stroke, treatment options for hemodynamic stroke are less validated. Surgical intervention methods have been established such as thromboendarterectomy, stenting, and bypass procedures . However, the optimal treatment strategy for an individual patient remains unknown. Additionally, what challenges the treatment of stroke patients is that the causes are highly heterogeneous. Thus, each patient suffering a stroke is an individual representation of the disease entity stroke.

Once a patient has had a stroke, they are at risk of having another. After the medical team identifies what caused the stroke, they may prescribe treatments to reduce the risk of a reoccurrence: Antiplatelet agents such as aspirin and anticoagulants, treatment or previously undiagnosed conditions such as high blood pressure, diabetes, atrial fibrillation (a heart rhythm disorder), or other

⁴¹ <https://www.bhf.org.uk/what-we-do/news-from-the-bhf/news-archive/2019/january/ai-set-to-decode-heart-attack-and-stroke-risk>

⁴² Béjot, Y., Bailly, H., Durier, J. & Giroud, M. Epidemiology of stroke in Europe and trends for the 21st century. *Presse Médicale* 45, e391–e398 (2016).

⁴³ Goldstein, L. B. et al. Guidelines for the Primary Prevention of Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke* 42, 517–584 (2011).

⁴⁴ Elkind MS. Why now? Moving from stroke risk factors to stroke triggers. *Curr Opin Neurol.* 2007;20:51–57. doi: 10.1097/WCO. 0b013e328012da75.

⁴⁵ Boehme, A. et al. (2017). Stroke Risk Factors, Genetics, and Prevention. *Circ Res.* 2017 Feb 3; 120(3): 472–495.

vascular disease as well as surgical interventions . Adherence to medication is critical to recovery and recurrent stroke prevention.

Demand side

With the possible exception of some very mild strokes and transient ischaemic attacks, patients will be admitted to hospital after a stroke. “Once admitted to an Acute Stroke Unit or a Stroke Specialist Ward they will receive an evidence-based, protocol-driven package of care which has many aspects that are not contingent on the severity of the index event nor on the health status of the patient.⁴⁶”

During the phase of optimising treatment, timely follow-up is crucial for determining the success of a given treatment.

As a Cochrane review⁴⁷ revealed, stroke patients who receive organised inpatient care in a stroke unit are more likely to be alive, independent, and living at home one year after the stroke. The benefits were most apparent in units based in a discrete ward. No systematic increase was observed in the length of inpatient stay.

As regards early supported discharge (ESD), another Cochrane review concluded: “Appropriately resourced ESD services with co-ordinated multidisciplinary team input provided for a selected group of stroke patients can reduce long-term dependency and admission to institutional care as well as reducing the length of hospital stay. Results are inconclusive for services without co-ordinated multidisciplinary team input. We observed no adverse impact on the mood or subjective health status of patients or carers, nor on readmission to hospital.⁴⁸”

Care delivery shortcomings/“Paint points”

Current treatment paradigms do not consider individual differences. This supports the assumption that stroke care could be significantly improved by more personalized risk calculation and individualized therapeutic recommendations. Data sharing and infrastructure needs must be addressed, such as integrating highly heterogeneous multi-scale data sources, integrating omics data into clinical care⁴⁹ or integrating imaging data⁵⁰. There also rarely seems to be no real-time tracking of EMS or prior transmission of patient data.

Treatment of acute ischemic strokes is highly time-dependant: Thus, lead-time reduction for treatment is critical⁵¹. Many patients present too late in the hospital to receive treatment⁵².

Lack of semantic interoperability is still a significant barrier to re-use of data from diverse sources: There is a current lack of implemented standards for clinical and research data. This is ranging from lack of specifications of what data should be collected in what situation to how that data should be technically represented and communicated securely across organizational and national borders⁵³.

Lack of collaboration and supporting tools hinders health and social care professionals from obtaining a holistic view of the patient care process. Poor patient participation and insufficient interaction between health and social care providers and patients confirm the need for tools to improve teamwork and to meet patients and informal caregivers’ information and communication needs⁵⁴.

Deficits in communication and collaboration during the discharge planning process are common⁵⁵. One big area of concern to patients and carers is the organisation of discharge from hospital as the move from being cared for in hospital by a team of professionals, to being at home and the responsibility of themselves and their carers⁵⁶.

⁴⁶ K. M. Hill, A. O. House, J. Hewison. Continuity of care in stroke and its relation to outcomes. 2008.

⁴⁷ Organised inpatient (stroke unit) care for stroke. Stroke Unit Trialists’ Collaboration. Cochrane Database Syst Rev. 2007 Oct 17; (4):CD000197.

⁴⁸ Langhorne P, Baylan S, Early Supported Discharge Trialists. Early supported discharge services for people with acute stroke. Cochrane Database of Systematic Reviews 2017, Issue 7. Art. No.: CD000443. DOI: 10.1002/14651858.CD000443.pub4.

⁴⁹ Dzau, V. J. & Ginsburg, G. S. Realizing the Full Potential of Precision Medicine in Health and Health Care. JAMA 316, 1659–1660 (2016). Associated with document Ref. Ares(2018)1483007 - 18/03/2018

⁵⁰ Hinman, J. D. et al. Principles of precision medicine in stroke. J Neurol Neurosurg Psychiatry 88, 54–61 (2017).

⁵¹ The development of visual task management ICT system for acute stroke care. S. Matsumoto et al. Journal of the Neurological Sciences, October 15, 2017 Volume 381, Supplement, Page 619

⁵² Florida Hospital Neuroscience Institute. Stroke Guidebook.

⁵³ Richesson, R. L., Horvath, M. M. & Rusincovitch, S. A. Clinical Research Informatics and Electronic Health Record Data. Yearb. Med. Inform. 9, 215–223 (2014).

⁵⁴ Supporting self-care and collaboration in stroke care through information and communication technology by Nadia Davoody, Sabine Koch, Maria Hägglund and Ingvar Krakau, 2019

Armor BL, Wight Aj, Carter S. Evaluation of Adverse Drug Events and Medication Discrepancies in Transitions of Care Between Hospital Discharge and Primary Care Follow-Up. Journal of Pharmacy Practice. 2016;29(2):132-137.

⁵⁶ Langhorne P, Baylan S, Early Supported Discharge Trialists. Early supported discharge services for people with acute stroke. Cochrane Database of Systematic Reviews 2017, Issue 7. Art. No.: CD000443. DOI: 10.1002/14651858.CD000443.pub4.

Post-stroke rehabilitation

Rationale

Stroke is a leading cause of long-term disability whose effects may be prolonged with physical, emotional, social, and financial consequences not only for those affected by the stroke but also for their family and friends. The burden of stroke is considerable at a population, societal, and individual level. Long-term recovery and rehabilitation support patients to live with the aftermath-effects of the stroke and support affected families to adapt to the caregiver-role. During this process, many elements of health care are used, including emergency response, acute care, inpatient and outpatient rehabilitation, and community and long-term care⁵⁷.

The primary objectives of post-stroke rehabilitation after the acute treatment phase are restoring or at least maximising functional and cognitive abilities, preventing complications and enhancing the independence and quality of life of stroke survivors⁵⁸. Integrated and patient-centred rehabilitation practice and information in a multi-actor and -disciplinary team setting are expected to reveal better outcomes for the patients⁵⁹. Besides physical disabilities, one should not underestimate the emotional effects including depression and anxieties of having a stroke which can interfere with the rehabilitation process and is equally crucial to treat to support the recovery.

Different stroke rehabilitation concepts and methods have been developed to date. However, from an evidence-based perspective only very few general proven recommendations exist: a) Specialized rehabilitation is useful, b) early rehabilitation and mobilization is useful and c) higher intensities of therapy are useful⁶⁰. Beyond this, it is unclear which therapy options lead to better rehabilitation outcome, i.e. which therapies are best suited for the individual patient⁶¹.

Demand side

The global burden of stroke is set to rise. It is predicted that by 2030, there will be 12 million stroke deaths, 70 million stroke survivors and 200 million disability adjusted life-years lost due to stroke worldwide. Rehabilitation helps stroke survivors to relearn skills that are possibly lost after having a stroke. Rehabilitation also teaches survivors new ways of performing tasks to circumvent or compensate for any residual disabilities. Individuals may need to learn how to manage the everyday life or how to communicate effectively when their ability to use language has been compromised. The rehabilitation success can make the difference between the need for 24/7 care or independency. Demographic changes across Europe are such that health and social care systems are failing to keep pace with demand.

Care delivery shortcomings/"Paint points"

Need to personalise rehabilitation: After the patient has left the hospital, gaps in care often occur and input in terms of rehabilitation therapy decreases or stops entirely. Since the rehabilitation success can make the difference between the need for 24/7 care or independency, there is dire demand to identify individual factors and therapy options to allow specifically tailored rehabilitation treatment for optimal outcomes after stroke. The success of rehabilitation (beyond restoring basic independence) depends on the ability to adapt the therapy programmes to individual patient needs which in turn depend on a number of factors such as the nature and severity of deficits, patient expectations, and caregiver support⁶².

Lack of longer-term provision of rehabilitation: A recent systematic review revealed that, although generally appreciated, rehabilitation was often perceived as insufficient and prematurely withdrawn and stroke survivors and caregivers felt more progress could have been achieved with longer therapy. Integrated tools that empower the patients to identify co-morbidities (such as a depression) are missing. Stroke survivors have substantial information needs which changes over time. There is,

⁵⁷ Cameron, J., Tsoi, C. and A. Marsella. Optimizing Stroke Systems of Care by Enhancing Transitions Across Care Environments. Stroke. September 2008. Vol 39, Issue 9

⁵⁸ Duncan PW, Zorowitz R, Bates B, Choi JY, Glasberg JJ, Graham GD, et al. Management of Adult Stroke Rehabilitation Care: a clinical practice guideline. Stroke; a journal of cerebral circulation. 2005;100-43.

⁵⁹ Ozer MN and Kroll T. Patient-centered Rehabilitation: Problems and Opportunities. Critical reviews in physical and rehabilitation medicine 2002; 14(3-4):273-289

⁶⁰ Moseley, A. M., Herbert, R. D., Sherrington, C. & Maher, C. G. Evidence for physiotherapy practice: a survey of the Physiotherapy Evidence Database (PEDro). Aust. J. Physiother. 48, 43-49 (2002).

⁶¹ Young, J. & Forster, A. Review of stroke rehabilitation. BMJ 334, 86-90 (2007).

⁶² Sulch, D., Melbourn, A., Perez, I. and L. Kalra. Integrated Care Pathways and Quality of Life on a Stroke Rehabilitation Unit. Stroke. June 2002 Vol 33, Issue 6.

however, not much done about provision of information needs of stroke survivors to facilitate self-care using ICT-tools in general during rehabilitation, especially home-based rehabilitation from the patient's perspective⁶³.

Lack of rehabilitation is a big bottleneck in stroke treatment⁶⁴: The demand for rehabilitation increases simultaneously to rising number of strokes worldwide. Not enough information about ICT tools is promoted to facilitate the recovery process for stroke survivors.

Difficulties in managing technology: There are studies revealing that people with acquired brain injuries after a stroke could have a variety of difficulties in managing technology, such as problems with handling, recognizing, and finding functions on the mobile phone or computer⁶⁵. Barriers which need to be taken into account by mhealth applications are sensory and motor impairments as well as limited vision and impaired speech⁶⁶.

Chronic care and monitoring

Demand side

Demand for monitoring devices currently varies with the health literacy and socio-economic status of patients. Until devices are prescribed by doctors, demand reflects consumers' beliefs and purchasing power rather than clinical understanding of healthcare needs.

Care delivery shortcomings/"Paint points"

Current devices for collecting information on the health status of the patient lack medical grade quality or innovative integration in effective systems. Apps developed without the involvement of clinicians and other necessary experts raise a number of concerns, e.g. about measurement accuracy and appropriateness of content.

Thousands of apps with relevant features are available in the stores, but the vast majority are posted under "fitness" or "wellness" categories and are labelled "not for medical use." Few can claim endorsement by experts in the field, or even that they provide appropriate data security.

An adequate approach to systems integration and interoperability is rare in current solutions, threatening vendor lock-in, even making re-use of collected data impossible. Uncertainty about data quality makes it difficult for healthcare professionals to use, given the liability they are subject to. Devices can be obtrusive if used excessively and stigmatising if they are not well designed. Patients with hypertension desire unobtrusive ways of managing their condition.

Low-cost long-term monitoring and re-assurance for patients who may have had the event many years ago. Tools to provide information and avoid stigmatisation as well as social exclusion of prevalent stroke patients.

Monitoring of health diet and lifestyle: Very little is known about the dietary habits and nutritional needs of stroke survivors. According to a recent literature review by Serra et al (2017), it appears that a combination of screening methods, including food record, laboratory and malnutrition screening tools assessments may be beneficial to assess the dietary intake adequacy of stroke survivors.

Reintegration

Rationale

Reintegration is the long-term outcome after stroke. After acute treatment and rehabilitation, reintegration success is measured by the patients' reintegration into their family, communities and workplaces. Self-esteem, depressive symptoms, social support satisfaction and other parameters are important. Such psycho-social parameters – together with functional rehab outcome – comprise long-term stroke outcome picture complete, e.g. by determining social integration, return to the work force

⁶³ Exploring of stroke survivors' information needs for an Information and Communication Technology based home stroke rehabilitation plan to facilitate self-care Author: Yamrotsow Woldemariam. Thesis, 2017

⁶⁴ PowerPoint presentation Catherine M. Fuhre. Sykehusinnkjøp HF Norwegian Hospital Procurement Trust, February 2019.

⁶⁵ <https://pdfs.semanticscholar.org/9de4/8197ecb8565225eca737e2f085f7713a7866.pdf>

⁶⁶ <https://www.ncbi.nlm.nih.gov/pubmed/30686063>

(RTW) and work performance. Resumption of paid employment has received little attention as of yet, but this area deserves greater emphasis as strokes continue to occur in the younger population^{67 68}.

Demand side

Worldwide, strokes are the second leading cause of death and the third leading cause of disability⁶⁹. Stroke is also a leading cause of dementia and depression. 17 million people suffer from a stroke annually worldwide⁷⁰. In other words, one of six people is affected by a stroke in his/her lifetime. Stroke survivors show a variety of physical and psychosocial problems which can affect their reintegration into the community. Strokes mainly affect individuals at the peak of their productive life which become increasingly crucial in an aging population. Despite its enormous impact on countries' socio-economic development, this growing crisis has received very little attention to date. The global burden of stroke is set to rise. It is predicted that by 2030, there will be 12 million stroke deaths, 70 million stroke survivors and 200 million disability adjusted life-years lost due to stroke worldwide⁷¹.

Care delivery shortcomings/"Paint points"

This field is affected – up until now – by a lack of data, and it is no wonder that no guidelines for interventions exist that predict return to work force⁷². The consequences from having a stroke are different from patient to patient. While some suffer from anxiety and depressions, others become half-paralysed. Hence, guidelines predicting the return to work force remain challenging. It remains unclear, which individual factors determine reintegration⁷³.

Integrated care procurement objectives (ICPOs) for stroke

Integrated Care Procurement Objective
ICPO 01. Address lack of electronic care record data integration from technologies designed to motivate and educate people as well as enhance the interface between person and their care team.
ICPO 02. Address lack of integration of nutritional and physical activity information and advice: Innovative solutions will be expected to be supported which allow patients to track a range of parameters including blood pressure, weight, impedance measured fat, fluid intake, muscle action, physical activity, carbohydrate intake and stress levels.
ICPO 03. Link stroke risk assessment results with an interface for care practitioners to ensure that the identified person with high risk of stroke can be monitored and followed up. Risk calculation and therapeutic recommendation tools should be personalised, addressing data sharing and infrastructure needs such as integrating highly heterogeneous multi-scale data sources, integrating omics data into clinical care or integrating imaging data. The provision of multiple channels to establish bi-directional communication of text, images, voices, video should be addressed as well.
ICPO 04. Improve transition from hospital to community setting- Innovative solutions should tackle the need of patients and family carers receiving the necessary training to enable a successful transition to the home environment. Patients and family carers often receive insufficient advice on the psychological and emotional impact of a stroke and how they can manage these complex feelings. Furthermore, it seems to be difficult to find and access information and assistance on care and support services after discharge from hospital. Solutions should also enable a better addressing of the current lack of proactive follow-up either from primary care, the hospital, allied healthcare professionals, and/ or social care services.

⁶⁷ Cameron, J., Tsoi, C. and A. Marsella. Optimizing Stroke Systems of Care by Enhancing Transitions Across Care Environments. Stroke. September 2008. Vol 39, Issue 9

⁶⁸ Wozniak M, Kittner S. Return to work after ischemic stroke: a methodological review. Neuroepidemiology. 2002; 27: 159–166.

⁶⁹ World Health Organisation. (2017) The top 10 causes of death. Available at: <http://www.who.int/mediacentre/factsheets/fs310/en/>.

⁷⁰ <http://ptaforum.pharmazeutische-zeitung.de/index.php?id=10883>

⁷¹ Feigin VL, Forouzanfar MH, Krishnamurthi R, et al. Global and regional burden of stroke during 1990–2010: findings from the global burden of disease study 2010. Lancet 2014;383:245–55. doi:10.1016/S0140-6736(13)61953-4

⁷² Canadian Stroke Best Practices Recommendations. Community Reintegration Following Stroke | Canadian Stroke Best Practice Recommendations. (2017). Available at: <http://www.strokebestpractices.ca/index.php/transitions/community-reintegration-following-stroke/>. (Accessed: 16th February 2017)

⁷³ Westerlind, E., Persson, H. C. & Sunnerhagen, K. S. Return to Work after a Stroke in Working Age Persons; A Six-Year Follow Up. PLOS ONE 12, e0169759 (2017).

Integrated Care Procurement Objective
ICPO 05. Find Anti-Coagulation Dosing Software system, interfacing to relevant (eg hospital and GP patient records) IT systems, as well as to device and any mobile applications to support safe transmission of meter results to software.
ICPO 06. Answer client information needs that change over time. ICT tools shall facilitate self-care during rehabilitation especially home-based rehabilitation from the patient’s perspective.

Care delivery shortcomings and procurement objective definition for dementia

Overview

Worldwide, around 50 million people have dementia, and there are nearly 10 million new cases every year. It mainly affects older people, but is not a normal part of the process of ageing. Dementia is one of the major causes of disability and dependency among older people worldwide and has a physical, psychological, social, and economical impact, not only on people with dementia, but also on their carers, families and society at large⁷⁴. The organisation of care and provision of support to people with dementia is of complex nature as includes many elements such as early diagnosis in order to promote early and optimal management, optimising physical health, cognition, activity and well-being, identifying and treating accompanying physical illness, detecting and treating challenging behavioural and psychological symptoms and providing information and long-term support to carers⁷⁵.

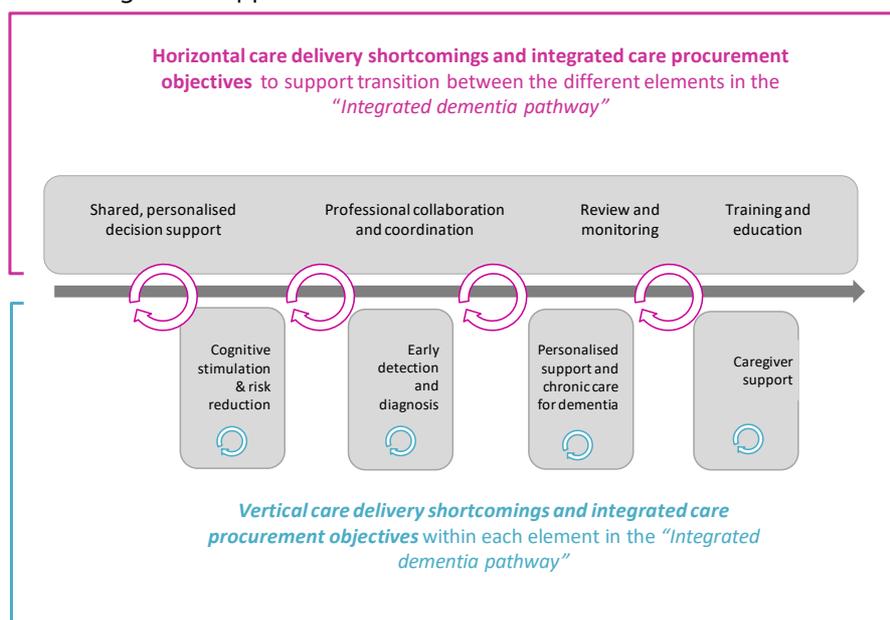


Figure 3. Integrated care pathway for dementia

Cognitive stimulation and risk reduction

Rationale

Dementia is a progressive neurocognitive disorder characterized by a progressive cognitive and functional decline until death¹. As life expectancies continue to rise, modifiable lifestyle factors that may

⁷⁴ WHO Dementia factsheet 2017. <https://www.who.int/news-room/fact-sheets/detail/dementia>

⁷⁵ WHO Dementia factsheet 2017. <https://www.who.int/news-room/fact-sheets/detail/dementia>

prevent cognitive decline and dementia in later life become increasingly important in order to maintain quality of life in old age⁷⁶.

There is increasing evidence that regular participation in cognitively stimulating social or leisure activities such as travelling, odds jobs, knitting, or gardening were associated with a lower risk of subsequent dementia^{1,77}. In this regard, regular physical activity is important for health promotion and is an effective strategy to prevent dementia onset⁷⁸. Moreover, a strong social network has been suggested to decrease the risk of dementia due to social interaction and mental stimulation⁷⁹.

Demand side

As the world population ages, neuropsychological diseases will become an important problem to face by public health agencies. In this regard, interventions that could delay disease would have a major public health impact⁸⁰. 50 million people around the world live with dementia since 2018, amounting 9 billion Euros⁸¹. Cognitive stimulation of people at risk is a key factor to prevent and combat dementia when studies have recently reported that, even though the technology is becoming more and more widely available, elderly people are not really well-disposed to technologies and have limited experience; these factors contribute towards limiting the widespread acceptance of cognitive stimulator technologies.

Care delivery shortcomings/"Paint points"

Lack of knowledge of dementia causes: There is not enough evidence about the protective and risk factors causing dementia, neither efficient strategies for prevention as for other illness such as diabetes or heart attack.

Lack of awareness and stigma on mental health: Around the world is still being a lack of awareness and stigma around mental illness. Consequently, there is not special for mental health, lacking promotion of psychological wellbeing and cognitive stimulation targeting risk population, such as the elderly group.

Socio-economic disparities exist: Elderly is a heterogeneous group, existing socio-economic disparities among them. This could be a greater barrier to access to leisure activities or physical programs, as well as ICT-solutions for cognitive training.

Care or family responsibilities: During this stage of life there are new responsibilities to attend. For example, most of the couples have to take care of their grandchildren, furthermore, when the need for care of one of the parts of the couple, the other supports and takes care. These situations may facilitate the elderly quite their own time for leisure and sometimes overwhelming themselves.

New technologies are sophisticated: Current smart phones, smart watches and sensors have sophisticated features, and target groups are not comfortable using ICT-solutions.

Lack of bi-directional connectivity of devices: Connectivity is another issue with most products on the market. If connectivity is available it is unidirectional, only supporting transferring values out of the device. Any input, including adaption to therapy parameters, therefore needs to be manually set. There are innovative, medical grade devices, but these tend to be costly and therefore only suited to research use rather than widespread adoption.

No real harnessing of ICT and technology features in health promotion: ICT-based solutions are not widely used by health care systems, and these solutions are just piloted but not adapted to real contexts. Online tools found are limited, and not integrated even with health records.

Lack of coordination integrating mental health care with different sectors: Leisure, tourism and physical activities are not integrated on the public mental health agenda for the elderly population.

Early detection and diagnosis

⁷⁶ Yates, L., Ziser, S., Spector, A., & Orrell, M. (2016). Cognitive leisure activities and future risk of cognitive impairment and dementia: Systematic review and meta-analysis. *International Psychogeriatrics*, 28(11), 1791-1806

⁷⁷ Fabrigoule, C. Et al. (1995). Social and Leisure Activities and Risk of Dementia: A Prospective Longitudinal Study, *Journal of the American Geriatrics Society* 43(5) 485-490.

⁷⁸ Ravaglia, G. Et al. (2008). Physical activity and dementia risk in the elderly Findings from a prospective Italian study. *Neurology*, 70, 1786-1794.

⁷⁹ Wang, H.-X., Karp, A., Winblad, B., & Fratiglioni, L. (2002). Late-life engagement in social and leisure activities is associated with a decreased risk of dementia: A longitudinal study from the Kungsholmen project. *American Journal of Epidemiology*, 155(12), 1081-1087.

⁸⁰ Brookmeyer, R., Gray, S. & Kawas, M.D. (1998). Projections of Alzheimer's disease in the United States and the public health impact of delaying disease onset. *American Journal of Public Health*, 88(9), 1337-1342.

⁸¹ Alzheimer's disease international (2018). Informe mundial sobre el alzheimer 2018. Londres: ADI.

Rationale

Studies lights that in the world there are eight million people are not diagnosed⁸². Consequently, early detection and diagnosis is a key factor in the chain of care for dementia. Dementia is composed of diverse and multiple cognitive deficiencies that include the deterioration of short and long-term memory and, at least, one of the following: aphasia, apraxia, agnosia and impaired executive functioning⁸³. In this regard, the degree of impairment must interfere with social and occupational functioning⁸⁴. The most frequent dementia is Alzheimer's disease (AD). There are different stages of AD: Asymptomatic, Mild Cognitive Impairment, early AD, moderate AD and severe AD. Dementia is more frequent in elderly, due to AD and others are linked to age. The diagnosis of dementia is clinical, with a limited role to date of the biological markers⁸⁵. As consequence, clinical guidelines for the diagnosis of dementia usually contain elements that allow the identification of problems of episodic memory. Most of the cases of dementia, this is gradual and may difficult to distinguish from normal aging, depression or lowest previous literacy levels among others. Moreover, there are several diagnostic tools for assessing dementia, but the sensitivity for the early detection of dementia is very low⁸⁶.

Demand side

The early detection and diagnosis of dementia requires time from GP and neuropsychological specialists, nevertheless the time per consultation in medical settings is not enough time to diagnosis the beginning of neurodegenerative diseases in early stages. Moreover, the existent tools for early detect or diagnosis dementia requires special training for professionals. For that reason, screening tests oriented to differentiate with high accuracy MCI and mild AD patients from primary care are needed⁸⁷.

Care delivery shortcomings/"Paint points"

Lack of knowledge of dementia causes: There is no evidence about the cause of dementia, neither efficient strategies for prevention¹¹.

Lack of awareness and stigma on mental health: Around the world is still being a lack of awareness and stigma around mental illness. Consequently, this situation hinders early detection and diagnosis¹¹.

The operation of the current risk assessment is imperfect: Current tools for assessment's sensitivity for the early detection is very low⁸⁸. In this regard, nowadays a diagnosis requires investing a lot of time with the patient, physical explorations, and brain scans. Consequently, health care providers require a huge investment of time and training to diagnosis dementia.

Patients are often not reached early enough: Studies show that in the world there are eight million people are not diagnosed. Moreover, the estimations around the ageing of the population help to calculate that these numbers increase to 152 million people by 2050⁸⁹.

Personalised support and chronic care for dementia

Rationale

The term dementia refers to a cognitive pattern and behavioural symptoms that, for usually, it arises from a chronic, often progressive, brain disease⁹⁰. Nevertheless, dementia shows wide variability, existing different stages of dementia, and symptomatology. For example, people in the early stages of dementia usually forget details and they cannot follow a long conversation due to repeating content or they forget about what they were talking about. In the intermediate stage, disorientation episodes occur, and the

⁸² Alzheimer's disease international (2018). Informe mundial sobre el alzheimer 2018. Londres: ADI.

⁸³ American Psychiatric Association (1994). Diagnostic and statistical manual of mental disorders (4th ed.). Washington, DC: Author.

⁸⁴ Herández, J. (2010). Dementia: language problems as early symptoms. Acta Neurológica Colombiana, 26(3), 101-111.

⁸⁵ Villarejo, A., & Puertas-Martin, V. (2011). Utilidad de los test breves en el cribado de demencia. Neurología, 26(7), 425-433.

⁸⁶ Tierney MC, Szalai JP, Dunn E et al. (2000). Prediction of probable Alzheimer disease in patients with symptoms suggestive of memory impairment. Value of the Mini-Mental State Examination. Arch Fam Med, 9, 527-32.

⁸⁷ Tsolaki, M., Zygouris, S., Lazarou, I., Kompatsiaris, I., Chatzileontiadis, L., et al. (2015). Our experience with informative and communication technologies (ICT) in dementia. Hell J Nucl Med Suppl. 1:131-9.

⁸⁸ Tierney MC, Szalai JP, Dunn E et al. (2000). Prediction of probable Alzheimer disease in patients with symptoms suggestive of memory impairment. Value of the Mini-Mental State Examination. Arch Fam Med, 9, 527-32.

⁸⁹ Alhambra-Borras, T. (2017). Design, implementation and evaluation of a multidimensional intervention on risk of falling, frailty and loneliness as a strategy to promote active and healthy ageing. Doctoral Thesis. University of Valencia, Spain.

⁹⁰ Herández, J. (2010). Dementia: language problems as early symptoms. Acta Neurológica Colombiana, 26(3), 101-111.

person is likely to have episodes of memory deficits⁹¹. In the final stages of dementia, persons have not longer the capacity of taking care of themselves because of the damage of their executive functions.

Although these conditions are irreversible¹⁰, currently there are two types of medications available for dementia, and both try to treat some of the symptoms. On one side, the inhibitors of cholinesterase (donepezil, rivastigmine and galantamine, which they also have other trade names), helping send messages between nerve cells and keeps the memory running. On the other side, the memantine (NMDA receptor) tries to block the damages of glutamate to the brain cells⁹².

The irreversibility of this neurodegenerative illness makes people lose their functional abilities, requiring greater medical and social care with time. For that reason, the treatment has to be focused on the maintenance of their functionalities and slowing down the illness. In this regard, psychosocial care for people with dementia is a key factor for maintaining cognitive functions and an independent life.

Demand side

50 million people around the world live with dementia since 2018. This figure will increase more than triple the 152 million by the year 2050. It is estimated that dementia amounted 9 billion euros in 2018, and it is expected that increases double¹¹. Furthermore, there is not a cure and the irreversibility of this illness makes people lose their cognitive functions¹⁰.

A key factor for chronic care of dementia is the maintenance of the cognitive and functionalities, slowing down the progress of the illness. Likewise, the quality of life and independence of people with dementia has to be taken into consideration for further ICT developments. In this regard, non-drug interventions are widely used in patients with Alzheimer's disease⁹³. Several interventions and services have shown positive impact improving quality of life and independence of people with dementia slowing down the loss of autonomy.

Care delivery shortcomings/"Paint points"

Socio-economic disparities exist: Elderly are a heterogeneous group, existing socio-economic disparities among them. This could be a greater barrier to access to services, as well as ICT-solutions for supporting cognitive rehabilitation or independent life at home.

Lack of evidence: There is a lack of studies on the success of non-medical treatments mediating the loss of cognitive functionalities. Both neurocognitive and psychosocial rehabilitation programmes have shown encouraging results but there is not a conclusion on the main benefits for people with dementia.

Lack of personalised treatments: People with dementia participate in different programmes for neurocognitive and psychosocial rehabilitation such as cognitive stimulation therapy, group-based interventions or reminiscence therapy. Nevertheless, there is as yet very little known about which therapy is more effective for each case.

New technologies are sophisticated: Current smart phones, smart watches and sensors have sophisticated features, and target groups are not comfortable using ICT-solutions.

No real harnessing of ICT and technology features in cognitive rehabilitation: ICT-based solutions are not widely used by health care systems to promote cognitive rehabilitation, and these solutions are just piloted but not adapted to real contexts. Online tools found are limited and not integrated even with health records.

No real harnessing of ICT and technology features in promoting independent life: ICT-based solutions are not widely used by social and health care systems to promote independent life of people with dementia, and these solutions are just piloted but not adapted to real contexts. Tools found being applied in real contexts are based on improving communication between caregivers and the person with dementia, but not integrated even with health records. There is a need for integrated ICT-tools addressing different domains such as improving communication with caregivers and supporting independence life for people with dementia. Inputs from the use of these tools may be integrated on

⁹¹ Tomoeda, C. K., & Bayles, K. A. (1993). Longitudinal effects of Alzheimer's disease on discourse production. *Alzheimer Disease and Associated Disorders*, 4: 223–236.

⁹² Alzheimer's disease international (2018). Informe mundial sobre el alzheimer 2018. Londres: ADI.

⁹³ Amieva, H. et al. (2016). Group and individual cognitive therapies in Alzheimer's disease: the ETNA3 randomized trial. *International Psychogeriatrics*, 28(5), 707–717

social and health care systems, for example, the study for the reasons if the person falls and eliminate the possible risks at home.

Caregiver support

Rationale
<p>A person with dementia will need support at home as the disease gets worse. Caring for them has many challenges for family members and caregivers. People suffering from dementia due to conditions such as Alzheimer's disease or other dementias have a progressive biological brain disorder that, gradually, causes them difficulties in remembering things, thinking clearly, communicating with other people or taking care of themselves. In addition, dementia can generate mood changes and even affect the personality and behaviour of the person suffering from the disease. For that reason, in the short-term caregivers help by trying to understand how the person with dementia perceives their world, giving to the person with dementia the ability to talk about any challenge and participate in their daily care. In the long term a person with dementia may need surveillance and help at home or in an institution.</p>
Demand side
<p>Recognize the role played by relatives and other unpaid carers is a key aspect of the provision of care for people with dementia. For that reason, help caregivers with information, advice, and psychosocial programmes aimed to reduce their burden are crucial to improve the quality of care for people with dementia.</p>
Care delivery shortcomings/"Paint points"
<p><u>Socio-economic disparities exist:</u> Caregivers are a heterogeneous group, existing socio-economic disparities among them. This could be a greater barrier to access to services, as well as ICT-solutions for supporting caring and reduction of the burden of care.</p> <p><u>Integrated tool for caring is missing:</u> ICT-based solutions are not widely used by social and health care systems to support unpaid care/Caregivers at home, and these solutions are just piloted but not adapted to real contexts. Tools found being applied in real contexts are based on improving communication between caregivers and the person with dementia, but not integrated even with health records. There is a need for integrated ICT-tools addressing different domains such as improving communication and supporting independence life for people with dementia. Inputs from the use of these tools may be integrated on social and health care systems, for example, if there is or not a following-up of the medication's reminders.</p> <p><u>Tools for the burden of care reduction are missing:</u> There is a lack of ICT-solutions focused on the mental health of caregivers, giving them therapeutic counseling and resources to reduce their feeling of burden/overwhelm by caring a person with dementia.</p>

Monitoring and review

Rationale
<p>Dementia is a progressive neuropsychological condition which gets worse over time. The deterioration happens slowly however but it does vary widely from person to person and can also depend on the type of dementia. Moreover, people with dementia are susceptible to adverse effects of medicines. However, they are not always closely monitored⁹⁴.</p> <p>The most common ways to monitor the progression of dementia are:</p> <ul style="list-style-type: none"> - Follow up appointments: after receiving the first prescription, the person with the dementia should have a follow-up appointment to make sure that there are not side effects and monitor the progression of the disease. - Memory tests: these tools could be useful to find out dementia's symptoms advance or stay the same for each case. - CT and MRI scans: these tests will show any further physical change in the brain, and how far dementia has progressed.

⁹⁴ Jordan, S., Gabe, M., Newson, L., Snelgrove, S., Panes, G., Picek, A., ... & Dennis, M. (2014). Medication monitoring for people with dementia in care homes: the feasibility and clinical impact of nurse-led monitoring. *The Scientific World Journal*.

In this regard, monitoring of dementia supports the medical decision-making process in order to choose more effective treatments.

Demand side

Data, derived or collected through clinical observation and the use of available technology, are urgently required to provide insights to study dementia's progression⁹⁵. Dementia care providers need a clinical assessment tool similar to the blood pressure cuff (sphygmomanometer) used by clinicians and patients for managing hypertension⁹⁶.

Care delivery shortcomings/"Paint points"

Missing simple tools with integrated scores for monitoring dementia. Simple tools are not comprehensive enough measuring just one domain regarding dementias' progression because they are lengthy and/or cover only a particular domain.

Lack of practical tools for real contexts. There are many tools available today to gauge the presence and severity of dementia symptoms through caregiver observation and report. However, most are best suited for research studies.

Lack of bi-directional connectivity of devices: Connectivity is another issue with most products on the market. If connectivity is available it is unidirectional, only supporting transferring values out of the device. There are innovative, medical grade devices, but these tend to be costly and therefore only suited to research use rather than widespread adoption.

No real harnessing of ICT and technology features in monitoring: ICT-based solutions are not widely used by social and health care systems, and these solutions are just piloted but not adapted to real contexts. Online tools found are limited, and not integrated even with health records.

Training and Education

Rationale

The complexity and diversity of the needs of older people present challenges for caring. For those patients who are at home, nursing and care assistant staff present a lack of knowledge and confidence in caring patients with dementia⁹⁷. Moreover, people with dementia needing greater care occupy up to one-quarter of acute hospital beds, nevertheless, the quality of care delivered to this patient group is of national concern due to staff report lack of knowledge, skills and confidence⁹⁸.

Family members are increasingly assuming the role of caregivers and have proved the first line of support for those diagnosed with dementia⁹⁹. Accepting this new role is accompanied by physical and psychological challenges that impact social, family and professional relationships, which often have a negative impact in the physical and mental health of caregivers¹⁰⁰. Special training underlining aspects such as acquisition of knowledge of the disease, ability to ask for help, awareness of the importance of self-care, greater family support and more time for him/her, among others is a key factor to improve care quality¹⁰¹.

Education and training require a substantial amount of professional and personal time. Making education more effective as well as more efficient seems to be realistic as education can be both standardised and personalised when appropriate subgroups are distinguished. A blended learning approach may utilise the best from both face-to-face as well as IT supported learning.

Demand side

⁹⁵ Power, M. W. (2004). U.S. Patent No. 6,753,782. Washington, DC: U.S. Patent and Trademark Office.

⁹⁶ Monahan, P. O., Boustani, M. A., Alder, C., Galvin, J. E., Perkins, A. J., Healey, P., ... & Callahan, C. (2012). Practical clinical tool to monitor dementia symptoms: the HABC-Monitor. *Clinical interventions in aging*, 7, 143.

⁹⁷ Hughes, J., Bagley, H., Reilly, S., Burns, A., & Challis, D. (2008). Care staff working with people with dementia: training, knowledge and confidence. *Dementia*, 7(2), 227-238.

⁹⁸ Surr, C. A., Smith, S. J., Crossland, J., & Robins, J. (2016). Impact of a person-centred dementia care training programme on hospital staff attitudes, role efficacy and perceptions of caring for people with dementia: A repeated measures study. *International journal of nursing studies*, 53, 144-151

⁹⁹ Sousa, L., Sequeira, C., Ferré-Grau, C., Neves, P., & Lleixà-Fortuño, M. (2016). Training programmes for family caregivers of people with dementia living at home: integrative review. *Journal of clinical nursing*, 25(19-20), 2757-2767.

¹⁰⁰ Sequeira, C (2013) Difficulties, coping strategies, satisfaction and burden in informal Portuguese caregivers. *Journal of Clinical Nursing* 22, 491– 500.

¹⁰¹ Sousa, L., Sequeira, C., Ferré-Grau, C., Neves, P., & Lleixà-Fortuño, M. (2016). Training programmes for family caregivers of people with dementia living at home: integrative review. *Journal of clinical nursing*, 25(19-20), 2757-2767.

50 million people around the world live with dementia since 2018. This figure will increase more than triple the 152 million by the year 2050. As the world population ages, neuropsychological diseases will become an important problem to face by public health agencies.

Studies highlight the importance of qualified and trained professionals to reach the full potential of non-pharmacological approached interventions¹⁰².

On the other hand, the increasing demand for caregivers for people with dementia is usually covered by the family context. In this regard, the need for greater care of people with dementia by their neuropsychological degenerative progression increases the care giving time. Relatives are not trained and they haven't got knowledge or skills to face the challenges.

Care delivery shortcomings/"Paint points"

Lack of personalised dementia education and training: Dementia education programmes are not personalised to caregiver's level of knowledge and not personalised to the different dementia's stages. Current health system efforts to proactively empower patients with (or at risk of developing) dementia through training are usually not tailored to individual needs. There are some public awareness campaigns and peer group meetings, but these do not and cannot accommodate all patient and caregivers needs.

Overall low use of ICT: The state of the art in training and education is characterised by a very low degree of ICT use. Multi-media use is very rare. Online portals provide mostly text information and lack the link to a local contact person. The content is not tailored to the patient's stage of cognitive functionality, medication prescribed and concomitant diseases, which confuses patients with information not relevant for their condition (too much or not adequate).

Lack of motivational features and skills gap analysis: The existing education programmes do not contain any motivational features, and not all test for knowledge gain.

Lack of informal carer training and support: Often, family carers seem to have to adapt to the changes that dementia affected their relatives and seek alternative ways of securing the resources they need for managing their lives. They express that they had not been prepared adequately for the caring role or assessed satisfactorily in terms of whether they could manage given their skill level, age and/or health status

Lack of lifelong learning activities. The existent learning activities are based on short-term activities, even when dementia is a life condition, generating new challenges with time, when the patient needs greater care.

Professional collaboration and coordination

Rationale

Most older adults with dementia will be cared for by primary care physicians, despite quality improvement efforts, evidence-based practice guidelines, and clinical research activities, the estimated total cost in 2018 for dementia is 8 billion Euros.

Primary care practice environment presents important challenges and dementia care suffers from quality problems¹⁰³. In this regard, although primary care physicians prescribe psychoactive medications to older adults¹⁰⁴ the primary care setting appears to be inadequate to provide comprehensive management approaches for dementia. Consequently, collaborative care models for dementia and depression have been successfully able to improve the behavioural, psychological, and mood symptoms of patients suffering from dementia or depression¹⁰⁵.

Demand side

Between healthcare professionals, letters and forms still represent the state-of-the-art in communication of medical information. This information (what we have done) together with medical guidelines (what

¹⁰² Gaugler J. E., Yu F., Davila H. W., Shippee T. (2014). Alzheimer's disease and nursing homes. *Health Affairs*, 33, 650-657.

¹⁰³ Lewin Group, The. Saving Lives. Saving Money: Dividends for Americans Investing in Alzheimer Research. Report of the Lewin Group to the Alzheimer's Association. 2004

¹⁰⁴ Aparasu RR, Mort JR, Sitzman S. (1998) Psychotropic prescribing for the elderly in office-based practice. *Clin Ther.* 603-419

¹⁰⁵ Callahan CM, Boustani MA, Unverzagt FW, et al. Effectiveness of Collaborative Care for Older Adults With Alzheimer Disease in Primary Care: A Randomized Controlled Trial. *JAMA.* 2006;295(18):2148-2157.

you should do), and sometimes complemented with local quality circles (do we really do what we should do?), is the foundation for cooperation in a decentralised professional network. Though state of the art in practice, such unplanned, point-to-point communication is far from meeting the requirements of coordinated stroke care. Solutions to improve the state of the art in this field have been the topic of three recent EC-funded projects on integrated care: CareWell¹⁰⁶, BeyondSilos¹⁰⁷ and SmartCare¹⁰⁸. In the case of dementia, collaborative dementia care model that delivered biopsychosocial interventions for patients suffering from dementia and their family caregivers has shown effectiveness, improving quality of care, quality of life and the behavioural and physiological symptoms of dementia¹⁰⁹.

Care delivery shortcomings/"Paint points"

Fragmentation prevails: In most public health systems around the world, fragmentation and poor coordination of care have been the greatest obstacles in ensuring adequate cognitive rehabilitation and care of people with dementia.

Health and social care professionals are also affected by the lack of information. The records that each of them holds about the patients are not shared across care environments, resulting in the fact that they must obtain medical information from the patient and re-administer tests when new patients arrive in their system of care.

Lack of analysis of needs of patients. People with dementia are treated by their illness, but these are not shaped by their own needs.

Shared, personalised decision support

Rationale

Including the patient or user perspective is a central organising principle of integrated care. Moreover, there is increasing recognition of the importance of strengthening relationships among patients, carers and practitioners, particularly for individuals receiving substantial health and care support, such as those with long-term or multiple conditions¹¹⁰.

Current efforts in ICT supported integrated care build upon individualised care plans and shared decision making between professionals (GPs, nurses, etc.) and patients as well as informal carers such as family carers thereby regularly monitoring and modifying as necessary set goals and prescribed activities which take account of patient's experience and preferences.

In the context of dementia¹¹¹, examinations of the decision-making process have often been limited to one of two issues: determining the loss of decision-making capacity¹¹², or establishing the family carer's responsibilities as a surrogate decision-maker¹¹³.

Demand side

Although most persons with dementia report wanting to participate in shared decision-making with their family carers, many do not remain involved once their symptoms move beyond mild dementia. On the other hand, family carers recognize the need to increase their own involvement in decision-making as the decision-making ability of the person with dementia declines.

Care delivery shortcomings/"Paint points"

Exclusion from the process of decision making people with dementia. Existent services are not yet being widely accessed by people living with dementia.

¹⁰⁶ CareWell Integrated Care Project Video. (2019). Retrieved from <http://carewell-project.eu/index.php?id=1746>

¹⁰⁷ BeyondSilos Project (2019). Retrieved from <http://www.beyondsilos.eu/home/>

¹⁰⁸ SmartCare Project (2019). Retrieved from <http://www.pilotsmartcare.eu/>

¹⁰⁹ Callahan CM, Boustani MA, Unverzagt FW, Austrom MG, Damush TM, Perkins AJ, et al. Effectiveness of collaborative care for older adults with Alzheimer disease in primary care: a randomized controlled trial. *JAMA*. 2006; 295(18):2148–2157.

¹¹⁰ Bunn, F., Goodman, C., Manthorpe, J., Durand, M. A., Hodkinson, I., Rait, G., ... & Wilson, P. (2017). Supporting shared decision-making for older people with multiple health and social care needs: a protocol for a realist synthesis to inform integrated care models. *BMJ open*, 7(2), e014026.

¹¹¹ Miller, L. M., Whitlatch, C. J., & Lyons, K. S. (2016). Shared decision-making in dementia: A review of patient and family carer involvement. *Dementia*, 15(5), 1141–1157.

¹¹² Arias J. J. (2013) A time to step in: Legal mechanisms for protecting those with declining capacity. *American Journal of Law & Medicine* 39(1): 134–159

¹¹³ Smith, A. K., Lo, B., & Sudore, R. (2013). When previously expressed wishes conflict with best interests. *JAMA Internal Medicine*, 173(13), 1241–1245. DOI: 10.1001/jamainternmed.2013.6053.

Overall low use of ICT: The state of the art in shared, personalised decision support is characterised by a very low degree of ICT use. Multi-media use is very rare. Online tools to facilitate interaction among relevant stakeholders are not widely extended.

Fragmentation prevails: In most welfare systems around the world, fragmentation and poor coordination of care have been the greatest obstacles in ensuring adequate cognitive rehabilitation and care of people with dementia. In this regard, health and social care is provided by professionals without coordination.

Integrated care procurement objectives (ICPOs) for dementia

Integrated Care Procurement Objective
ICPO 07. Address integration with other sectors such as tourism, leisure and physical activities for elderly people with health. Targeting cognitive stimulation through tourism, leisure and physical activities has shown positive results on literature, but the offer of different evidence-based ICT-solutions for risk population is not wide
ICPO 08. Address the lack of time of professionals for consults by longitudinal screening programs targeting elderly population in the community promoting awareness: Longitudinal screening programs will inform healthcare providers about the cognitive and functional competencies of the population at risk. Moreover, a community-based screening programme will promote awareness combating and eliminating stigmas on mental health.
ICPO 09. Address the lack of ICT-solutions promoting cognitive rehabilitation. This should include the integration on tools and solutions with health records.
ICPO 10. Include relevant stakeholders such as social carers and pharmacies in prevention: The interface to patients and their access to services should capitalise on the fact that social workers and pharmacies can be in frequent contact with at-risk patients and so can play a strong role in prevention and early detection.
ICPO 11. Adjust the feedback of the data from monitoring to new care strategies. Data derived or collected through clinical observation and the use of available technology, has to be translated on personalised social and health care strategies avoiding the lack of bi-directional connectivity of devices.

Care delivery shortcomings and procurement objective definition for Multimorbidity

Overview

Multimorbidity, defined as a co-occurrence of two or more chronic conditions, is an increasing problem worldwide and is already a significant epidemiological problem in Europe related to the increase on life-expectancy and rapidly aging population. Observational study reviews have estimated that up to 95% of people older than 65 years may be affected by multimorbidity¹¹⁴. Although multimorbidity prevalence increases with age and frailty, it is not only associated with aging and can affect younger people too, where frailty assessment tools are not well developed^{115,116}. It is also strongly associated with social determinants and people from deprived areas are in higher risk of complex conditions, less access to care delivery system and poorer health outcomes. However, there is a lack of effective risk stratification tools.

In the following we will define the care delivery shortcomings (“pain points”) and person-centred integrated care procurement objective with the modified sections and components based on the

¹¹⁴ Concepció Violan et al., «Prevalence, Determinants and Patterns of Multimorbidity in Primary Care: A Systematic Review of Observational Studies», *PLoS One* 9, n.º 7 (2014): e102149, <https://doi.org/10.1371/journal.pone.0102149>.

¹¹⁵ Violan et al.

¹¹⁶ Frances S Mair y Katie I Gallacher, «Multimorbidity: what next?», *The British Journal of General Practice* 67, n.º 659 (junio de 2017): 248-49, <https://doi.org/10.3399/bjgp17X690965>.

recommendations from the consensus meeting of the Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life Cycle (JA-CHRODIS).¹¹⁷

Delivery of the Care Model System

Rationale

Patients with multimorbidity include a great variety of different combinations in its spectrum, including the risk of complications, burden of treatment, complexity, quality of life and disability, resource demand and healthcare cost. The traditional health care delivery model was designed to answer to acute and disease-specific situations and with the change in epidemiology of the diseases there is an increasing need of adapt and re-designing the health delivery model to cover chronic conditions, multimorbidity and complex situations. However, the effort to this demand has been difficult due to the lack of good understanding, evidence and agreement on basic information from aetiology to best practices.¹¹⁸ There is a need of new models of care to improve care delivery to patients with multimorbidity.¹¹⁹

Demand side

Regular comprehensive assessment of patients: The complexity of multimorbidity requires a regular assessment of patients where the progression of different conditions and their treatment, the impact and changes in patient's autonomy, the burden of care, and social and personal resources need to be addressed. The interaction of these elements will define the prognosis and quality of life of patients as individuals and the burden of care for carers but will also impact the social stability, social wellbeing and therefore the population health. A central part of the comprehensive understanding of patients' global situation is also the evaluation and recognition of patient's values, opinions, desires and choices and the co-production of an individualised care plan.

Multidisciplinary, coordinated team: Comprehensive assessment and understanding of patients with multimorbidity as well as adequate support and continuity of care must be organised in a multidisciplinary team with clear definition of everyone's role, information and decision directions and coordination.

Professional appointed as coordinator of the individualized care plan and contact person for patient and family ("case manager"): To be able to guarantee the continuity of care and best coordination, at least two figures have been appointed as necessary:

- 1) **Responsible clinician:** a clinician with a generalist approach. Depending of the risk stratification and the level of complexity, there could be different options such a general practitioner, a general practitioner with an internist's or geriatrician's support, or an internist or geriatrician as the responsible clinician in the most complex cases. In any case, the general practitioner should be always involved.
The responsible clinician should supervise all the care and treatment to ensure care continuity, should incorporate other specialists' recommendations, make clinical decisions and agree the care plan with the patients and their family and carers.
- 2) **Case manager:** the case manager should be the primary contact with the patient who will also coordinate their care with the team and should be able to link all the care providers and support services. This approach should improve care and health outcomes, guarantee care continuity and accessibility, and optimize the use of the services.

Individualized Care Plans: The multidisciplinary team responsible of the care of the patients should be able to offer a holistic approach for their care, which should be individualised and adapted for each patient, person-centred, integrated and coordinated with a long-up plan. There should be guidelines for multimorbidity conditions where best practices and pathways should be well-explained, as well as options for patients to co-design their own care. All the changes in the agreed care plan should be

¹¹⁷ Katie Palmer et al., «Multimorbidity Care Model: Recommendations from the Consensus Meeting of the Joint Action on Chronic Diseases and Promoting Healthy Ageing across the Life Cycle (JA-CHRODIS)», *Health Policy (Amsterdam, Netherlands)* 122, n.º 1 (2018): 4-11, <https://doi.org/10.1016/j.healthpol.2017.09.006>.

¹¹⁸ Rokas Navickas et al., «Multimorbidity: What do we know? What should we do?», *Journal of Comorbidity* 6, n.º 1 (17 de febrero de 2016): 4-11, <https://doi.org/10.15256/joc.2016.6.72>.

¹¹⁹ Jonathan Stokes et al., «The Foundations Framework for Developing and Reporting New Models of Care for Multimorbidity», *Annals of Family Medicine* 15, n.º 6 (noviembre de 2017): 570-77, <https://doi.org/10.1370/afm.2150>.

available, updated and accessible for the team involved in patient's care. The individualized plans should also be able to assess, predict and review patient's risk depending on their conditions, stratify the risk and foresee future negative outcomes to prevent and plan the response accordingly.

Electronic patient records, exchange of patient information and uniform coding of patients' health problems: It is essential that all parts involved in the patients care and more in the care of complex cases to share the information and to use an standardise language to understand each other. The whole care team and all care providers should be able to use and access to patient's health records, get the summary or at-glance essential information to understand the progression, current situation and the agreements during share-decision making. Standardised approach to the coding system and tools and standardised language is vital to avoid misunderstandings and errors. The whole team should be trained to optimise the use of the tool use and the coding system.

Socio-economic disparities: Multimorbidity is strongly associated with social determinants and poverty. For instance, more deprived areas have different combination of diseases and multimorbidity appears 10-15 years earlier than less deprived populations.¹²⁰ The quality of care, the social support, the access to information and understanding of the process and life-expectancy are also lower. The multimorbidity rates and their progression are also different among migrants compared to locals ("healthy migrant effect") and among migrants in different countries. It is necessary to understand the effect of the migrant status to adapt the care strategy for specific situations.¹²¹

Polypharmacy: Older patients and patients with multimorbidity have specific needs regarding to drugs and there is little understanding of its implications and its effect in health outcomes.¹²² Polypharmacy, age and disease interaction may affect drug pharmacokinetics, safety of drugs and recipients and difficulties due to drug presentation.¹²³

Care delivery shortcomings/"Paint points"

There are shortcomings in the care delivery system at design level that prevent from a comprehensive assessment of patients: Patients with multimorbidity need regular comprehensive assessment. Current services are not designed to offer this holistic approach. They lack multidisciplinary team organisation, coordination and information sharing strategies, decision-making process definition, adaptive and personalised IT systems, personalised patient monitoring strategies and capacity and training in the workforce.

Care providers do not have enough training and guidance to offer and follow a personalised care plan to their patients. Service organisations do not always support trust among professionals and there are no strategies to support team building and team working. There is no information integration among different professionals and care providers involved in the care of the patient and resources for assessment, planning and updating information and care plan are lacking.

During the assessment, patient risk stratification should include social and health information, patients' and their social network's capacity and capability to face the treatment burden, and it should be able to detect target groups for eHealth strategies or other support tools. There are no tools to integrate the whole information and to offer a holistic overview of patients' situation nowadays. The fragmentation of risk stratification processes, which are disease-specific or excluding the social component does not offer enough information to develop an adequate care plan. There are no standardised tools based on evidence in multimorbidity beyond the sum of different disease-specific tools, and the information about disease interactions and drug interactions in not addressed properly.

Multidisciplinary, coordinated team: Multidisciplinary teams are necessary to assess and treat all the complex needs patients with multimorbidity have including medical, pharmacological, social and psychological perspective. The core team should include a clinician with a generalist approach (primary health or specialist level -internal medicine or geriatrics- depending on complexity) who should be able to centralise and optimise all clinical components of patients' care. The team could be supported

¹²⁰ Stewart W. Mercer et al., «Multimorbidity and the Inverse Care Law in Primary Care», *BMJ* 344 (19 de junio de 2012): e4152, <https://doi.org/10.1136/bmj.e4152>.

¹²¹ Luis Andrés Gimeno-Feliu et al., «Multimorbidity and Immigrant Status: Associations with Area of Origin and Length of Residence in Host Country», *Family Practice* 34, n.º 6 (16 de noviembre de 2017): 662-66, <https://doi.org/10.1093/fampra/cmz048>.

¹²² Mair y Gallacher, «Multimorbidity».

¹²³ Danijela Gnjidic, Andy Husband, y Adam Todd, «Challenges and Innovations of Delivering Medicines to Older Adults», *Advanced Drug Delivery Reviews* 135 (octubre de 2018): 97-105, <https://doi.org/10.1016/j.addr.2018.08.003>.

by external specialist if needed. High level of coordination and information sharing should prevent from duplications of tests, drug interaction, contradictory information and errors, and should also decrease patients' and systems burden.

Professional appointed as coordinator of the individualized care plan and contact person for patient and family ("case manager"): The care team should include one nominated clinician to coordinate the medical treatment, make medical decisions and agree on the care plan with the patient, as well as a case manager who should be the first contact with the patient. Case manager would guarantee a single entry in the system and act as a link between the patient and the team.

Individualized Care Plans: There is a cultural shift in society regarding to the relationship with health providers from paternalistic to co-production. In the case of patients with chronic conditions and multimorbidity the co-design of their care plan provides support and confidence to both the care providers and patients. The individualised care plan should be written, updated live to show the latest decision, accessible for all the care providers and it should include all the decisions agreed with the patient. The care plan should address the risk stratification and risk prevention discussions, the progression of the disease and negative outcome predictions and plan the response. The current information sharing tools do not usually offer the needed flexibility to include individualised care plans and the access to the information is frequently limited to the care team.

The guidelines for multimorbidity should include different possible pathways based on evidence to support health providers and patients to make an informed decision. There is no availability of such guidelines nowadays.

Electronic patient records, exchange of patient information and uniform coding of patients' health problems: As explained above, one of the most challenging aspect of the design of new care models are information sharing systems that need to be safe due to their sensitive information as well as accessible from all the care providers. In most of the current systems electronic health records are not accessible to the whole care team and different stakeholders use different IT systems making the exchange of information cumbersome. Professionals do not receive appropriate training in the coding system and duplications and errors are frequent. Information systems do not offer options to summarise patient's progression and status data effectively. Suboptimal information sharing increases the risk of adverse effects in the care and treatment such as drug-drug interaction, increases patients and care providers uncertainty and decreases trust in the system and therefore patient's compliance with their treatment.

From the system perspective, ineffective data collection and coding undermine the possibilities of system.

What is more, the adoption of information and coding systems are costly and difficult. They should adapt easily to new care delivery models and be modifiable to new populations needs. However, they usually offer little flexibility, the changes are costly and time-consuming, so there is a high resistance to change the systems making using tools outdated and inefficient.

Information sharing limitations and legislation beyond health system organisation borders: In many countries health systems within a country are organised in regions and the boundaries of the information sharing system are limited to the health provider in the region. There is a need to acknowledge that people with multimorbidity travel from one region to another, and from one country to another more easily and frequently than in the past, mostly between European countries for short, intermediate or longer periods. It is necessary to find strategies to share information saved in local health systems among European regions and countries ensuring data safety and patients' confidentiality but providing continuity of care to patients.

Socio-economic disparities: There is a lack of tools to address the effect social determinant of health and their impact at population health level regarding multimorbidity as well as risk stratification strategies to include socio-economic information to adapt preventive measures.

Medication delivery model: Drug delivery model need to acknowledge the current challenges regarding to polypharmacy, the need to include drug and disease-interaction in the research agenda and adapt current drug presentation to improve their suitability for complex situations.¹²⁴

¹²⁴ Gnjidic, Husband, y Todd.

Decision support

Demand side

Implementation of evidence-based practice: Currently most of the guidelines and research focus in disease-specific situations that do not answer to many multimorbidity patients' need. The problem with multimorbidity also lies on the fact that the combination of different conditions, differences in social support and grades of patients' autonomy result in countless different situations the social and health care need no answer individually as well as taking into consideration the preferences and values of patients. There is a need of improving evidence in multimorbidity conditions beyond disease-specific approaches, including interaction between different diseases, interaction between different treatments and drugs and offering best informed and educated individualised options.¹²⁵

Computerizes clinical charts: All members of the multidisciplinary team should have access to patient's health records. The information exchange should be available, with high quality information and avoiding unnecessary information. Information should be precise, short, updated and easy-to-understand for all the team the current situation, the progression rate, the discussions and decisions made in the past and updated agreed care plan. The information sharing should use a standardised tool and a standardised language regarding to symptoms, diagnostics, drugs and all the other treatments and decisions included in the care plan.

Training members of the multidisciplinary team: Multimorbidity management is complex both from the technical skill and from the team management and coordination perspective. All members involved in the care of patients should have high level technical training: to assess and manage patients' situation comprehensively, to take into account the existing evidence and adapt existing knowledge to the specific situation, to respect patients' values and desires during the co-production of their individualised care, to empower patients, to train and help patients and their carers in the self-management. On the other hand, they should all be trained in team coordination, role definition, decision making processes, communication strategies and all the tools, including technological innovations, involved in patients' care.

Developing consultation system to consult professional experts: The most complex cases would frequently need high level expert consultation outside the core care team to solve a problem. The team should be able to access to experts easily and without significant delay.

Care delivery shortcomings/"Paint points"

Implementation of evidence-based practice: There is a lack of multimorbidity-centred approach in current guidelines which are based on specific diseases so current guidelines need to be applied with caution. Professionals need to be aware of the possible disease-interaction and drug-drug interaction. Computerized standardised clinical charts would help in the decision-making process.

Avoid low-value based diagnostics and therapeutic interventions: All interventions that have shown to be non-beneficial or harmful need to be avoided. There is a need to systematic review of the existing evidence and guidelines to discourage professionals to offer unnecessary treatments and promote a better use of resources.¹²⁶ In the past research has been focus on the underuse of resources but there is an increasing need to tackle the overuse of resources, specifically in complex situations. There are initiatives supporting this approach such as Prudent Health Care in Wales, Choosing Wisely, Smarter Medicine, "Klug entscheiden" for example, but wider dissemination, better training and education tools are necessary.¹²⁷

Training members of the multidisciplinary team:

Multimorbidity situations include a huge variety of combinations and complexity levels. Whereas low and intermediate risk patients are more easily managed by teams, more complex situations increase uncertainty due to lack of training on technical skills, and team management and coordination. Therefore, high-risk patients are at higher risk of poor-quality health care and outcomes.

¹²⁵ Davide L. Vetrano et al., «An International Perspective on Chronic Multimorbidity: Approaching the Elephant in the Room», *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences* 73, n.º 10 (11 de septiembre de 2018): 1350-56, <https://doi.org/10.1093/gerona/glx178>.

¹²⁶ Edouard J. Battegay y Marcus Cheetham, «Choosing Wisely - An International and Multimorbid Perspective», *Zeitschrift Fur Evidenz, Fortbildung Und Qualitat Im Gesundheitswesen* 129 (diciembre de 2017): 27-30, <https://doi.org/10.1016/j.zefq.2017.10.010>.

¹²⁷ Battegay y Cheetham.

Access to external experts by the team to improve their knowledge and to support complex situation management should be guaranteed.

Teams should have clear protocols and pathways on patient management and decision-making processes, good and updated information sharing processes, and clear problem-solving protocols. All team members should be aware and trained on the existing protocols and pathways.

High turnover rates in teams put at risk the stability and smoothness of the team management and coordination and the care of the patients. The system should encourage the creation of stable teams as well as guarantee all new team members are fully trained when they become a new member or the team.

Developing consultation system to consult professional experts: Access to experts is usually difficult by the teams. On one hand, it may be difficult to know and access the experts in a field. On the other hand, the difficulties in bureaucracy and the delay in responses in the access to the experts may make the effort futile and both the team and the patients may feel abandoned.

Self-management support

Demand side

Training of care providers to tailor self-management support based on patient preferences and competencies: Patients with multimorbidity and their carers should be trained and supported to self-manage their symptoms as much as possible. The team should be able to assess the capacity and capability of the patients and their carers; appreciate, respect and include patients' values, desires and decisions in their care; and tailor their self-management plan accordingly.

Providing options for patients and families to improve their self-management: Patients, their families and carers should receive the best education possible to increase their health literacy, increase their capability to strengthen patients' self-managements and the efficacy of their self-care. Apart from training by their care team, educational material should be created and available for the patients in adapted language and other communication material. Other platforms as group-activities, patients' platforms with professional support, online and face-to-face options should be considered and offered. New technological options including self-monitoring, telehealth and other devices use should be considered when available to help in patients' monitoring and self-knowledge and self-management. Patients' family and carers should be involved as much as possible with the permission of the patient.

Shared decision making (care provider and patients): Patients with multimorbidity, including all the spectrum of complexity have two main problems during their care: on one hand, the engagement and compliance with treatment (either with preventive, maintenance or exacerbation treatment approach); and on the other hand, the increase in insecurities and mistrust with their care team during the worsening of their condition, and the support and respect of their choices during the process. Patients' involvement in their care plan design and decision-making processes would increase trust with the team, help in the understanding of the expected progress and foresee and plan responses to future complications.

Patient-operated technology allowing patients to send information to their care providers: Good monitoring of the symptoms and conditions of patients with multimorbidity is essential for their care. Patient-operated technology would facilitate self-monitoring and the possibility to share this information with the care team would allow them to improve follow-up and react to patients' changes easier and without delay. The use of technology to monitor patients remotely would improve the follow-up of patients with accessibility difficulties but it would also help in decreasing the burden of hospital visits for all patients, as well as being supported by the care team.

Care delivery shortcomings/"Paint points"

Training of care providers to tailor self-management support based on patient preferences and competencies: The team should be trained in their communication skills, in the adaptation on language levels and in the use of other communication strategies. The team should also have strategies to motivate and support patients in their self-management, to increase treatment compliance as well as to increase their health literacy and empowerment to enable them in the

decision making. Many times, team members do not have skill or preparation to engage with patients and it is only based in their personal ability. The health system should support team member training and their access to educational material.

There is also a lack of tools to assess and understand the burden of treatment patients, families and carers have and, to assess the capacity to cope with this treatment burden. There is a need to improve evidence, guidelines, tools and strategies to support care providers and care team in the assessment of treatment burden and in its optimisation.¹²⁸

Providing options for patients and families to improve their self-management: The availability of training options and material that is adapted and personalised to different conditions is very irregular among health providers and services. The educational material should be adapted to local context and different capabilities, and available for patients and carer to revisit. The better education and knowledge patients have the more enable they will be to make informed decisions in their own care and engage with their care plan and treatment.

Shared decision making (care provider and patients): Care providers should be trained to offer the best possible information to patients and empower them for the decision-making process. There is a need of training on language and capability adaptation. On the other hand, the information technologies allow patients easier access to information even though information on internet may be misleading and may increase anxiety to patients. Patient-care provider relationship and trust is also hampered if the information is contradictory.¹²⁹ New strategies to lead patients to good quality information are needed and care providers need to be trained to face well informed patients as well as misinformed patients to guide them to good information sources and manage the resulting conflicts.

Patient-operated technology allowing patients to send information to their care providers: There is a lack of existing and adapted devices and tools to allow direct communication between patient and care providers. Medical devices, supportive aids and health monitoring tools should be user-friendly and support strategies should be available. Patients should receive adequate training about how and when use the existing tools and there should be a prompt response and easy contact to support and solver patients with errors in patient-operated technology errors.

Care team should have access to the information shared by patients easily and in a simplified way to detect abnormalities that need to be reviewed. The systems should get improved functions and formulas to balance the risk of missing a significant abnormality and the enormous workload if no significant data need to be reviewed regularly. Care team should also be trained in the protocol of the review and react process of the monitoring data they receive.

However, not all patients feel comfortable or prefer using devices and eHealth technologies. There is a need to develop strategies and risk stratification tools to identify target population eHealth strategies should be offered.¹³⁰ Professionals need to be trained in the correct and good use of technologies and to balance face-to-face interaction with technology contact adequately.

Social and community resources

Demand side

Supporting access to community and social-resources: Patients with multimorbidity have further needs beyond the health care. The progression of different conditions often affects patients' autonomy and depending on the burden of the care both the patients and the carer loss social network increasing their risk of isolation. There is a need to integrate social capacity and capability aspects of patients and their family in their care.

Involvement of social network (informal), including friends, patients' associations, family and neighbours: It is important to engage patients, families and carer with informal community resources such as patients' associations, support groups and social activities and networking. Beyond face-to-

¹²⁸ Mair y Gallacher, «Multimorbidity».

¹²⁹ Graham G. Macdonald et al., «EHealth Technologies, Multimorbidity, and the Office Visit: Qualitative Interview Study on the Perspectives of Physicians and Nurses», *Journal of Medical Internet Research* 20, n.º 1 (26 de 2018): e31, <https://doi.org/10.2196/jmir.8983>.

¹³⁰ Sidsel M. Runz-Jørgensen, Michaela L. Schiøtz, y Ulla Christensen, «Perceived Value of EHealth among People Living with Multimorbidity: A Qualitative Study», *Journal of Comorbidity* 7, n.º 1 (2017): 96-111, <https://doi.org/10.15256/joc.2017.7.98>.

face local initiatives to engage with local community, the possibilities information technology offer should be explored.

Care delivery shortcomings/"Paint points"

Supporting access to community and social-resources: Assessment tools, information sharing strategies, health and social professional's joint decision support and formal social resource provision should be improved. There are no comprehensive social support assessment risk stratification tools that are also integrated in the holistic health care assessment process. There is a need to detect patients' and carer's social networking and social support, risk stratification for losing of social support and isolation risk. At the population level, a multilateral information sharing strategies and access improving tools should be also developed to improve the co-design of the urban architecture and transport services for instance to improve access to people with diverse difficulties.

Involvement of social network (informal), including friends, patients' associations, family and neighbours: Strategies to facilitate access to community activities should be enhancing. Local and global communities could play a part in the support of patients and carers. Volunteer work and informal activities should also be better integrated in the community resource planning.

Integrated care procurement objectives (ICPOs) for multimorbidity

Integrated Care Procurement Objective
ICPO 12. Develop strategies and tools to support care teams with specialists for complex case management. Centralised expert team directories and protocols to access (even remotely) should facilitate the care of patients and increase the confidence of the team.
ICPO 13. Create and provide tools that promote patients' comprehensive assessment, including health and social variables but also the progression of the conditions and the decision-making processes.
ICPO 14. Develop drug interaction detection tools and integrate the role of pharmacist in the care team to optimise treatment and avoid risk. Research improvement and evidence-based guidelines for drug interactions are necessary to be included.
ICPO 15. Develop tools to help monitor patients with multimorbidity in real-life situations and share that information with the care team.
ICPO 16. Address the difficulties for treatment compliance in long-term and complex situations with polypharmacy. Develop strategies and tools to promote adherence assessment and detection of treatment fatigue as well as providing support for patients and family carers.
ICPO 17. Address the lack of information integration among different stakeholders and different health and social care providers, resulting in information fragmentation and increase risk of errors. This shall include the development of a summary of a patient's information, (e.g. needs, care plan, medication, care delivery schedule) with the content being subjected to local role based access rules, and made available to all care practitioners. The solution should also include the development of a standardised coding system to identify the patient's main problems and for the codes to be accurately mapped to the coding of other systems or documentation used by the care team.
ICPO18. Address the lack of training and resources in care teams to capacity building on technical skills on complex situations as well as team coordination protocols and strategies. Decision-making processes, patient-contact strategies, standardised language and coding system and the use of the existing tools need to be developed and all users need to have updated and regular training. Address the low effectiveness of some of the existing training strategies (such as checking lists to access to a job) and promote engaging and team building training processes.

Care delivery shortcomings and procurement objective definition for COPD**Overview**

The chronic lung disease COPD is characterized by reduced airflow, inflammation and flare-ups, called exacerbations, in which the patient may experience increased coughing, mucus, shortness of breath, wheezing, and a feeling of tightness in their chest. If those symptoms are not detected and treated in a timely fashion, they can escalate and lead to hospitalizations, disability and a diminished quality of life.

COPD is the third leading cause of death in the United States. By 2030, COPD will become the third cause of mortality and seventh cause of morbidity worldwide.

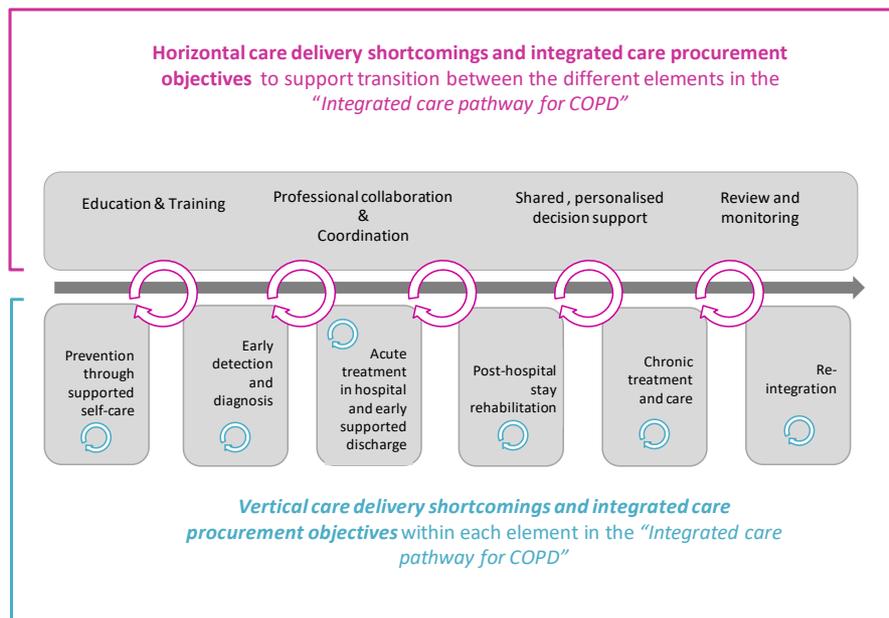


Figure 4. Integrated care pathway for COPD

Care delivery shortcomings/"Paint points"

Lack of consistency of prescribing between primary and secondary care: Good organisation of care across the interface between primary and secondary care is essential to guarantee patients' high quality care. Lack of communication between professionals in primary and secondary care is often cited as one reason for patients receiving their medicines not in a timely manner¹³¹. The lack of consistency between primary and secondary care was also criticized by COPD patients. There is evidence that including pharmacist in care teams decreases the risk for errors and help in the optimisations of the treatment.

Inconsistency and confusion about drugs and devices: A growing number of new drugs and inhaler devices enter the market annually. However, this may also cause inconsistency and confusion among patients but also among professionals on how to treat COPD.

Weak inhaler technique training: Most patients use their inhaler incorrectly, thereby becoming more susceptible to poor clinical control and exacerbations¹³². Inhaled therapy is the most widely used way to treat patients with COPD, but up to 90% of them do not use their inhalers correctly¹³³.

Separating cost and efficiency programmes from quality improvement and patient safety initiatives: Traditionally the NHS cost and efficiency programmes have tended to be divorced from quality improvement and patient safety initiatives. This disconnected approach means that any savings made from cost improvement programmes are made to contribute to the overall financial position and the opportunity is repeatedly missed to reinvest in high value care i.e. care that improves patient outcomes and reduces costs in the longer term.

Adherence across multiple aspects of therapy (including smoking cessation, physical exercise and activity, and medication adherence) remains low¹³⁴.

Services are often reactive focussing on responding to exacerbations rather than taking measures to prevent exacerbation or at least minimize its effects¹³⁵.

¹³¹ <https://www.england.nhs.uk/wp-content/uploads/2018/03/responsibility-prescribing-between-primary-secondary-care-v2.pdf>

¹³² <https://bmjopen.bmj.com/content/bmjopen/9/1/e022685.full.pdf>

¹³³ Lavorini F, Magnan A, Dubus JC, et al. Effect of incorrect use of dry powder inhalers on management of patients with asthma and COPD. *Respir Med* 2008;102:593–604.

¹³⁴ Blackstock FC, ZuWallack R, Nici L, Lareau SC (2016) Why don't our patients with chronic obstructive pulmonary disease listen to us? The Enigma of Nonadherence. *Ann Am Thorac Soc* 13: 317-323

¹³⁵ Williams L, Wilcox D, ZuWallack R, Nici L (2016) Integrated Care: What does this mean for the COPD Patient? *Chron Obstruct Pulmon Dis* 1: 15.

Integrated care procurement objectives (ICPOs) for COPD

Integrated Care Procurement Objective
ICPO 19. Simplify treatment guidelines and pathways in the treatment of COPD. To avoid confusion and inconsistency for patients and professionals, guidelines and pathways on how to use inhaler devices or medication should be simplified. These can support patients to control their medication and not lose the overview but also enable professionals to simplify the treatment for the individual patient.
ICPO 20. Promote e-learning and mHealth applications for inhaler technique training. E-learning and mHealth applications can support the correct inhale techniques by patients for instance with applications on the smart phone. Thereby, patients can practice at home whenever they want to on their phones and clinics are relieved as well as the risk for exacerbations can be reduced.
ICPO 21. Address the lack of tools to assess the capacity and capability of patients and carers to deal with the treatment burden. Include relevant stakeholders such as pharmacist to optimise treatment, detect errors in medication and interactions, adapt presentations if needed and support the team in their decision-making processes.
ICPO 22. Find solutions and tools to support the improvement of self-efficacy and to support education and training as well as motivation and behaviour change.
ICPO 23. Address the lack of understanding of the processes involved in long-term treatment compliance. Treatment compliance needs to be understood with a holistic approach. There is a need for tools and strategies to monitor patients' compliance to treatment, to detect and analyse the problems if there is a fatigue and to support them with the adherence.
ICPO 24. Address the lack of training and available material to support teams and patients in the self-management development. There is a need to develop motivational and educational material, adapted to local context and different capacities to support care teams and patients in their self-management.
ICPO 25. Develop drug interaction detection tools and integrate the role of pharmacist in the care team to optimise treatment and avoid risk. Research improvement and evidence-based guidelines for drug interactions are necessary to be included.

Care delivery shortcomings and procurement objective definition for Aortic Stenosis

Overview

Aortic stenosis (AS) can be congenital or degenerative and is the most common heart valve disease worldwide^{136 137}. It can occur due to many causes (e.g. rheumatic fever or a congenital heart defect) though this condition more commonly develops during ageing as calcium or scarring damages the valve and restricts the amount of blood flowing through the valve¹³⁸. In Europe, approximately one million people over 75 years suffer from severe aortic stenosis (AS), one of the most serious and most common valve diseases, and this disease burden is increasing with the aging population¹³⁹.

The presence of calcific valve disease is associated with older age, male gender, elevated serum lipoprotein levels, diabetes, smoking, metabolic syndrome, and hypertension¹⁴⁰. Aortic Stenosis is a degenerative and progressive disease and sooner or later a valve replacement is mandatory in order to prevent irreversible hemodynamic changes¹⁴¹. Before however symptoms occur, aortic stenosis is preceded by a silent, rather long lasting latent phase characterised by a slow

¹³⁶ Supino PG, Borer JS, Preibisz J, et al. : The epidemiology of valvular heart disease: a growing public health problem. *Heart Fail Clin.* 2006;2(4):379–93.

¹³⁷ Pibarot P, Dumesnil JG: Prosthetic heart valves: selection of the optimal prosthesis and long-term management. *Circulation.* 2009;119(7):1034–48.

¹³⁸ <https://www.mayoclinic.org/diseases-conditions/aortic-stenosis/symptoms-causes/syc-20353139>

¹³⁹ Thoenes, M. et al (2018). Patient screening for early detection of aortic stenosis (AS)—review of current practice and future perspectives. *Journal of Thoracic Disease.* 2018 Sep; 10(9): 5584–5594.

¹⁴⁰ <https://academic.oup.com/eurheartj/article/31/4/416/417799>

¹⁴¹ Mathias Van Hemelrijck et al (2018). Recent advances in understanding and managing aortic stenosis. *F1000Res* (2018) 7:58.

progression at the molecular, cellular, and tissue levels¹⁴². The disease is often mis-diagnosed and often under-treated.

Aortic stenosis (AS) is associated with a significant reduction of life expectancy and a decline of quality of life. AS is one of the most prevalent cardiac valve diseases among the elderly that requires frequent consultations with the healthcare system, hospital admissions and often interventionist treatment. Symptoms include osteoarthritis, fatigue, chest pain and dizziness or loss of consciousness. However, in some cases the AS is asymptomatic. The diagnosis is based on symptoms, the finding of a typical cardiac systolic murmur and the confirmation of the valvular lesion with cardiac imaging techniques, mainly echocardiography. Once an AS has been diagnosed and there are several treatment options: surgical treatment, treatment with catheter interventions or palliative care supported by drug treatment.

The European Society of Cardiology recommends the consultation of a multidisciplinary heart team in the management of valvular heart disease, heart failure, and myocardial revascularization. Such a heart team normally consists of cardiologists, cardiac surgeons, interventionists, imaging specialists, anesthetists and midlevel providers. In specific cases the expert opinion of a general practitioner, geriatrician or intensive care specialist can be of additional value¹⁴³. According to current evidence, TAVI appears to be an optimal solution (TAVI-in-valve) in high surgical risk populations¹⁴⁴. For other population segments, conventional open heart surgery remains the optimal treatment. For those clients who cannot undergo a TAVI or an open heart surgery, treatment with drugs is the only option currently.

Recent advances in telemonitoring technologies create opportunities to monitor electrocardiogram (ECG) and vital signs remotely, facilitating redesign of follow-up trajectories. A particularly interesting application of mobile health is telemonitoring, in which mobile sensor applications facilitate remote follow-up of physiological parameters. Accordingly, telemonitoring systems that track vital parameters can create alternative strategies for current in-hospital monitoring. With this approach, patients are no longer confined to the hospital for follow-up of the ECG or other vital signs, which opens doors to redesigning the post-procedural patient trajectory¹⁴⁵. For the TAVR population, the introduction of remote monitoring technologies raises the possibility of shortening hospital stay length in eligible patients without abstaining from follow-up of pacemaker dependency. As mentioned previously, this can promote fast rehabilitation, procure a patient-friendly post-procedural trajectory, and optimize use of hospital bed capacity¹⁴⁶. However, further research regarding the effectiveness of this concept is required, involving evaluation of the overall effects on patient outcome, efficiency, and cost-effectiveness¹⁴⁷.

¹⁴² Marquis-Gravel et al (2016). Medical Treatment of Aortic Stenosis. *Circulation*. 2016;134:1766–1784.

¹⁴³ Christiaan F. J. Antonides, Michael J. Mack & A. Pieter Kappetein (2017) Approaches to the Role of The Heart Team in Therapeutic Decision Making for Heart Valve Disease, *Structural Heart*, 1:5-6, 249-255, DOI: 10.1080/24748706.2017.1380377

¹⁴⁴ Mathias Van Hemelrijck et al (2018). Recent advances in understanding and managing aortic stenosis. *F1000Res* (2018) 7:58.

¹⁴⁵ Hermans, M.C. et al (2018). Remote Monitoring of Patients Undergoing Transcatheter Aortic Valve Replacement: A Framework for Postprocedural Telemonitoring. *JMIR Cardio* 2018 (Mar 16); 2(1):e9.

¹⁴⁶ van Mourik, M. S. et al (2019). Percutaneous treatment of aortic valve disease: Towards optimal patient outcomes.

¹⁴⁷ Hermans, M.C. et al (2018). Remote Monitoring of Patients Undergoing Transcatheter Aortic Valve Replacement: A Framework for Postprocedural Telemonitoring. *JMIR Cardio* 2018 (Mar 16); 2(1):e9.

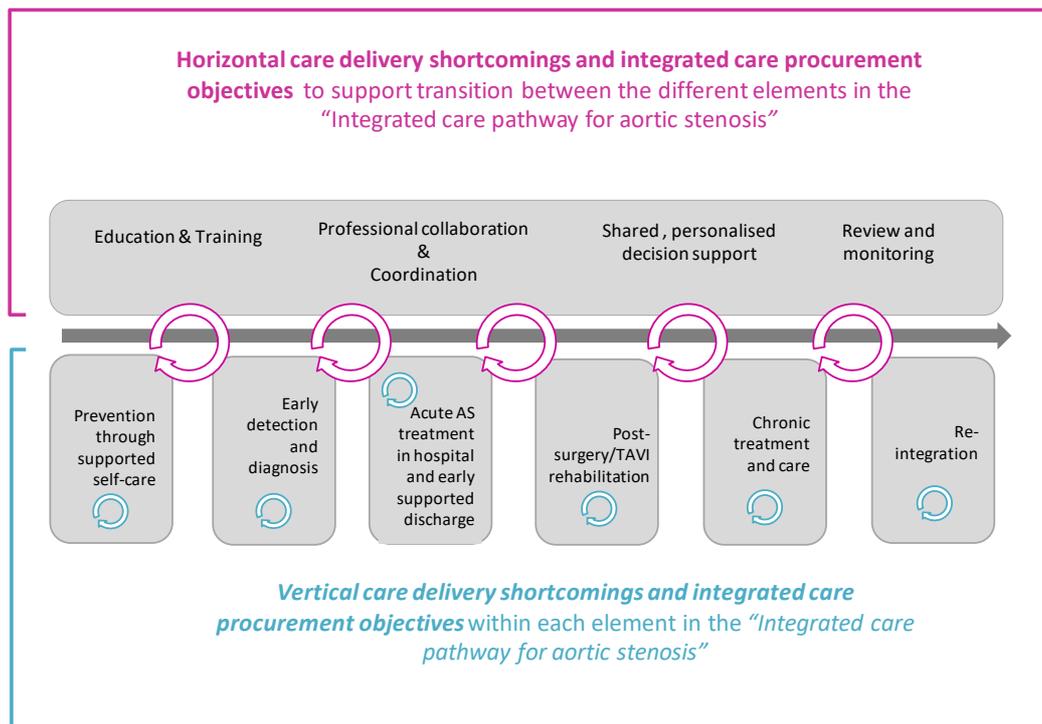


Figure 5. Integrated care pathway for aortic stenosis

Care delivery shortcomings/“Paint points”

Awareness is low and poses an additional risk to early detection as patients tend to present to late to healthcare services: Early detection is of great importance as degenerative aortic stenosis (AS) is associated with a high mortality if diagnosed late and if no valve replacement therapy is performed. Symptoms might remain hidden in a latent asymptomatic stage of the disease until signs of left ventricular (LV) impairment appear¹⁴⁸. Once symptomatic, AS prognosis is poor unless surgery or TAVI is performed¹⁴⁹. The biggest catalyst for the implementation of successful disease screening measures is to increase public, patient and physician awareness of AS. According to a recently published survey in almost 9,000 subjects aged ≥ 60 years across nine European countries, only 2% of the respondents expressed concerns about VHD. In contrast, 28% of study patients were concerned about cancer and 25% about Alzheimer’s disease. When patients were asked about their knowledge of AS, 92% of respondents had no knowledge of the condition or provided an incorrect definition¹⁵⁰. Many patients who develop symptoms remain undetected in clinical practice because of lack of follow-up or access to care, or because they have subconsciously, often unconsciously, adapted by decreasing their level of activity to avoid symptoms¹⁵¹. Further to this, factors such as waiting lists for diagnosis or budget limitations for treatment in early onset stages are delaying early detection.

Ease the “watchful waiting” time for patients and train patients on early onset symptoms. Many patients of mild-to-moderate AS are in “watchful waiting”. In watchful waiting, the patient has been diagnosed with AS. However, the severity of the disease does not yet require SAVR or TAVR¹⁵². The watchful waiting does however require that patients recognize and promptly report any symptoms and that they return to the hospital for a follow-up echocardiogram¹⁵³.

¹⁴⁸ Mathias Van Hemelrijck et al (2018). Recent advances in understanding and managing aortic stenosis. F1000Res (2018) 7:58.

¹⁴⁹ Redfors, B. et al (2017). Stress Testing in Asymptomatic Aortic Stenosis. Circulation 135, No. 20. 2017;135:1956–1976.

¹⁵⁰ Thoenes, M. et al (2018). Patient screening for early detection of aortic stenosis (AS)—review of current practice and future perspectives. Journal of Thoracic Disease. 2018 Sep; 10(9): 5584–5594.

¹⁵¹ Redfors, B. et al (2017). Stress Testing in Asymptomatic Aortic Stenosis. Circulation 135, No. 20. 2017;135:1956–1976.

¹⁵² <https://www.heart-valve-surgery.com/heart-surgery-blog/2017/10/24/aortic-stenosis-progression-dr-kevin-accolla/>

¹⁵³ John Campo, Andrea Tsores, Jane Kruse, Azad Karim, Adin-Cristian Andrei, Menghan Liu, Robert O. Bonow, Patrick McCarthy, S. Chris Malaisrie. Prognosis of Severe Asymptomatic Aortic Stenosis With and Without Surgery. The Annals of Thoracic Surgery, 2019; DOI: 10.1016/j.athoracsur.2019.01.031

Lack of cooperation and coordination with social support services and uncoordinated Follow-Up management: Out of hospital follow up is limited and the need to improve follow-up is especially relevant for the population of older people. They need special attention during follow-up (FU) to achieve a successful outcome and avoid early and late complications affecting patients' survival and quality of life¹⁵⁴. The large majority of especially TAVI patients are very old, with many co-morbidities, sometimes with a low socio-cultural level, often alone and without family support. These conditions may lead to substantial management problems which can be summarized as follows:

- Lack of family support and poor compliance to therapy and out-patient visits
- Therapy adjustments
- (Recurrent) hospitalizations¹⁵⁵

Telemonitoring can be used to improve follow-up procedures for patients, but further research regarding the effectiveness of this concept is required^{156 157}.

Educational support for patients should be improved: The existence of different treatment options can for example be confusing for the patient. It is this important that, when diagnosed with aortic stenosis, the patient, their family and caregiver understand what aortic stenosis is, and how it can be treated. There is no ICT-Tool for patients' decision support; decisions aids are just available as print material or online booklets. An easy-to-use iPad app exists, explaining the disease, its treatment options and, importantly, what happens after discharge from the hospital, when the level of care is reduced and additional support becomes very important. Dubbed the "Aortic Stenosis Patient Journey iPad App," nursing staff, as well as patients and their family, can download this tool from the iTunes store for free¹⁵⁸.

There seems to be a need for a multidisciplinary valve service to improve monitoring, evaluation, documentation, and timing of intervention for patients with aortic stenosis. Key elements would be to ensure effective, multidisciplinary communication between team members, including echocardiographers and clinicians, co-ordinators, interventional cardiologists, and cardiothoracic surgeons as well as shared-decision making processes, also considering the level of fragility of a patient, patients' preferences, needs and values¹⁵⁹. In order to monitor the extensive set of diagnostic and therapeutic options it is suggested that decision making is performed in a multidisciplinary team, i.e. a Heart Team¹⁶⁰. "Another advantage of the Heart Team is that the pre-operative diagnostic work-up will become more standardized, since a protocolized and complete pre-operative assessment is a requirement to have a successful multidisciplinary meeting. Finally, an open discussion about therapeutic options in complex patients creates an environment for clinicians to discuss and expand their knowledge. Moreover, complex cases sometimes require creative solutions which are not always supported by protocols and guidelines. The Heart Team offers a platform for "creative solutions," and an opportunity to share responsibility for these treatments. Finally, these discussions can deliver an important contribution to the education of medical students and clinical residents in one of the most difficult and rapidly evolving subjects of medicine.¹⁶¹"

Integrated care procurement objectives (ICPOs) for multimorbidity and cutting across conditions

Integrated Care Procurement Objective- Multimorbidity

¹⁵⁴ Aranzulla, T. C., De Benedictis, M. and Riccardo Asteggiano (2016). Follow-up management after transcatheter aortic valve implantation (TAVI). E-Journal of Cardiology Practice Volume 14.

¹⁵⁵ Aranzulla, T. C., De Benedictis, M. and Riccardo Asteggiano (2016). Follow-up management after transcatheter aortic valve implantation (TAVI). E-Journal of Cardiology Practice Volume 14.

¹⁵⁶ van Mourik, M. S. et al (2019). Percutaneous treatment of aortic valve disease: Towards optimal patient outcomes.

¹⁵⁷ Hermans, M.C. et al (2018). Remote Monitoring of Patients Undergoing Transcatheter Aortic Valve Replacement: A Framework for Postprocedural Telemonitoring. JMIR Cardio 2018 (Mar 16); 2(1):e9.

¹⁵⁸ http://www.ptca.org/news/2016/0125_MEDTRONIC_AS_IPAD.html

¹⁵⁹ Frey, N., Steeds, R.P., Serra, A. et al. BMC Cardiovasc Disord (2017) 17: 5. <https://doi.org/10.1186/s12872-016-0439-4>

¹⁶⁰ Christiaan F. J. Antonides, Michael J. Mack & A. Pieter Kappetein (2017) Approaches to the Role of The Heart Team in Therapeutic Decision Making for Heart Valve Disease, Structural Heart, 1:5-6, 249-255, DOI: 10.1080/24748706.2017.1380377

¹⁶¹ Christiaan F. J. Antonides, Michael J. Mack & A. Pieter Kappetein (2017) Approaches to the Role of The Heart Team in Therapeutic Decision Making for Heart Valve Disease, Structural Heart, 1:5-6, 249-255, DOI: 10.1080/24748706.2017.1380377, p. 250.

ICPO 26. Include relevant stakeholders such as social carers and pharmacies in prevention: The interface to patients and their access to services should capitalise on the fact that social workers and pharmacies can be in frequent contact with at-risk patients and so can play a strong role in prevention and early detection. Furthermore, solutions should capitalise on new technologies to increase awareness and outreach among the general population and especially high-risk population segments.
ICPO 27. Find solutions that address the often uncoordinated follow-up of clients discharged from hospital and that support shared-decision making processes, also considering values, needs and preferences of the clients. Innovative solutions should tackle the need of patients and family carers receiving the necessary training to enable a successful transition to the home environment. Patients and family carers often receive insufficient advice on the psychological and emotional impact of aortic stenosis, the impacts of a surgery or TAVI and how they can manage these complex feelings. Furthermore, it seems to be difficult to find and access information and assistance on care and support services after discharge from hospital. Solutions should also enable a better addressing of the current lack of proactive follow-up either from primary care, the hospital, allied healthcare professionals, and/or social care services.
ICPO 28. Answer client information needs that change over time. ICT tools shall facilitate self-care and management during recovery at home from the patient's perspective.
ICPO 29. Address lack of electronic care record data integration from technologies designed to motivate and educate people as well as enhance the interface between person and their care team.
ICPO 30. Find solutions that support the multidisciplinary valve service to improve monitoring, evaluation, documentation, planning, and timing of intervention for patients with aortic stenosis.
ICPO 31. Find solutions facilitating peer-to-peer support. Solutions targeted at self--supporting (perhaps with a regional coverage), and access to experts or expert patients are relevant here too.
Cross- cutting Integrated Care Procurement Objective
ICPO 32. Intervention strategies should be personalised in terms of timing, frequency, composition, content, etc. according to contextual changes (change in behaviours, lifestyle, health state and knowledge) throughout life. Choices will be offered in terms of psychological strategies such as rewards for quick wins, celebrating the small successes, or gamification. The solution is to clearly help identify strategies on how to implement healthier behaviour in day to day situations. The solutions therefore will enable the patient to set realistic, measurable and achievable goals and offer measurement criteria that indicate success.
ICPO 33. Address the need to improve risk assessment strategies with a holistic approach to identify patients and families beyond disease-specific risk stratification tools. There is a need to integrate disease-interaction and drug-drug interaction risk, rapid progression risk, risk of high need of resources, social exclusion risk, the risk of unbearable treatment burden or the risk of psychological difficulties. The interface to patients and their access to services should, amongst others, capitalise on the fact that pharmacies can be in frequent contact with at-risk patients and thus can play a strong role in prevention and early detection.
ICPO 34. Provide multiple communication channels (e.g. portals, APPs, secure chat, videoconference), in addition to the usual paper-and-pencil and phone calls,e.g. <ul style="list-style-type: none"> • To share the individual's care plan and the notes on its delivery among the care team members; • To facilitate the remote contacts (e.g. WhatsApp-like) between the care team/stakeholders; • To manage a patient's feedback on the appropriate execution of his/her planned self-management tasks; • To generate/notify/rank alerts in case of need, perhaps after a filter made by a Contact Centre."
ICPO 35. Create easy-to-understand and adaptable, personalised educational and motivational materials reflecting local languages, and contexts, cultures and capacities to empower patients and family carers in the self-management and decision-making process.

ICPO 37. Address the need to improve information sharing between patients and care practitioners, regarding both the monitoring process of patients' conditions as well as more informal communication on decision-sharing or difficulties during treatment.

3. Prioritisation of Procurement Objectives by the Euriphi Regions and PPOs

Methodology for Integrated Care Procurement Objective selection

The aim of WP3 in Euriphi is to undertake a series of activities to gain insights and organise the demand side around a small set of Integrated Care Procurement Objectives (ICPO) that address existing care delivery shortcomings. The objective is to identify care delivery shortcomings in the selected topics and prioritise the 3-4 main procurement objectives.

After the selection of topics and systematic desk-top research analysis the next step was to prioritise the main procurement demands with the aim of selecting the top three or four priorities that will be subject to the Open Market Consultation (OMC) in October.

The selection process includes: 1) First survey to the organisations involved in Euriphi; 2) Discussion of the results with the organisations involved in Euriphi; 3) Second survey addressed at regions, PPOs and care delivery organisations across Europe; 4) Consultation to Euriphi Advisory Board.

Survey addressed at care delivery and public procurement organisations involved in Euriphi

The aim of the survey was to collect feedback from the procurement and care delivery organisations involved in Euriphi:

- to understand their priorities in relation to the some of the identified procurement objectives,
- to identify if a PPO and/or care delivery organisation had already implemented an innovative solution to address one of the ICPOs elicited from the desk-top research exercise, and
- to identify if a PPO and/or care delivery organisation had already implemented an innovative solution to address one of the ICPOs elicited from the desk-top research exercise, and
- to gather any additional potential procurement objectives, we have not identified which may be a priority for your organisation on the existing topics or other integrated care topics.

The survey was structured along the five topics mentioned above: Stroke, Dementia, COPD, aortic stenosis and Multimorbidity. In the survey, Euriphi regions and PPOs were asked to rate each of the 36 Integrated Care Procurement Objectives according to its importance for a future procurement activity in their region/ organisation. We did not want to learn whether they generally think that it is an important topic, but rather whether their region/organisation intends to start any procurement activities in the future (within the next 2-3 years).

The survey was set-up as a LimeSurvey and questions ordered per topic (cf. pdf version of the Limesurvey in Annex I). Euriphi regions and PPOs were asked to rate each ICPO on a 5- point scale:

- 1= Not at all important
- 2= Slightly important
- 3= Important
- 4= Fairly important
- 5= Very important

The survey was completed by 8 care delivery and public procurement organisations involved in Euriphi (FDG, NHSCS, ARESS, FPT, NWSSP, RSD, AQUAS and RESAH).

Stroke

Stroke is a complicated, heterogeneous condition with acute onset but complex and enduring treatment and follow-up. Consequently, stroke care is complex and covers a whole spectrum of care including acute care, rehabilitation and long-term care with both in-hospital, outpatient and community-based care. Stroke care is thus per definition multidisciplinary and the integration of care is of particular concern.

*© Image Care 2012 On Dec 12 4:15. Answers will be an integral part of stroke patient's electronic records. Immediate FHIR format. Aggregates ICD Selection. Library V1.0 User Help.

Please rate the following ICPO according to its importance for a future procurement activity in your region/organisation:
 "Address lack of electronic care record data integration from technologies designed to motivate and educate people as well as enhance the interface between person and their care team."

1 2 3 4 5

1= Not at all important
 2= Slightly important
 3= Important
 4= Fairly important
 5= Very important

Is an innovative solution addressing this ICPO already existing in your region/organisation?

Yes No

If yes, can you describe the solution in a few sentences?

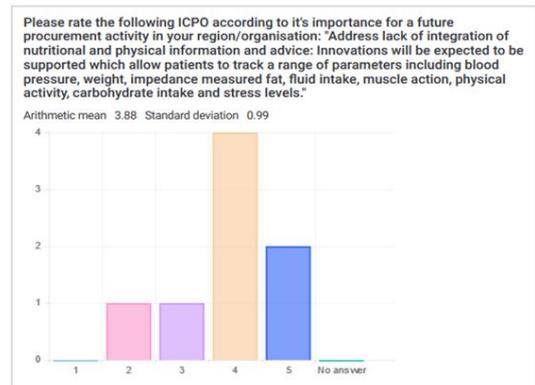
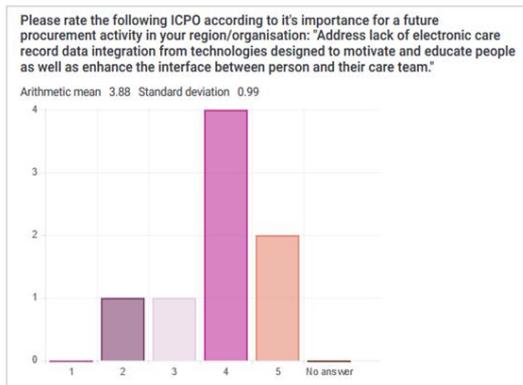
Figure 6. WP3 LimeSurvey addressed to Euriphi regions/PPOs-Example questions

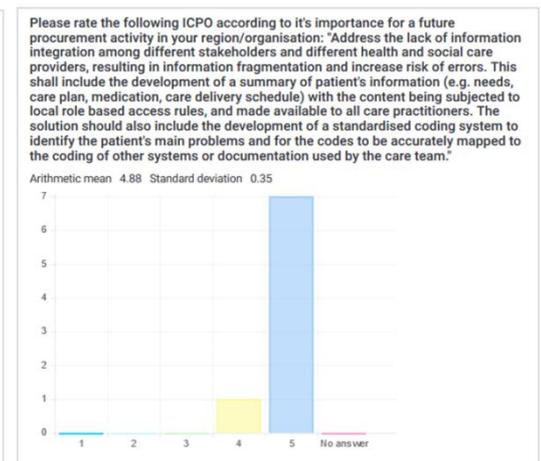
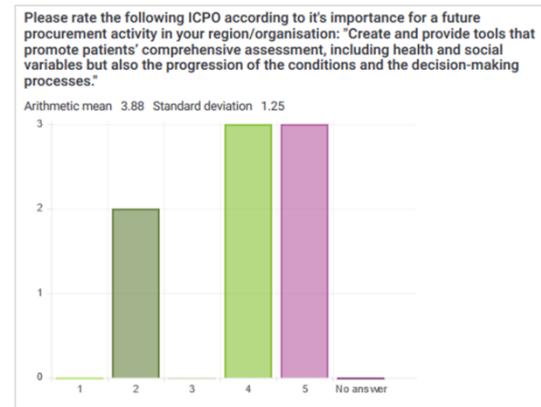
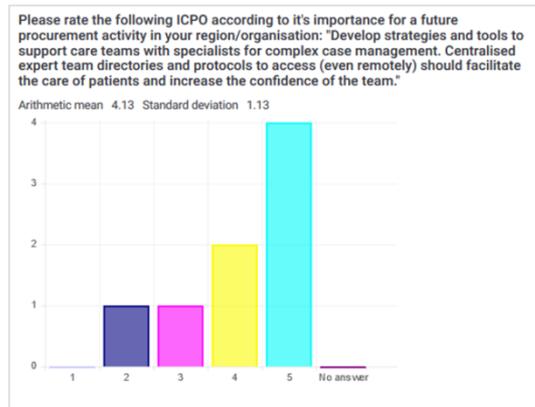
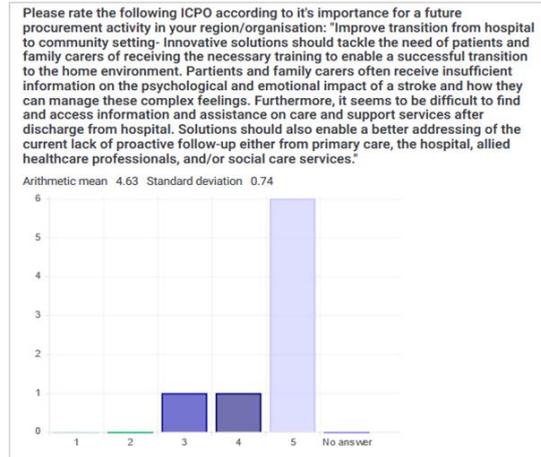
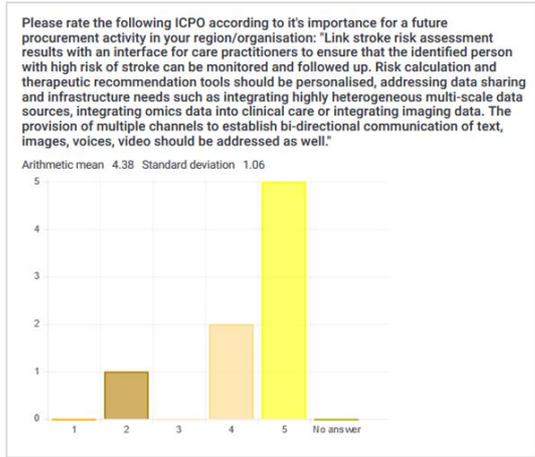
Prioritisation criteria and results analysis

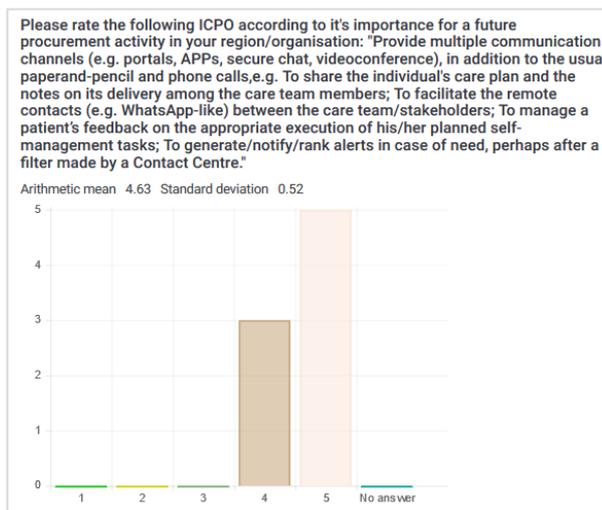
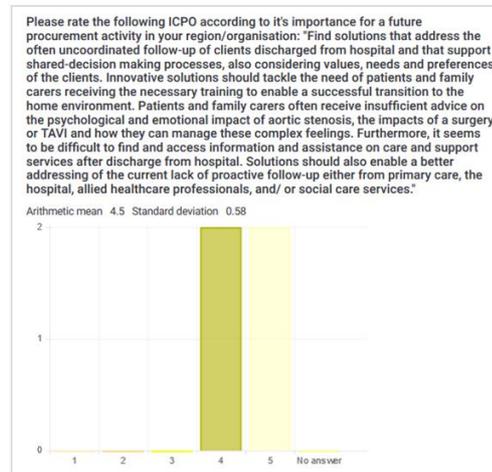
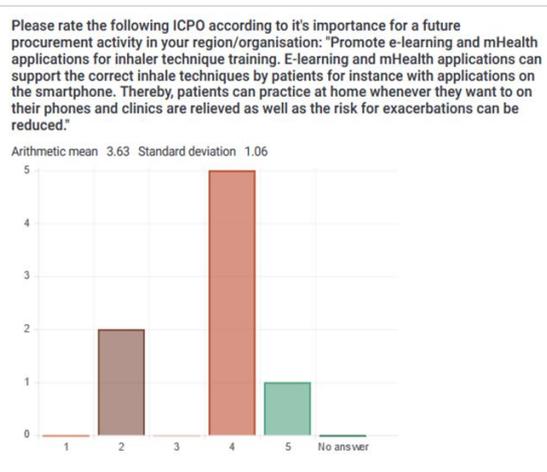
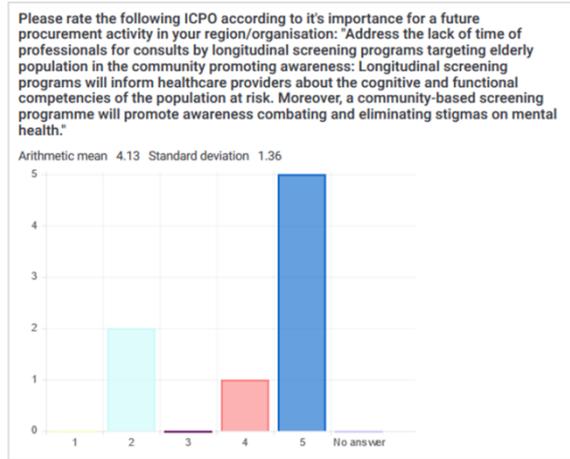
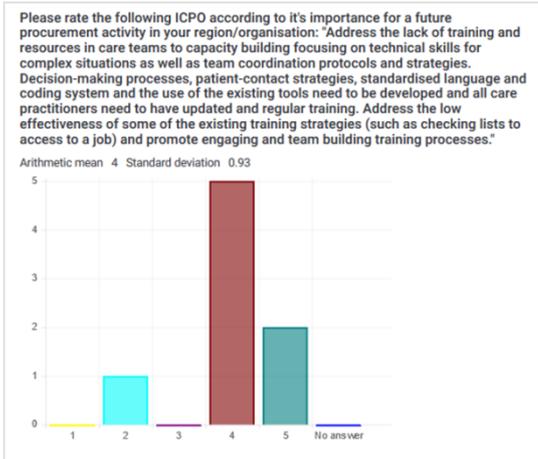
All ICPOs were analysed and those included in the shortlist that met the following criteria:

- At least 5 regions/PPOs rated with score 4;
- Highest score for each topic

This prioritisation analysis led to a shortlist of 13 ICPOs. Scorings for the ICPOs that were included in the shortlist are presented below.







Short-list of procurement objectives

Integrated Care Procurement Objective	Main care delivery shortcoming(s)
Stroke	
<p>Address lack of electronic care record data integration from technologies designed to motivate and educate people as well as enhance the interface between person and their care team.</p>	<p><u>Existing tools are too simple, not personalised and lack integration:</u> Current approaches to nutrition and supplementation are often based on single advice without lasting support. Current tools mainly focus on diet, take a quite simple approach, do not sufficiently personalise according to patient characteristics and lack the support required to be successfully adopted by the majority of those at risk / patients. Available approaches seem not to have considered that some goals are easier to achieve than others and that some goals need to be prioritised over others. Such nutritional support is mainly stand-alone and not yet, as it should be, well integrated with day-to-day activities. Many studies also only report results for all strokes combined and there are limited data on diet in relation to different types of a stroke. Where physical activity is addressed, this is mainly in isolation from diet. Most activity trackers also lack the accuracy necessary for medical decision making and lack integration functionalities towards EHRs or medical records.</p> <p><u>Lack of bi-directional connectivity of devices:</u> Connectivity is another issue with most products on the market. If connectivity is available it is unidirectional, only supporting transferring values out of the device. Any input, including adaptation to therapy parameters, therefore needs to be manually set. There are innovative, medical grade devices, but these tend to be costly and therefore only suited to research use rather than widespread adoption.</p> <p><u>No real harnessing of ICT and technology features in health promotion:</u> ICT „tools“ today do not take real advantage of ICT but print information (perhaps in PDF) for clinicians and patients. Online tools we have found are limited to a single language domain, and not integrated even with health records.</p> <p><u>Lack of semantic interoperability is still a significant barrier to re-use of data from diverse sources:</u> There is a current lack of implemented standards for clinical and research data. This is ranging from lack of specifications of what data should be collected in what situation to how that data should be technically represented and communicated securely across organizational and national borders¹⁶².</p> <p><u>Lack of collaboration and supporting tools hinders health and social care professionals from obtaining a holistic view of the patient care process.</u> Poor patient participation and insufficient interaction between health and social care providers and patients confirm the need for tools to improve teamwork and to meet patients and informal caregivers' information and communication needs¹⁶³.</p>
<p>Address lack of integration of nutritional and physical information and advice: Innovations will be expected</p>	<p><u>Existing tools are too simple, not personalised and lack integration:</u> Current approaches to nutrition and supplementation are often based on single advice without lasting support. Current tools mainly focus on diet, take a quite simple approach, do not</p>

¹⁶² Richesson, R. L., Horvath, M. M. & Rusincovitch, S. A. Clinical Research Informatics and Electronic Health Record Data. Yearb. Med. Inform. 9, 215–223 (2014).

¹⁶³ Supporting self-care and collaboration in stroke care through information and communication technology by Nadia Davoody, Sabine Koch, Maria Häggglund and Ingvar Krakau, 2019

<p>to be supported which allow patients to track a range of parameters including blood pressure, weight, fluid intake, physical activity, stress levels etc.</p>	<p>sufficiently personalise according to patient characteristics and lack the support required to be successfully adopted by the majority of those at risk / patients. Available approaches seem not to have considered that some goals are easier to achieve than others and that some goals need to be prioritised over others. Such nutritional support is mainly stand-alone and not yet, as it should be, well integrated with day-to-day activities. Many studies also only report results for all strokes combined and there are limited data on diet in relation to different types of a stroke¹⁶⁴. Where physical activity is addressed, this is mainly in isolation from diet. Most activity trackers also lack the accuracy necessary for medical decision making and lack integration functionalities towards EHRs or medical records.</p>
<p>Link stroke risk assessment results with an interface for care practitioners to ensure that the identified person with high risk of stroke can be monitored and followed up. Risk calculation and therapeutic recommendation tools should be personalised, addressing data sharing and infrastructure needs such as integrating highly heterogeneous multi-scale data sources. The provision of multiple channels to establish bi-directional communication of text, images, voices, video should be addressed as well.</p>	<p>Risk assessment online tools we have found are limited to a single language domain, and not integrated even with local health records or professional platforms and records. A survey of the state of the art in the market showed the use of pull media only and no interface with health systems either to draw risk parameters or to deliver assessment results back into the relevant systems.</p> <p><u>The operation of current risk assessment models is imperfect:</u> The ASCVD risk assessment for example was found to overestimate hypertension risk in adults, both for those without diabetes overall, and across socio-demographic subgroups¹⁶⁵. Another tool, SCORE¹⁶⁶, can be used by health professionals to assess their patients, but it is not integrated into their own systems and relies on manual entry of patient parameters by the health professional. Further to this, these tools in most cases “tend to use ‘snap-shot’ measurements of risk factors taken at the time of assessment – such as cholesterol levels and blood pressure – to predict the patient’s overall risk of cardiovascular disease. They do not account for a patient’s medical history and how their risk factors have changed over time, nor do they differentiate the risk by specific heart and circulatory diseases, such as heart attacks, strokes, heart failure or abnormal heart rhythms.”¹⁶⁷ Another shortcoming of such score assessments is that they measure a 5 or 10 year risk for patients and thus under-estimate the life-time risk for younger patients, who are increasingly affected by a stroke¹⁶⁸.</p> <p><u>Lack of personalized treatment incentives:</u> Former epidemiologic studies have identified major overarching causes of stroke such as hypertension, cigarette smoking, diabetes, dyslipidemia, atrial fibrillation and carotid stenosis¹⁶⁹. While general recommendations can be given to patients to treat these conditions, it is currently unknown how a given patient is individually affected by these risk factors. Importantly, most of the risk factors are currently undertreated in the population. Likely, this can be attributed to the lack of personalized treatment incentives.</p> <p><u>Current treatment paradigms do not consider individual differences.</u> This supports the assumption that stroke care could be</p>

¹⁶⁴ Larsson, S. et al. Dietary Approaches for Stroke Prevention. Stroke. 2017;48:2905-2911.

¹⁶⁵ Rana, Jamal S. et al. “Accuracy of the Atherosclerotic Cardiovascular Risk Equation in a Large Contemporary, Multiethnic Real-World Population.” Journal of the American College of Cardiology 67.18 (2016): 2118–2130. PMC. Web. 1 Oct. 2018.

¹⁶⁶ <https://www.escardio.org/Education/Practice-Tools/CVD-prevention-toolbox/SCORE-Risk-Charts>

¹⁶⁷ <https://www.bhf.org.uk/what-we-do/news-from-the-bhf/news-archive/2019/january/ai-set-to-decode-heart-attack-and-stroke-risk>

¹⁶⁸ Béjot, Y., Bailly, H., Durier, J. & Giroud, M. Epidemiology of stroke in Europe and trends for the 21st century. Presse Médicale 45, e391–e398 (2016).

¹⁶⁹ Goldstein, L. B. et al. Guidelines for the Primary Prevention of Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. Stroke 42, 517–584 (2011).

	<p>significantly improved by more personalized risk calculation and individualized therapeutic recommendations. Data sharing and infrastructure needs must be addressed, such as integrating highly heterogeneous multi-scale data sources, integrating omics data into clinical care¹⁷⁰ or integrating imaging data¹⁷¹. There also rarely seems to be no real-time tracking of EMS or prior transmission of patient data.</p> <p><u>Lack of semantic interoperability is still a significant barrier to re-use of data from diverse sources:</u> There is a current lack of implemented standards for clinical and research data. This is ranging from lack of specifications of what data should be collected in what situation to how that data should be technically represented and communicated securely across organizational and national borders¹⁷².</p>
<p>Improve transition from hospital to community setting- Innovative solutions should tackle the need of patients and family carers of receiving the necessary training to enable a successful transition to the home environment. Patients and family carers often receive insufficient information on the psychological and emotional impact of a stroke and how they can manage these complex feelings. Furthermore, it seems to be difficult to find and access information and assistance on care and support services after discharge from hospital. Solutions should also enable a better addressing of the current lack of proactive follow-up either from primary care, the hospital, allied healthcare professionals, and/or social care services.</p>	<p><u>Need to personalise rehabilitation:</u> After the patient has left the hospital, gaps in care often occur and input in terms of rehabilitation therapy decreases or stops entirely. Since the rehabilitation success can make the difference between the need for 24/7 care or independency, there is dire demand to identify individual factors and therapy options to allow specifically tailored rehabilitation treatment for optimal outcomes after stroke. The success of rehabilitation (beyond restoring basic independence) depends on the ability to adapt the therapy programmes to individual patient needs which in turn depend on a number of factors such as the nature and severity of deficits, patient expectations, and caregiver support¹⁷³.</p> <p><u>Lack of collaboration and supporting tools hinders health and social care professionals from obtaining a holistic view of the patient care process.</u> Poor patient participation and insufficient interaction between health and social care providers and patients confirm the need for tools to improve teamwork and to meet patients and informal caregivers' information and communication needs¹⁷⁴.</p> <p><u>Deficits in communication and collaboration during the discharge planning process are common</u>¹⁷⁵.</p> <p>One big area of concern to patients and carers is the organisation of discharge from hospital as the move from being cared for in hospital by a team of professionals, to being at home and the responsibility of themselves and their carers¹⁷⁶.</p> <p><u>Lack of longer-term provision of rehabilitation:</u> A recent systematic review revealed that, although generally appreciated, rehabilitation was often perceived as insufficient and prematurely withdrawn and stroke survivors and caregivers felt more progress could have been achieved with longer therapy. Integrated tools that empower the patients to identify co-morbidities (such as a depression) are missing. Stroke survivors have substantial information needs which changes over time. There is, however, not much done about</p>

¹⁷⁰ Dzau, V. J. & Ginsburg, G. S. Realizing the Full Potential of Precision Medicine in Health and Health Care. JAMA 316, 1659–1660 (2016). Associated with document Ref. Ares(2018)1483007 - 18/03/2018

¹⁷¹ Hinman, J. D. et al. Principles of precision medicine in stroke. J Neurol Neurosurg Psychiatry 88, 54–61 (2017).

¹⁷² Richesson, R. L., Horvath, M. M. & Rusincovitch, S. A. Clinical Research Informatics and Electronic Health Record Data. Yearb. Med. Inform. 9, 215–223 (2014).

¹⁷³ Sulch, D., Melbourn, A., Perez, I. and L. Kalra. Integrated Care Pathways and Quality of Life on a Stroke Rehabilitation Unit. Stroke. June 2002 Vol 33, Issue 6.

¹⁷⁴ Supporting self-care and collaboration in stroke care through information and communication technology by Nadia Davoody, Sabine Koch, Maria Hägglund and Ingvar Krakau, 2019

Armor BL, Wight Aj, Carter S. Evaluation of Adverse Drug Events and Medication Discrepancies in Transitions of Care Between Hospital Discharge and Primary Care Follow-Up. Journal of Pharmacy Practice. 2016;29(2):132-137.

¹⁷⁶ Langhorne P, Baylan S, Early Supported Discharge Trialists. Early supported discharge services for people with acute stroke. Cochrane Database of Systematic Reviews 2017, Issue 7. Art. No.: CD000443. DOI: 10.1002/14651858.CD000443.pub4.

	<p>provision of information needs of stroke survivors to facilitate self-care using ICT-tools in general during rehabilitation, especially home-based rehabilitation from the patient's perspective¹⁷⁷.</p> <p><u>Lack of rehabilitation is a big bottleneck in stroke treatment</u>¹⁷⁸: The demand for rehabilitation increases simultaneously to rising number of strokes worldwide. Not enough information about ICT tools is promoted to facilitate the recovery process for stroke survivors.</p> <p><u>Difficulties in managing technology</u>: There are studies revealing that people with acquired brain injuries after a stroke could have a variety of difficulties in managing technology, such as problems with handling, recognizing, and finding functions on the mobile phone or computer¹⁷⁹. Barriers which need to be taken into account by mhealth applications are sensory and motor impairments as well as limited vision and impaired speech¹⁸⁰.</p>
Multimorbidity	
<p>Develop strategies and tools to support care teams with specialists for complex case management. Centralised expert team directories and protocols to access (even remotely) should facilitate the care of patients and increase the confidence of the team.</p>	<p><u>Electronic patient records, exchange of patient information and uniform coding of patients' health problems</u>: As explained above, one of the most challenging aspect of the design of new care models are information sharing systems that need to be safe due to their sensitive information as well as accessible from all the care providers. In most of the current systems electronic health records are not accessible to the whole care team and different stakeholders use different IT systems making the exchange of information cumbersome. Professionals do not receive appropriate training in the coding system and duplications and errors are frequent. Information systems do not offer options to summarise patient's progression and status data effectively. Suboptimal information sharing increases the risk of adverse effects in the care and treatment such as drug-drug interaction, increases patients and care providers uncertainty and decreases trust in the system and therefore patient's compliance with their treatment. From the system perspective, ineffective data collection and coding undermine the possibilities of system. What is more, the adoption of information and coding systems are costly and difficult. They should adapt easily to new care delivery models and be modifiable to new populations needs. However, they usually offer little flexibility, the changes are costly and time-consuming, so there is a high resistance to change the systems making using tools outdated and inefficient.</p> <p><u>Multidisciplinary, coordinated team</u>: Multidisciplinary teams are necessary to assess and treat all the complex needs patients with multimorbidity have including medical, pharmacological, social and psychological perspective. The core team should include a clinician with a generalist approach (primary health or specialist level - internal medicine or geriatrics- depending on complexity) who should be able to centralise and optimise all clinical components of patients' care. The team could be supported by external specialist if needed. High level of coordination and information sharing should</p>

¹⁷⁷ Exploring of stroke survivors' information needs for an Information and Communication Technology based home stroke rehabilitation plan to facilitate self-care Author: Yamrotsow Woldemariam. Thesis, 2017

¹⁷⁸ PowerPoint presentation Catherine M. Fuhre. Sykehusinnkjøp HF Norwegian Hospital Procurement Trust, February 2019.

¹⁷⁹ <https://pdfs.semanticscholar.org/9de4/8197ecb8565225eca737e2f085f7713a7866.pdf>

¹⁸⁰ <https://www.ncbi.nlm.nih.gov/pubmed/30686063>

	<p>prevent from duplications of tests, drug interaction, contradictory information and errors, and should also decrease patients' and systems burden.</p>
<p>Create and provide tools that promote patients' comprehensive assessment, including health and social variables but also the progression of the conditions and the decision-making processes.</p>	<p>Patients with multimorbidity need regular comprehensive assessment. Current services are not designed to offer this holistic approach. They lack multidisciplinary team organisation, coordination and information sharing strategies, decision-making process definition, adaptive and personalised IT systems, personalised patient monitoring strategies and capacity and training in the workforce.</p> <p>Service organisations do not always support trust among professionals and there are no strategies to support team building and team working. There is no information integration among different professionals and care providers involved in the care of the patient and resources for assessment, planning and updating information and care plan are lacking.</p> <p>During the assessment, patient risk stratification should include social and health information, patients' and their social network's capacity and capability to face the treatment burden, and it should be able to detect target groups for eHealth strategies or other support tools. There are no tools to integrate the whole information and to offer a holistic overview of patients' situation nowadays. The fragmentation of risk stratification processes, which are disease-specific or excluding the social component does not offer enough information to develop an adequate care plan. There are no standardised tools based on evidence in multimorbidity beyond the sum of different disease-specific tools, and the information about disease interactions and drug interactions is not addressed properly.</p>
<p>Develop tools to help monitoring patients with multimorbidity in real-life situations and share that information with the care team.</p>	<p>There is a lack of existing and adapted devices and tools to allow direct communication between patient and care providers. Medical devices, supportive aids and health monitoring tools should be user-friendly and support strategies should be available. Patients should receive adequate training about how and when use the existing tools and there should be a prompt response and easy contact to support and solve patients with errors in patient-operated technology errors.</p> <p>Care team should have access to the information shared by patients easily and in a simplified way to detect abnormalities that need to be reviewed. The systems should get improved functions and formulas to balance the risk of missing a significant abnormality and the enormous workload if no significant data need to be reviewed regularly. Care team should also be trained in the protocol of the review and react process of the monitoring data they receive.</p> <p>However, not all patients feel comfortable or prefer using devices and eHealth technologies. There is a need to develop strategies and risk stratification tools to identify target population eHealth strategies should be offered.¹⁸¹ Professionals need to be trained in the correct and good use of technologies and to balance face-to-face interaction with technology contact adequately.</p>

¹⁸¹ Frances S Mair y Katie I Gallacher, «Multimorbidity: what next?», *The British Journal of General Practice* 67, n.º 659 (junio de 2017): 248-49. <https://doi.org/10.3399/bjgp17X690965>.

<p>Address the lack of information integration among different stakeholders and different health and social care providers, resulting in information fragmentation and increase risk of errors. This shall include the development of a summary of patient's information (e.g. needs, care plan, medication, care delivery schedule) with the content being subjected to local role based access rules, and made available to all care practitioners. The solution should also include the development of a standardised coding system to identify the patient's main problems and for the codes to be accurately mapped to the coding of other systems or documentation used by the care team.</p>	<p><u>Electronic patient records, exchange of patient information and uniform coding of patients' health problems:</u> As explained above, one of the most challenging aspect of the design of new care models are information sharing systems that need to be safe due to their sensitive information as well as accessible from all the care providers. In most of the current systems electronic health records are not accessible to the whole care team and different stakeholders use different IT systems making the exchange of information cumbersome. Professionals do not receive appropriate training in the coding system and duplications and errors are frequent. Information systems do not offer options to summarise patient's progression and status data effectively. Suboptimal information sharing increases the risk of adverse effects in the care and treatment such as drug-drug interaction, increases patients and care providers uncertainty and decreases trust in the system and therefore patient's compliance with their treatment.</p> <p>From the system perspective, ineffective data collection and coding undermine the possibilities of system.</p> <p>What is more, the adoption of information and coding systems are costly and difficult. They should adapt easily to new care delivery models and be modifiable to new populations needs. However, they usually offer little flexibility, the changes are costly and time-consuming, so there is a high resistance to change the systems making using tools outdated and inefficient.</p> <p><u>Information sharing limitations and legislation beyond health system organisation borders:</u> In many countries health systems within a country are organised in regions and the boundaries of the information sharing system are limited to the health provider in the region. There is a need to acknowledge that people with multimorbidity travel from one region to another, and from one country to another more easily and frequently than in the past, mostly between European countries for short, intermediate or longer periods. It is necessary to find strategies to share information saved in local health systems among European regions and countries ensuring data safety and patients' confidentiality but providing continuity of care to patients.</p> <p><u>Developing consultation system to consult professional experts:</u> Access to experts is usually difficult by the teams. On one hand, it may be difficult to know and access the experts in a field. On the other hand, the difficulties in bureaucracy and the delay in responses in the access to the experts may make the effort futile and both the team and the patients may feel abandoned.</p>
<p>Address the lack of training and resources in care teams to capacity building focusing on technical skills for complex situations as well as team coordination protocols and strategies. Decision-making processes, patient-contact strategies, standardised language and coding system and the use of the existing</p>	<p>Care providers do not have enough training and guidance to offer and follow a personalised care plan to their patients.</p> <p>There is a need to shift towards complex situation management instead of disease-specific or problem-specific situations in the curricula of the professional training process, as well as in research.</p> <p>Professionals do not receive appropriate training in the coding system and duplications and errors are frequent.</p> <p>Training of care providers to tailor self-management support based on patient preferences and competencies and provide options for patients and families to improve their self-management: The team</p>

<p>tools need to be developed and all care practitioners need to have updated and regular training. Address the low effectiveness of some of the existing training strategies (such as checking lists to access to a job) and promote engaging and team building training processes.</p>	<p>should be trained in their communication skills, in the adaptation on language levels and in the use of other communication strategies. The team should also have strategies to motivate and support patients in their self-management, to increase treatment compliance as well as to increase their health literacy and empowerment to enable them in the decision making. Many times, team members do not have skill or preparation to engage with patients and it is only based in their personal ability. The health system should support team member training and their access to educational material.</p> <p>The availability of training options and material that is adapted and personalised to different conditions is very irregular among health providers and services. The educational material should be adapted to local context and different capabilities, and available for patients and carer to revisit. The better education and knowledge patients have the more enable they will be to make informed decisions in their own care and engage with their care plan and treatment.</p>
<p>Dementia</p>	
<p>Address the lack of time of professionals for consults by longitudinal screening programs targeting elderly population in the community promoting awareness: Longitudinal screening programs will inform healthcare providers about the cognitive and functional competencies of the population at risk. Moreover, a community-based screening programme will promote awareness combating and eliminating stigmas on mental health.</p>	<p><u>The operation of the current risk assessment is imperfect:</u> Current accuracy of tools for assessment's sensitivity for the early detection is very low¹⁸². In this regard, nowadays a diagnosis requires investing a lot of time with the patient, physical explorations, and brain scans. Consequently, health care providers require a huge investment of time and training to diagnosis dementia.</p> <p><u>Patients are often not reached early enough:</u> Studies highlight that in the world there are eight million people are not diagnosed. Moreover, the estimations around the ageing of the population help to calculate that these numbers increase to 152 million people by 2050⁸.</p>
<p>COPD</p>	
<p>Promote e-learning and mHealth applications for inhaler technique training. E-learning and mHealth applications can support the correct inhale techniques by patients for instance with applications on the smart phone. Thereby, patients can practice at home whenever they want to on their phones and clinics are relieved as well</p>	<p><u>Weak inhaler technique training:</u> Most patients use their inhaler incorrectly, thereby becoming more susceptible to poor clinical control and exacerbations¹⁸³. Inhaled therapy is the most widely used way to treat patients with COPD, but up to 90% of them do not use their inhalers correctly¹⁸⁴.</p>

¹⁸² Tierney MC, Szalai JP, Dunn E et al. (2000). Prediction of probable Alzheimer disease in patients with symptoms suggestive of memory impairment. Value of the Mini-Mental State Examination. Arch Fam Med, 9, 527–32.

¹⁸³ <https://bmjopen.bmj.com/content/bmjopen/9/1/e022685.full.pdf>

¹⁸⁴ Lavorini F, Magnan A, Dubus JC, et al. Effect of incorrect use of dry powder inhalers on management of patients with asthma and COPD. Respir Med 2008;102:593–604.

<p>as the risk for exacerbations can be reduced.</p>	
Aortic stenosis	
<p>Find solutions that address the often uncoordinated follow-up of clients discharged from hospital and that support shared-decision making processes, also considering values, needs and preferences of the clients. Innovative solutions should tackle the need of patients and family carers receiving the necessary training to enable a successful transition to the home environment. Patients and family carers often receive insufficient advice on the psychological and emotional impact of aortic stenosis, the impacts of a surgery or TAVI and how they can manage these complex feelings. Furthermore, it seems to be difficult to find and access information and assistance on care and support services after discharge from hospital. Solutions should also enable a better addressing of the current lack of proactive follow-up either from primary care, the hospital, allied healthcare professionals, and/or social care services.</p>	<p><u>Lack of cooperation and coordination with social support services and uncoordinated Follow-Up management:</u> Out of hospital follow up is limited and the need to improve follow-up is especially relevant for the population of older people. They need special attention during follow-up (FU) to achieve a successful outcome and avoid early and late complications affecting patients' survival and quality of life¹⁸⁵. The large majority of especially TAVI patients are very old, with many co-morbidities, sometimes with a low socio-cultural level, often alone and without family support. These conditions may lead to substantial management problems which can be summarized as follows:</p> <ul style="list-style-type: none"> - Lack of family support and poor compliance to therapy and out-patient visits - Therapy adjustments - (Recurrent) hospitalizations¹⁸⁶ <p>Telemonitoring can be used to improve follow-up procedures for patients, but further research regarding the effectiveness of this concept is required^{187 188}.</p> <p><u>Educational support for patients should be improved:</u> The existence of different treatment options can for example be confusing for the patient. It is this important that, when diagnosed with aortic stenosis, the patient, their family and caregiver understand what aortic stenosis is, and how it can be treated. There is no ICT-Tool for patients' decision support; decisions aids are just available as print material or online booklets. An easy-to-use iPad app exists, explaining the disease, its treatment options and, importantly, what happens after discharge from the hospital, when the level of care is reduced and additional support becomes very important. Dubbed the "Aortic Stenosis Patient Journey iPad App," nursing staff, as well as patients and their family, can download this tool from the iTunes store for free¹⁸⁹.</p>
Cross-cutting	
<p>Provide multiple communication channels (e.g. portals, APPs, secure chat, videoconference), in addition to the usual paper-and--pencil and phone calls,e.g.</p>	

¹⁸⁵ Aranzulla, T. C., De Benedictis, M. and Riccardo Asteggiano (2016). Follow-up management after transcatheter aortic valve implantation (TAVI). E-Journal of Cardiology Practice Volume 14.

¹⁸⁶ Aranzulla, T. C., De Benedictis, M. and Riccardo Asteggiano (2016). Follow-up management after transcatheter aortic valve implantation (TAVI). E-Journal of Cardiology Practice Volume 14.

¹⁸⁷ van Mourik, M. S. et al (2019). Percutaneous treatment of aortic valve disease: Towards optimal patient outcomes.

¹⁸⁸ Hermans, M.C. et al (2018). Remote Monitoring of Patients Undergoing Transcatheter Aortic Valve Replacement: A Framework for Postprocedural Telemonitoring. JMIR Cardio 2018 (Mar 16); 2(1):e9.

¹⁸⁹ http://www.ptca.org/news/2016/0125_MEDTRONIC_AS_IPAD.html

<ul style="list-style-type: none">• To share the individual's care plan and the notes on its delivery among the care team members;• To facilitate the remote contacts (e.g. WhatsApp-like) between the care team/stakeholders;• To manage a patient's feedback on the appropriate execution of his/her planned self-management tasks;• To generate/notify/rank alerts in case of need, perhaps after a filter made by a Contact Centre	
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Survey addressed at care delivery and public procurement organisations across Europe

A second survey (LimeSurvey, cf. pdf copy in Annex II) was addressed to regions, PPOs and care delivery organisations across Europe (beyond the EURIPHI Health and Social Care Regions Network) in order to collect a broader view on demands for innovative solutions in the area of integrated care across Europe. The survey included the 13 ICPOs that were prioritised by the Euriphi regions as a result of the first survey. Results of the second survey are currently analysed and will be reported in D3.3.

4. Next steps

Forthcoming activities in WP3 will focus on defining the 3-4 ICPOs that will be subject to the OMC in October and the procurement learning case development in WP5. The OMC will reveal whether the defined procurement objectives can be addressed by a product readily on the market (available at scale) or whether there needs to be a push from the demand side.

Two sources of information will be used to define the 3-4 ICPOs to be chosen from the shortlist presented in chapter 3:

- results from the second LimeSurvey that was addressed to regions, PPOs and care delivery organisations across Europe (beyond the EURIPHI Health and Social Care Regions Network) in order to collect a broader view on demands for innovative solutions in the area of integrated care across Europe.
- Consultation with the Euriphi Advisory Board.

Further to this, an online platform is currently under development that will serve as an ongoing information source for care delivery and public procurement organisations.

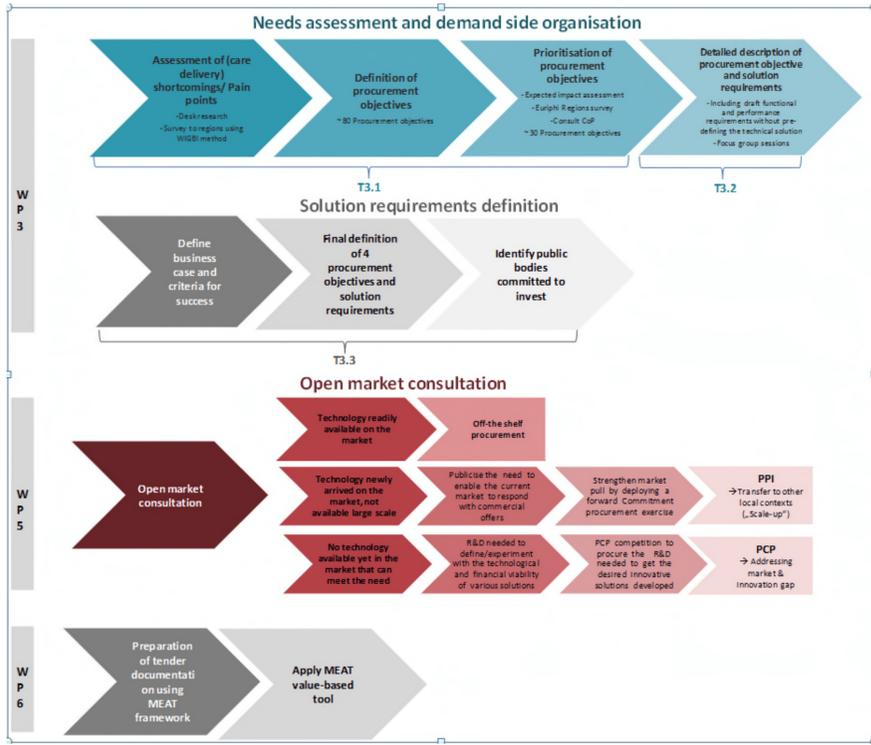
Annex I “Pdf copy of the questionnaire addressed at care delivery and public procurement organisations involved in Euriphi”

Copy - Euriphi Procurement Objective Priorisation

You will be aware that the aim of WP3 in Euriphi is to undertake a series of activities to organise the demand side around a small set of Integrated Care Procurement Objectives (ICPO) that address existing care delivery shortcomings. Work started with a systematic desk-top research analysis with the aim to identify existing care delivery shortcomings across care delivery pathways for the following topics:

- Stroke
- Dementia
- COPD
- Multimorbidity
- Aortic Stenosis

Care delivery shortcomings were then translated into Integrated Care Procurement Objectives. Altogether, more than 30 Integrated Care Procurement Objectives were defined. The overall workflow of WP3 and its relation to other workpackages in Euriphi is described in the figure below.



Survey objectives

The aim of this initial survey is to collect feedback from the procurement and care delivery organisations involved in Euriphi

- to understand their priorities in relation to the identified procurement objectives,
- to identify any innovative solutions that have already been implemented to address the procurement objective or one similar, and
- to gather any additional potential procurement objectives we have not identified and which may be a priority for your organisation on the existing topics or other integrated care topics.

How to complete the survey

The survey is structured along the four topics mentioned above: Stroke, Dementia, COPD, aortic stenosis and Multimorbidity. For each of the topics we elicited the care pathway components and for each of these, we researched the supply and demand side and identified existing care delivery shortcomings by means of a systematic desk top research and literature analysis. Integrated Care Procurement Objectives (ICPO), to potentially address the care delivery shortcomings, were then formulated. Each ICPO is not a technical specification (as this will be developed at a later stage in the project), but describes what an innovative solution* would need to address a care delivery shortcoming. If you want to learn more about the care delivery shortcomings we identified, please check the background document "Euriphi care delivery shortcomings and procurement objectives".

In the survey, we kindly ask you to rate each of the identified Integrated Care Procurement Objectives according to its importance for a future procurement activity in your region/ organisation. We do not want to learn whether you generally think that it is an important topic, but rather whether your region/organisation intends to start any procurement activities in the future (within the next 2-3 years). For each procurement objective we would like you to specify whether there are any innovative solutions in your region/ organisation already in place addressing that objective or something similar.

*An innovative solution may be a service, a product, a digital/CT system or device, or a combination.

There are 69 questions in this survey

Stroke

Stroke is a complicated, heterogeneous condition with acute onset but complex and enduring treatment and follow-up. Consequently, stroke care is complex and covers a whole spectrum of care including acute care, rehabilitation and long-term care with both in-hospital, outpatient and community-based care. Stroke care is thus per definition multidisciplinary and the integration of care is of particular concern*.

*Int J Integr Care. 2012 Oct-Dec; 12: e193. Economic evidence on integrated care for stroke patients: a systematic review. Johanneke F.M.M. Tummers, Augustinus J.P. Schrijvers, Johanna M.A. Visser-Meily

[] Please rate the following ICPO according to its importance for a future procurement activity in your region/organisation: **"Address lack of electronic care record data integration from technologies designed to motivate and educate people as well as enhance the interface between person and their care team."** *

Please choose **only one** of the following:

- 1
 2
 3
 4
 5

- 1= Not at all important
 2= Slightly important
 3= Important
 4= Fairly important
 5= Very important

[] Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
 No

[] Please rate the following ICPO according to its importance for a future procurement activity in your region/organisation: **"Address lack of integration of nutritional and physical information and advice: Fluids intake be supported which allow patients to track a range of parameters including blood pressure, weight, impedance measured, fat, fluid intake, muscle action, physical activity, carbohydrate intake and stress levels."** *

Please choose **only one** of the following:

- 1
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- 1= Not at all important
 2= Slightly important
 3= Important
 4= Fairly important
 5= Very important

[] Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
 No

[] Please rate the following ICPO according to its importance for a future procurement activity in your region/organisation: **"Link stroke risk assessment results with an interface for care practitioners to ensure that the identified person with high risk of stroke can be monitored and followed up. Risk calculation and therapeutic recommendation should be personalised, addressing data sharing and infrastructure needs such as integrating highly heterogeneous multi-scale data sources, integrating omics data into clinical care or integrating imaging data. The provision of multiple channels to establish bi-directional communication of text, images, voices, video should be addressed as well."** *

Please choose **only one** of the following:

- 1
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- 1= Not at all important
 2= Slightly important
 3= Important
 4= Fairly important
 5= Very important

[] Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
 No

[] Please rate the following ICPO according to its importance for a future procurement activity in your region/organisation: **"Improve transition from hospital to community setting- Home innovative solutions should tackle the needs of patients and family carers of receiving the necessary training to enable a successful transition to the home environment. Patients and family carers often receive insufficient information on the psychological and emotional impact of a**

stroke and how they can manage these complex feelings. Furthermore, it seems to be difficult to find and access information and assistance on care and support services after discharge from hospital. Solutions should also enable a better addressing of the current lack of proactive follow-up either from primary care, the hospital, allied healthcare professionals, and/or social care services." *

Please choose **only one** of the following:

- 1
- 2
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- 4
- 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
- No

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: *"Find Anti-Coagulation Dosing Software system, interfacing to relevant (e.g. hospital and GP patient records) IT systems and any mobile applications to support safe transmission of meter results to software."* *

Please choose **only one** of the following:

- 1
- 2
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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
- No

Dementia

Worldwide, around 50 million people have dementia, and there are nearly 10 million new cases every year. It mainly affects older people, but is not a normal part of the process of ageing. Dementia is one of the major causes of disability and dependency among older people worldwide and has a physical, psychological, social, and economical impact, not only on people with dementia, but also on their carers, families and society at large*. The organisation of care and provision of support to people with dementia is of complex nature as includes many elements such as early diagnosis in order to promote early and optimal management, optimising physical health, cognition, activity and well-being, identifying and treating accompanying physical illness, detecting and treating challenging behavioural and psychological symptoms and providing information and long-term support to carers**.

* WHO Dementia factsheet 2017. <https://www.who.int/news-room/fact-sheets/detail/dementia> (<https://www.who.int/news-room/fact-sheets/detail/dementia>)

** WHO Dementia factsheet 2017. <https://www.who.int/news-room/fact-sheets/detail/dementia> (<https://www.who.int/news-room/fact-sheets/detail/dementia>)

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Address integration with other sectors such as tourism, leisure and physical activities for elderly people with health. Targeting cognitive stimulation through tourism, leisure and physical activities has shown positive results on literature, but the offer of different evidence-based ICT-solutions for risk population is not wide."** *

Please choose **only one** of the following:

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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
- No

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Address the lack of time of professionals for consults by longitudinal screening programs targeting elderly population in the community promoting awareness: Longitudinal screening programs will inform healthcare providers about the cognitive and functional competencies of the population at risk. Moreover, a community-based screening programme will promote awareness combating and eliminating stigmas on mental health."** *

Please choose **only one** of the following:

- 1
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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
- No

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Address the lack of ICT-solutions promoting cognitive rehabilitation. This should include the integration on tools and solutions with health records."** *

Please choose **only one** of the following:

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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
- No

Multimorbidity

Multimorbidity, defined as a co-occurrence of two or more chronic conditions, is an increasing problem worldwide and is already a significant epidemiological problem in Europe related to the increase on life-expectancy and rapidly aging population. Observational study reviews have estimated that up to 95% of people older than 65 years may be affected by multimorbidity*. Although multimorbidity prevalence increases with age and frailty, it is not only associated with aging and can affect younger people too, where frailty assessment tools are not well developed**. It is also strongly associated with social determinants and people from deprived areas are in higher risk of complex conditions, less access to care delivery system and poorer health outcomes. However, there is a lack of effective risk stratification tools.

Patients with multimorbidity include a great variety of different combinations in its spectrum, including the risk of complications, burden of treatment, complexity, quality of life and disability, resource demand and healthcare cost. The traditional health care delivery model was designed to answer to acute and disease-specific situations and with the change in epidemiology of the diseases there is an increasing need of adapt and re-designing the health delivery model to cover chronic conditions, multimorbidity and complex situations. However, the effort to this demand has been difficult due to the lack of good understanding, evidence and agreement on basic information from aetiology to best practices***. There is a need of new models of care to improve care delivery to patients with multimorbidity****.

*Concepción Violán et al., «Prevalence, Determinants and Patterns of Multimorbidity in Primary Care: A Systematic Review of Observational Studies», PLoS One 9, n.o 7 (2014): e102149, <https://doi.org/10.1371/journal.pone.0102149>.

** Ibid.

*** Rokas Navickas et al., «Multimorbidity: What do we know? What should we do?», Journal of Comorbidity 6, n.o 1 (17 de febrero de 2016): 4-11, <https://doi.org/10.15256/jcc.2016.6.72>.

**** Jonathan Stavikas et al., «The Foundations Framework for Developing and Reporting New Models of Care for Multimorbidity», Annals of Family Medicine 15, n.o 6 (noviembre de 2017): 570-77, <https://doi.org/10.1370/afm.2150>.

Please rate the following ICPO according to it's importance for a future procurement activity in your region/ organisation: ***"Develop strategies and tools to support care teams with specialising ICPO according to its importance. Centralised expert team directories and protocols to access (even remotely) should facilitate the care of patients and increase the confidence of the team."*** *

Please choose **only one** of the following:

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- 1= Not at all important
- 2= Slightly important
- 3= Important
- 4= Fairly important
- 5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
- No

Please rate the following ICPO according to its importance for a future procurement activity in your region/organisation: ***"Create and provide tools that promote patients' comprehensive assessment, including health and social variables but also the progression of the conditions and the decision-making processes."*** *

Please choose **only one** of the following:

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- 1= Not at all important
- 2= Slightly important
- 3= Important
- 4= Fairly important
- 5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
- No

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: ***"Develop drug interaction detection tools and integrate the role of pharmacists in the care team to optimise treatment and avoid risk. Research improvement and evidence-based guidelines for drug interactions are necessary to be included."*** *

Please choose **only one** of the following:

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- 1= Not at all important
- 2= Slightly important
- 3= Important
- 4= Fairly important
- 5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
- No

Please rate the following ICPO according to its importance for a future procurement activity in your region/organisation: ***"Develop tools to help monitoring patients with multimorbidity in real-life situations and share that information with the care team."*** *

Please choose **only one** of the following:

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- 1= Not at all important
- 2= Slightly important
- 3= Important
- 4= Fairly important
- 5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
- No

Please rate the following ICPO according to its importance for a future procurement activity in your region/organisation: ***"Address the difficulties for treatment compliance in long-term and complex situations with polypharmacy. Develop strategies and tools for adherence assessment and detection of treatment fatigue as well as providing support for patients and family carers."*** *

Please choose **only one** of the following:

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- 1= Not at all important
- 2= Slightly important
- 3= Important
- 4= Fairly important
- 5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
- No

Please rate the following ICPO according to its importance for a future procurement activity in your region/organisation: ***"Address the lack of information integration among different stakeholders and different health and social care providers, resulting in information fragmentation and increase risk of errors. This shall include the development of a summary of patient's imortance (e.g. needs, care plan, medication, care delivery schedule) with the content of a being subjected to local role based access rules, and made available to all care practitioners. The solution should also include the development of a standardised coding system to identify the patient's main problems and for the codes to be accurately mapped to the coding of other systems or documentation used by the care team."*** *

Please choose **only one** of the following:

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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
- No

COPD

The chronic lung disease COPD is characterized by reduced airflow, inflammation and flare-ups, called exacerbations, in which the patient may experience increased coughing, mucus, shortness of breath, wheezing, and a feeling of tightness in their chest. If those symptoms are not detected and treated in a timely fashion, they can escalate and lead to hospitalizations, disability and a diminished quality of life.

COPD is the third leading cause of death in the United States. By 2030, COPD will become the third cause of mortality and seventh cause of morbidity worldwide.

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Simplify treatment guidelines and pathways in the treatment of COPD. To avoid confusion and inconsistency for patients and professionals, guidelines and pathways on how to use inhaler devices or medication should be simplified. These can support patients to control their medication and not lose the overview but also enable professionals to simplify the treatment for individual patient."** *

Please choose **only one** of the following:

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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
 No

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Promote e-learning and mHealth applications for inhaler technique training. E-learning and mHealth applications can support the correct inhale techniques by patients for instance with applications on the smartphone. Thereby, patients can practice at home whenever they want to on their phones and clinics are relieved as well as the risk for exacerbations can be reduced."** *

Please choose **only one** of the following:

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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
 No

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Address the lack of tools to assess the capacity and capability of patients and carers to deal with the treatment burden. Include relevant stakeholders such as pharmacist to optimise treatment, detect errors in medication and interactions, adapt presentations if needed and support the team in their decision-making processes."**

*

Please choose **only one** of the following:

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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
 No

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Find solutions and tools to support the improvement of self-efficacy and to support education and training as well as motivation and behaviour change."**

*

Please choose **only one** of the following:

- 1
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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
 No

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Address the lack of understanding of the processes involved in long-term treatment compliance. Treatment compliance need to be understood with a holistic approach. There is a need for tools and strategies to monitor patients' compliance to treatment, to detect and analyse the problems if there is a fatigue and to support them with the adherence."**

*

Please choose **only one** of the following:

- 1
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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
 No

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Address the lack of training and available material to support teams and patients in the self-management development. There is a need to develop motivational and educational material, adapted to local context and different capacities to support care teams and patients in their self-management."**

*

Please choose **only one** of the following:

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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

Yes

No

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Develop drug interaction detection tools and integrate the role of pharmacist in the care team to optimise treatment and avoid risk. Research improvement and evidence-based guidelines for drug interactions are necessary to be included."**

*

Please choose **only one** of the following:

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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

Yes

No

- 1
- 2
- 3
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- 5

1= Not at all important
2= Slightly important
3= Important
4= Fairly important
5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
- No

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Find solutions facilitating peer-to-peer support. Solutions targeted at self-supporting (perhaps with a regional coverage), and access to experts or expert patients are relevant here too."**

*

Please choose **only one** of the following:

- 1
- 2
- 3
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1= Not at all important
2= Slightly important
3= Important
4= Fairly important
5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
- No

Cross-cutting

[]Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Intervention strategies should be personalised in terms of timing, frequency, composition, content, etc. according to contextual changes (change in behaviours, lifestyle, health state and knowledge) throughout life. Choices will be offered in terms of psychological strategies such as rewards for quick wins, celebrating the small successes, or gamification. The solution is to clearly help identify strategies on how to implement healthier behaviour in day to day situations. The solutions therefore will enable the patient to set realistic, measurable and achievable goals and offer measurement criteria that indicate success."** *

Please choose **only one** of the following:

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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

[]Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
 No

[]Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Address the need to improve risk assessment strategies with a holistic approach to identify patients and families beyond disease-specific risk stratification tools. There is a need to integrate disease-interaction and drug-drug interaction risk, rapid progression risk, risk of high need of resources, social exclusion risk, the risk of unbearable treatment burden or the risk of psychological difficulties. The interface to patients and their access to services should, amongst others, capitalise on the fact that pharmacies can be in frequent contact with at-risk patients and thus can play a strong role in prevention and early detection."** *

Please choose **only one** of the following:

- 1
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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

[]Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
 No

[]Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Provide multiple communication channels (e.g. portals, APPs, secure chat, videoconference), in addition to the usual paperand-pencil and phone calls,e.g.**

- **To share the individual's care plan and the notes on its delivery among the care team members;**
- **To facilitate the remote contacts (e.g. WhatsApp-like) between the care team/stakeholders;**
- **To manage a patient's feedback (e.g. the appropriate execution of his/her planned self-management tasks;**
- **To generate/notify/rank alerts in case of need, perhaps after a filter made by a Contact Centre."**

*

Please choose **only one** of the following:

- 1
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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

[]Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
 No

[]Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Address the lack of training and resources in care teams to capacity building focusing on technical skills for complex situations as well as team coordination protocols and strategies. Decision-making processes, patient-contact strategies, standardised language and coding system and the use of the existing tools need to be developed and all care practitioners need to have updated and regular training. Address the low effectiveness of some of the existing training strategies (such as checking lists to access to a job) and promote engaging and team building training processes."** *

Please choose **only one** of the following:

- 1
 2
 3
 4
 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

[]Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
 No

[]Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Create easy-to-understand and adaptable educational and motivational materials reflecting local languages, and contexts, cultures and capacities to empower patients and family carers in the self-management and decision-making process."** *

Please choose **only one** of the following:

- 1
 2
 3
 4
 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

[]Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

- Yes
 No

[]Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation: **"Address the need to improve informationn sharing between patients and care practitioners, regarding both the monitoring process of patients' conditions as well as more informal communication on decision-sharing or difficulties during treatment."** *

Please choose **only one** of the following:

- 1
 2
 3
 4
 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/ organisation? *

Please choose **only one** of the following:

Yes

No

Additional Integrated Care Procurement Objectives

In this section we kindly ask you to describe any additional Integrated Care Procurement Objective we have not yet identified and which may be a priority for your region/organisation on the existing topics or other integrated care topics. Thank you!

Are there any other procurement objectives we have not identified and which may be a priority for your organisation on the existing topics or other integrated care topics?

*

Please choose **only one** of the following:

- Yes
- No

If so, to which integrated care topic does the procurement objective belong to? *

Choose one of the following answers

Please choose **only one** of the following:

- Stroke
- Dementia
- Multimorbidity
- Aortic Stenosis
- COPD
- Other

Please describe the Integrated Care Procurement Objective for an innovative solution that has a priority in your region/organisation. Please note that an innovative solution may be a service, a product, a digital/ICT system or device, or a combination). *

Please write your answer here:

07-17-2019 – 12:17

Submit your survey.
Thank you for completing this survey.

Annex II “Pdf copy of the questionnaire Survey addressed at care delivery and public procurement organisations across Europe”

Euriphi Integrated Care Procurement Objective Priorisation

The overall aim of Euriphi (<https://www.euriphi.eu/>) (<https://www.euriphi.eu/>) is to contribute to the introduction of innovation and integrated care solutions in Europe's health and social care systems through cross-border value-based innovation procurement.

Workpackage 3 in Euriphi undertakes a series of activities to organise the demand side for innovation solutions that support new models of patient-centred integrated care around a small set of Integrated Care Procurement Objectives (ICPO) that address existing care delivery shortcomings. Work started with a systematic desk-top research analysis with the aim to identify existing care delivery shortcomings across care delivery pathways for the following topics:

- Stroke
- Dementia
- COPD
- Multimorbidity
- Aortic Stenosis

Care delivery shortcomings were then translated into Integrated Care Procurement Objectives. Altogether, more than 30 Integrated Care Procurement Objectives were defined. This long list of initial procurement objectives was provided to the care delivery and public procurement organisations involved in the Euriphi project to

- to understand their priorities in relation to the some of the identified procurement objectives,
- to identify any innovative solutions that have already been implemented to address the procurement objective or one similar, and
- to gather any additional potential procurement objectives we have not identified and which may be a priority for your organisation on the existing topics or other integrated care topics.

Survey objectives

Analysis of the prioritised procurement objectives of the Euriphi care delivery and public procurement organisations has lead to a reduced list of 13 procurement objectives that we would now like to test with organisations outside Euriphi to identify their procurement demands and priorities.

The aim of the survey is to collect feedback from the procurement and care delivery organisations not involved in Euriphi to understand their priorities in relation to the Euriphi procurement objectives and thus get a better view of the European demand.

How to complete the survey

The survey is structured along the five topics mentioned above: Stroke, Dementia, COPD, aortic stenosis and Multimorbidity. For each of the topics you will find a list of Integrated Care Procurement Objectives (ICPO) that potentially address existing care delivery shortcomings. Each ICPO is not a technical specification (as this will be developed at a later stage in the project), but describes what an innovative solution* would need to deliver in order to address a care delivery shortcoming.

In the survey, we kindly ask you to rate each of the identified Integrated Care Procurement Objectives according to its importance for a future procurement activity in your region/ organisation. We do not want to learn whether you generally think that it is an important topic, but rather whether your region/organisation

intends to start any procurement activities in the future (within the next 2-3 years). For each procurement objective we would like you to specify whether there are any innovative solutions in your region/ organisation already in place addressing that objective or something similar.

Thank you for taking time to complete the Euriphi survey.

Please note that responses to this survey are not anonymised. We will not publish your personal results, but the persons who will analyse the survey (Sonja Müller & Martina Böll from empirica, Leo Lewis & Edelweiss Aldasoro from IFIC) will see your responses in a not anonymised format.

*An innovative solution may be a service, a product, a digital/CT system or device, or a combination.

There are 54 questions in this survey

Stroke

Stroke is a complicated, heterogeneous condition with acute onset but complex and enduring treatment and follow-up. Consequently, stroke care is complex and covers a whole spectrum of care including acute care, rehabilitation and long-term care with both in-hospital, outpatient and community-based care. Stroke care is thus per definition multidisciplinary and the integration of care is of particular concern*.

*Int J Integr Care. 2012 Oct-Dec; 12: e193. Economic evidence on integrated care for stroke patients; a systematic review. Johanneke F.M.M Tummers, Augustinus J.P Schrijvers, Johanna M.A Visser-Meily

[]

Please rate the following ICPO according to its importance for a future procurement activity in your region/organisation:

"Address lack of electronic care record data integration from technologies designed to motivate and educate people as well as enhance the interface between person and their care team."

*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

Yes

No

If yes, can you describe the solution in a few sentences?

Please write your answer here:

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Address lack of integration of nutritional and physical information and advice: Innovations will be expected to be supported which allow patients to track a range of parameters including blood pressure, weight, impedance measured fat, fluid intake, muscle action, physical activity, carbohydrate intake and stress levels."

*

Please choose **only one** of the following:

1

2

3

4

5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

Yes

No

If yes, can you describe the solution in a few sentences?

Please write your answer here:

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Link stroke risk assessment results with an interface for care practitioners to ensure that the identified person with high risk of stroke can be monitored and followed up. Risk calculation and therapeutic recommendation tools should be personalised, addressing data sharing and infrastructure needs such as integrating highly heterogeneous multi-scale data sources, integrating omics data into clinical care or integrating imaging data. The provision of multiple channels to establish bi-directional communication of text, images, voices, video should be

addressed as well."

*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

- Yes
- No

If yes, can you describe the solution in a few sentences?

Please write your answer here:

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Improve transition from hospital to community setting- Innovative solutions should tackle the need of patients

and family carers of receiving the necessary training to enable a successful transition to the home environment. Patients and family carers often receive insufficient information on the psychological and emotional impact of a stroke and how they can manage these complex feelings. Furthermore, it seems to be difficult to find and access information and assistance on care and support services after discharge from hospital. Solutions should also enable a better addressing of the current lack of proactive follow-up either from primary care, the hospital, allied healthcare professionals, and/or social care services."

*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

- Yes
- No

If yes, can you describe the solution in a few sentences?

Please write your answer here:



Multimorbidity

Multimorbidity, defined as a co-occurrence of two or more chronic conditions, is an increasing problem worldwide and is already a significant epidemiological problem in Europe related to the increase on life-expectancy and rapidly aging population. Observational study reviews have estimated that up to 95% of people older than 65 years may be affected by multimorbidity*. Although multimorbidity prevalence increases with age and frailty, it is not only associated with aging and can affect younger people too, where frailty assessment tools are not well developed**. It is also strongly associated with social determinants and people from deprived areas are in higher risk of complex conditions, less access to care delivery system and poorer health outcomes. However, there is a lack of effective risk stratification tools. Patients with multimorbidity include a great variety of different combinations in its spectrum, including the risk of complications, burden of treatment, complexity, quality of life and disability, resource demand and healthcare cost. The traditional health care delivery model was designed to answer to acute and disease-specific situations and with the change in epidemiology of the diseases there is an increasing need of adapt and re-designing the health delivery model to cover chronic conditions, multimorbidity and complex situations. However, the effort to this demand has been difficult due to the lack of good understanding, evidence and agreement on basic information from aetiology to best practices***. There is a need of new models of care to improve care delivery to patients with multimorbidity****.

*Concepció Violan et al., «Prevalence, Determinants and Patterns of Multimorbidity in Primary Care: A Systematic Review of Observational Studies», PloS One 9, n.o 7 (2014): e102149, <https://doi.org/10.1371/journal.pone.0102149>.

** ibid.

*** Rokas Navickas et al., «Multimorbidity: What do we know? What should we do?», Journal of Comorbidity 6, n.o 1 (17 de febrero de 2016): 4-11, <https://doi.org/10.15256/joc.2016.6.72>.

**** Jonathan Stokes et al., «The Foundations Framework for Developing and Reporting New Models of Care for Multimorbidity», Annals of Family Medicine 15, n.o 6 (noviembre de 2017): 570-77, <https://doi.org/10.1370/afm.2150>.

[]

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Develop strategies and tools to support care teams with specialists for complex case management. Centralised expert team directories and protocols to access (even remotely) should facilitate the care of patients and increase the confidence of the team."

*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4

5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

Yes

No

If yes, can you describe the solution in a few sentences?

Please write your answer here:

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Create and provide tools that promote patients' comprehensive assessment, including health and social variables but also the progression of the conditions and the decision-making processes."

*

Please choose **only one** of the following:

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1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

Yes

No

If yes, can you describe the solution in a few sentences?

Please write your answer here:

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Develop tools to help monitoring patients with multimorbidity in real-life situations and share that information with the care team."

*

Please choose **only one** of the following:

1

2

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5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

Yes

No

If yes, can you describe the solution in a few sentences?

Please write your answer here:

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Address the lack of information integration among different stakeholders and different health and social care providers, resulting in information fragmentation and increase risk of errors. This shall include the development of a summary of patient's information (e.g. needs, care plan, medication, care delivery schedule) with the content being subjected to local role based access rules, and made available to all care practitioners. The solution should also include the development of a standardised

coding system to identify the patient's main problems and for the codes to be accurately mapped to the coding of other systems or documentation used by the care team."

*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

- Yes
- No

If yes, can you describe the solution in a few sentences?

Please write your answer here:

Dementia

Worldwide, around 50 million people have dementia, and there are nearly 10 million new cases every year. It mainly affects older people, but is not a normal part of the process of ageing. Dementia is one of the major causes of disability and dependency among older people worldwide and has a physical, psychological, social, and economical impact, not only on people with dementia, but also on their carers, families and society at large*. The organisation of care and provision of support to people with dementia is of complex nature as includes many elements such as early diagnosis in order to promote early and optimal management, optimising physical health, cognition, activity and well-being, identifying and treating accompanying physical illness, detecting and treating challenging behavioural and psychological symptoms and providing information and long-term support to carers**.

* WHO Dementia factsheet 2017. <https://www.who.int/news-room/fact-sheets/detail/dementia>

** WHO Dementia factsheet 2017. <https://www.who.int/news-room/fact-sheets/detail/dementia>

[]

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Address the lack of time of professionals for consults by longitudinal screening programs targeting elderly population in the community promoting awareness: Longitudinal screening programs will inform healthcare providers about the cognitive and functional competencies of the population at risk. Moreover, a community-based screening programme will promote awareness combating and eliminating stigmas on mental health."

*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

- Yes
- No

If yes, can you describe the solution in a few sentences?

Please write your answer here:

COPD

The chronic lung disease COPD is characterized by reduced airflow, inflammation and flare-ups, called exacerbations, in which the patient may experience increased coughing, mucus, shortness of breath, wheezing, and a feeling of tightness in their chest. If those symptoms are not detected and treated in a timely fashion, they can escalate and lead to hospitalizations, disability and a diminished quality of life. COPD is the third leading cause of death in the United States. By 2030, COPD will become the third cause of mortality and seventh cause of morbidity worldwide.

[]

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Promote e-learning and mHealth applications for inhaler technique training. E-learning and mHealth applications can support the correct inhale techniques by patients for instance with applications on the smartphone. Thereby, patients can practice at home whenever they want to on their phones and clinics are relieved as well as the risk for exacerbations can be reduced."

*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

[] Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

- Yes
- No

If yes, can you describe the solution in a few sentences?

Please write your answer here:

Aortic stenosis

Aortic stenosis (AS) can be congenital or degenerative and is the most common heart valve disease worldwide (1, 2). It can occur due to many causes (e.g. rheumatic fever or a congenital heart defect) though this condition more commonly develops during ageing as calcium or scarring damages the valve and restricts the amount of blood flowing through the valve (3). In Europe, approximately one million people over 75 years suffer from severe aortic stenosis (AS), one of the most serious and most common valve diseases, and this disease burden is increasing with the aging population (4). The presence of calcific valve disease is associated with older age, male gender, elevated serum lipoprotein levels, diabetes, smoking, metabolic syndrome, and hypertension (5). Aortic Stenosis is a degenerative and progressive disease and sooner or later a valve replacement is mandatory in order to prevent irreversible hemodynamic changes (6). Before however symptoms occur, aortic stenosis is preceded by a silent, rather long lasting latent phase characterised by a slow progression at the molecular, cellular, and tissue levels (7). The disease is often mis-diagnosed and often under-treated. Aortic stenosis (AS) is associated with a significant reduction of life expectancy and a decline of quality of life. AS is one of the most prevalent cardiac valve diseases among the elderly that requires frequent consultations with the healthcare system, hospital admissions and often interventionist treatment. Symptoms include osteoarthritis, fatigue, chest pain and dizziness or loss of consciousness. However, in some cases the AS is asymptomatic. The diagnosis is based on symptoms, the finding of a typical cardiac systolic murmur and the confirmation of the valvular lesion with cardiac imaging techniques, mainly echocardiography. Once an AS has been diagnosed and there are several treatment options: surgical treatment, treatment with catheter interventions or palliative care supported by drug treatment. The European Society of Cardiology recommends the consultation of a multidisciplinary heart team in the management of valvular heart disease, heart failure, and myocardial revascularization. Such a heart team normally consists of cardiologists, cardiac surgeons, interventionists, imaging specialists, anesthetists and midlevel providers. In specific cases the expert opinion of a general practitioner, geriatrician or intensive care specialist can be of additional value (8). According to current evidence, TAVI appears to be an optimal solution (TAVI-in-valve) in high surgical risk populations (9). For other population segments, conventional open heart surgery remains the optimal treatment. For those clients who cannot undergo a TAVI or an open heart surgery, treatment with drugs is the only option currently. Recent advances in telemonitoring technologies create opportunities to monitor electrocardiogram (ECG) and vital signs remotely, facilitating redesign of follow-up trajectories. A particularly interesting application of mobile health is telemonitoring, in which mobile sensor applications facilitate remote follow-up of physiological parameters. Accordingly, telemonitoring systems that track vital parameters can create alternative strategies for current in-hospital monitoring. With this approach, patients are no longer confined to the hospital for follow-up of the ECG or other vital signs, which opens doors to redesigning the post-procedural patient trajectory (10). For the TAVR population, the introduction of remote monitoring technologies raises the possibility of shortening hospital stay length in eligible patients without abstaining from follow-up of pacemaker dependency. As mentioned previously, this can promote fast rehabilitation, procure a patient-friendly post-procedural trajectory, and optimize use of hospital bed capacity (11). However, further research regarding the effectiveness of this concept is required, involving evaluation of the overall effects on patient outcome, efficiency, and cost-effectiveness (12).

1 Supino PG, Borer JS, Preibisz J, et al. : The epidemiology of valvular heart disease: a growing public health problem. *Heart Fail Clin.* 2006;2(4):379–93.

2 Pibarot P, Dumesnil JG: Prosthetic heart valves: selection of the optimal prosthesis and long-term management. *Circulation.* 2009;119(7):1034–48.

3 <https://www.mayoclinic.org/diseases-conditions/aortic-stenosis/symptoms-causes/syc-20353139>

4 Thoenes, M. et al (2018). Patient screening for early detection of aortic stenosis (AS)—review of current practice and future perspectives. *Journal of Thoracic Disease.* 2018 Sep; 10(9): 5584–5594.

5 <https://academic.oup.com/eurheartj/article/31/4/416/417799>

6 Mathias Van Hemelrijck et al (2018). Recent advances in understanding and managing aortic stenosis. *F1000Res* (2018) 7:58.

7 Marquis-Gravel et al (2016). Medical Treatment of Aortic Stenosis. *Circulation.* 2016;134:1766–1784.

8 Christiaan F. J. Antonides, Michael J. Mack & A. Pieter Kappetein (2017) Approaches to the Role of The Heart Team in Therapeutic

Decision Making for Heart ValveDisease, Structural Heart, 1:5-6, 249-255, DOI: 10.1080/24748706.2017.1380377

9 Mathias Van Hemelrijck et al (2018). Recent advances in understanding and managing aortic stenosis. F1000Res (2018) 7:58.

10 Hermans, M.C. et al (2018). Remote Monitoring of Patients Undergoing Transcatheter Aortic Valve Replacement: A Framework for Postprocedural Telemonitoring. JMIR Cardio 2018 (Mar 16); 2(1):e9.

11 van Mourik, M. S. et al (2019). Percutaneous treatment of aortic valve disease: Towards optimal patient outcomes.

12 Hermans, M.C. et al (2018). Remote Monitoring of Patients Undergoing Transcatheter Aortic Valve Replacement: A Framework for Postprocedural Telemonitoring. JMIR Cardio 2018 (Mar 16); 2(1):e9.

[]

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Find solutions that address the often uncoordinated follow-up of clients discharged from hospital and that support shared-decision making processes, also considering values, needs and preferences of the clients. Innovative solutions should tackle the need of patients and family carers receiving the necessary training to enable a successful transition to the home environment. Patients and family carers often receive insufficient advice on the psychological and emotional impact of aortic stenosis, the impacts of a surgery or TAVI and how they can manage these complex feelings. Furthermore, it seems to be difficult to find and access information and assistance on care and support services after discharge from hospital. Solutions should also enable a better addressing of the current lack of proactive follow-up either from primary care, the hospital, allied healthcare professionals, and/ or social care services."

*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

- Yes
- No

If yes, can you describe the solution in a few sentences?

Please write your answer here:

Cross-cutting

Integrated care procurement objectives that cut across different conditions.

[]

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Provide multiple communication channels (e.g. portals, APPs, secure chat, videoconference), in addition to the usual paperand-pencil and phone calls,e.g.

- To share the individual's care plan and the notes on its delivery among the care team members;
- To facilitate the remote contacts (e.g. WhatsApp-like) between the care team/stakeholders;
- To manage a patient's feedback on the appropriate execution of his/her planned self-management tasks;

- To generate/notify/rank alerts in case of need, perhaps after a filter made by a Contact Centre."

*

Please choose **only one** of the following:

- 1
 2
 3
 4
 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

[]Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

- Yes
 No

[]If yes, can you describe the solution in a few

sentences?

Please write your answer here:

[]

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Address the lack of training and resources in care teams to capacity building focusing on technical skills for complex situations as well as team coordination protocols and strategies. Decision-making processes, patient-contact strategies, standardised language and coding system and the use of the existing tools need to be developed and all care practitioners need to have updated and regular training. Address the low effectiveness of some of the existing training strategies (such as checking lists to access to a job) and promote engaging and team building training processes."

*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

- Yes
- No

If yes, can you describe the solution in a few sentences?

Please write your answer here:

Integrated Care Procurement Objectives suggested by Euriphi regions and PPOs

The following Integrated Care Procurement Objectives were suggested by some of the Euriphi regions and PPOs but not yet fed back to and prioritised by other Euriphi regions and PPOs . We thus kindly ask you for your view and priorities in relation to these Integrated Care Procurement Objectives.

[]

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Integrated homecare suite of digital solutions and associated services designed to support older people with mild cognitive impairment and their care team to promote health and wellbeing, reduce delayed transfers of care, reduce frailty and deterioration, and provide a flexible response to support daily living skills and activities."

*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

[] Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

- Yes
- No

[] If yes, can you describe the solution in a few sentences?

Please write your answer here:



Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Integrated platform to provide interoperability between digital solutions (both those used in the homecare and institutionalised care environments), electronic care record systems and data analytics to further progress towards the digital transformation of health and care."

*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

- Yes
- No

If yes, can you describe the solution in a few

sentences?

Please write your answer here:

[]

Please rate the following ICPO according to it's importance for a future procurement activity in your region/organisation:

"Address delayed transfer of care for the elderly frail/dementia cohort of patients, their reablement, falls prevention and reduction, offer the best quality care and treatment to optimise patient outcomes, avoiding health care and social support inequalities across geographical footprint."

*

Please choose **only one** of the following:

- 1
- 2
- 3
- 4
- 5

1= Not at all important

2= Slightly important

3= Important

4= Fairly important

5= Very important

[]Is an innovative solution addressing this ICPO already existing in your region/organisation? *

Please choose **only one** of the following:

Yes

No

[] If yes, can you describe the solution in a few sentences?

Please write your answer here:

Additional Integrated Care Procurement Objectives

In this section we kindly ask you to describe any additional Integrated Care Procurement Objective we have not yet identified and which may be a priority for your region/organisation on the existing topics or other integrated care topics. Thank you!

[]

Are there any other procurement objectives we have not identified and which may be a priority for your organisation on the existing topics or other integrated care topics?

*

Please choose **only one** of the following:

- Yes
 No

[]

If so, to which integrated care topic does the procurement objective belong to?

*

Check all that apply

Please choose **all** that apply:

- Stroke
 Dementia
 Multimorbidity
 Aortic Stenosis
 COPD
 Other:

[]

Are you aware of any investments in your organisation/region that facilitate changes towards value-driven health and social care delivery? Investments can include for example:

- Education, awareness raising activities
- Innovation budgets for adopting new technologies or care pathways
- Time to establish and enter into innovation procurement procedures.

*

Please choose **only one** of the following:

- Yes
- No

[] If so, can you shortly describe the nature of the investment(s)?

Please write your answer here:

Contact details

[] Please enter the name of your organisation. *

Please write your answer here:

[] Type of organisation *

Choose one of the following answers

Please choose **only one** of the following:

- Care delivery organisation
- Procurement organisation
- Regional/local authority
- Research organisation
- Other

Thank you for completing the Euriphi survey! If you have any further questions or are interested in becoming a member of the Euriphi Regional Network please contact Sonja.Mueller@empirica.com.

10-15-2019 – 00:00

Submit your survey.

Thank you for completing this survey.