

University of Groningen

Characteristics of Surgical Prosthetic Heart Valves and Problems Around Labelling

EACTS-STIS-AATS Valve Labelling Tas; Durko, Andras P.; Head, Stuart J.; Pibarot, Philippe; Atluri, Pavan; Bapat, Vinayak; Cameron, Duke E.; Casselman, Filip P. A.; Chen, Edward P.; Dahle, Gry

Published in:
Annals of thoracic surgery

DOI:
[10.1016/j.athoracsur.2019.03.020](https://doi.org/10.1016/j.athoracsur.2019.03.020)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2019

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

EACTS-STIS-AATS Valve Labelling Tas, Durko, A. P., Head, S. J., Pibarot, P., Atluri, P., Bapat, V., Cameron, D. E., Casselman, F. P. A., Chen, E. P., Dahle, G., Ebels, T., Elefteriades, J. A., Lancellotti, P., Prager, R. L., Rosenhek, R., Speir, A., Stijnen, M., Tasca, G., Yoganathan, A., ... De Paulis, R. (2019). Characteristics of Surgical Prosthetic Heart Valves and Problems Around Labelling: A Document From the European Association for Cardio-Thoracic Surgery (EACTS)-The Society of Thoracic Surgeons (STS)-American Association for Thoracic Surgery (AATS) Valve Labelling Task Force. *Annals of thoracic surgery*, 108(1), 292-303. <https://doi.org/10.1016/j.athoracsur.2019.03.020>

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.



Trends and Developments in Health-Care and Social Services

5

Irma Mikkonen, Panayota Sourtzi, Riitta Turjamaa,
Marja Äijö, Eeva-Riitta Ylinen, Evelyn J. Finnema, and
Job T. B. van 't Veer

5.1 Disease Prevention Targeting Older People

Health and well-being promotion as well as disease prevention are an important part of health-care and social services also in older people's lives in all settings. As was mentioned in the introduction of this chapter, focusing on health and well-being promotion and disease prevention for older people supports enhancing health and well-being of older people as well as enabling efficient use of resources in health-care and social services. Different kinds of approaches and interventions are used to increase people's well-being and prevent diseases as well as reduce health costs. These interventions are traditionally targeted towards younger people as those who have more years of life ahead and can benefit from prevention activities for longer period of time. However, while the population is ageing in Europe, health and well-being promotion and disease prevention for older people is more and more important as it may bring variety of social benefits. Several kinds of methods are used in health promotion and disease prevention [1–3].

I. Mikkonen (✉) · R. Turjamaa · E.-R. Ylinen · M. Äijö
School of Health Care, Savonia University of Applied Sciences, Kuopio, Finland
e-mail: riitta.turjamaa@savonia.fi; eeva-riitta.ylinen@savonia.fi; marja.aijo@savonia.fi

P. Sourtzi
Department of Nursing, Sector of Public Health, School of Health Sciences,
National and Kapodistrian University of Athens, Athens, Greece
e-mail: psourtzi@nurs.uoa.gr

E. J. Finnema · J. T. B. van 't Veer
Research Group Care and Wellbeing, NHL Stenden University of Applied Sciences,
Leeuwarden, The Netherlands
e-mail: evelyn.finnema@nhl.nl; j.van.het.veer@nhl.nl

5.1.1 Definitions of Health Promotion and Disease Prevention

Health promotion is defined by WHO to be the process of enabling people to enhance control over as well as improve their health [4, 5]. Whereas in the definition made by WHO, the aim of disease prevention is to minimize the burden caused by different diseases and associated risk factors. Thus, disease prevention approaches aim both to prevent the occurrence of disease, for example, by reducing risk factors, and stop to progress and reduce its consequences [4]. Prevention will take place both on population and individual levels. Often, disease prevention is divided into three different approaches: primary disease prevention is aimed at preventing the onset of disease, secondary prevention is meant to control the disease before it manifests clinically, and tertiary prevention is focused on decreasing the impact of a disease on the person's life as well as to support to manage with it. All these contribute to reducing the risk of disabilities. The concepts of disease prevention and health promotion are close to each other and share many goals, and there is considerable overlap between functions. According to the definition of WHO, the concepts can be differentiated on a conceptual level: health promotion activities are those that require and are based on inter-sectoral actions and are concerned with the social determinants of health, whereas disease prevention measures are primarily concentrated on the health-care sector.

5.1.2 Forms of Disease Prevention

As health, well-being and healthy lifestyle are discussed in the previous chapters dealing with ageing and healthy ageing, this section focuses on disease prevention related to older adults.

Chronic diseases (non-communicable diseases), such as heart disease, stroke, cancer, chronic respiratory diseases and diabetes, are the leading cause of mortality in Europe, representing 77 percent of the total disease burden and 86 percent of all deaths. These diseases are linked by common risk factors, underlying determinants and opportunities for intervention [2]. Tackling four major risk behaviours—smoking, alcohol abuse, unhealthy diet and sedentary lifestyle—can help prevent many chronic diseases. But to be effective, such efforts need to be based on targeted health promotion, prevention and early detection. According to the EU commission, it is important to involve and integrate all the levels from communities to policy makers to address the challenge of chronic diseases. In addition, environmental and social determinants play an important role in the development of chronic diseases [6]. Primary care has an important role in the prevention of non-communicable diseases (see Sect. 5.3). Integrating prevention interventions into primary care is said to be one of the major strategies to improve outcomes [2, 7].

Moreover, when older people are concerned in disease prevention, it is important to remember that older people are a heterogeneous group of adults. The same health and well-being promotion and disease prevention approaches directed to adults are often effective as well with older adults [6]. However, because older people are not

one homogeneous group, often more individualized approaches taking into account the older people's needs are necessary [8]. With older people, it is important that health and well-being promotion and disease prevention programmes also take into account supporting the older people's functional ability and quality of life. Interventions that create supportive environments and foster healthy choices are important at all stages of life. Furthermore, with older people, specific programmes to prevent, for example, frailty and falls as well as social isolation are important [6, 9, 10].

Indeed, it is important to adapt interventions to individuals and their levels of capacity. When ageing, many individuals will experience periods of high and stable capacity, declining capacity and a significant loss of capacity. Each of these three periods requires different interventions in order to respond to each individual's needs. However, though age increases the risk of many chronic conditions, the presence of a disease in older age does not mean that the older adults could not feel to be fit and healthy; they may experience high levels of well-being despite the presence of one or more diseases and disability and frailty [8, 10].

Disease prevention strategies and approaches can be defined and categorized in many different ways. Here we discuss preventive approaches in older people's services presented by Allen and Glasby [1]. One of the main sources in their commentary was a European Union (EU) review of prevention and long-term care in older people's services across 14 European countries (known as Interlinks—see <http://interlinks.euro.centre.org/project>) thus representing a European viewpoint though using a national perspective of England. Consequently, ten preventive approaches in older people's services will be discussed. These approaches are the following: promoting healthy lifestyles, vaccination, screening, falls prevention, housing adaptations and practical support, telecare and technology, intermediate care, reablement, partnership working between health and social care and personalization.

5.1.2.1 Promoting Healthy Lifestyles

The promotion of older people's health and well-being includes physical activity, diet, substance consumption and social engagement. Social and health-care professionals, in their respective roles, may act as health and well-being advocates for older persons by helping and supporting them to maintain and improve physical, psychological and social well-being through education and promotion of health behaviours. Because most of the diseases in older age are due to non-communicable diseases, risk factors for these conditions are important targets in promoting healthy lifestyle. Approaches and interventions to reduce the burden of disability and mortality in older age by enabling healthy behaviours and controlling metabolic risk factors should continue throughout the person's life [1, 2].

5.1.2.2 Vaccination

Older people may be at increased risk of serious illness or death resulting from certain common infections because the immune function decreases with age, leading to more severe and more frequent infections. Moreover, older people may have not received immunizations in younger years, and some newer vaccines may not have been available to them when they were children. Consequently, the best way of

protecting older people from serious infections is to be vaccinated against them. Three common but potentially dangerous diseases that older people should be vaccinated against are influenza, pneumococcal disease and shingles (herpes zoster). In addition, boosters may also be recommended for immunity that decreases rapidly with age. The most important of these are boosters against tetanus and diphtheria, and these are also recommended for older people in many countries [1].

Because these above-mentioned diseases pose particular health risks to older people in terms of the high risk of developing serious complications, it is very important that health professionals make an effort to inform and educate older people of the need to protect themselves against certain diseases, such as influenza, pneumococcal pneumonia and tetanus [1]. Also in vaccination programmes of different European countries, the same principles as in recent social and health care in general should be emphasized, such as life-course approach involving older population as well as empowerment of people enabling them, for example, to have access and be aware of the benefits of vaccination [11].

5.1.2.3 Screening

Screening is the systematic application of a test to identify individuals at risk of a specific disease. Medical screening and screening programmes can allow early diagnosis and intervention and thus prevent disability and death as well as improve quality of life. There are screening tests available for some chronic diseases [7]. Examples of testing are breast screening, cervical screening, screening for depression, functional testing and sensory testing. Screening includes also ethical questions related to, for example, in what age the costs and harms outweigh the benefits [1]. There is evidence that in the primary care, screening for specific conditions can be a potentially useful tool in identifying those in need of interventions to promote health and well-being or prevent disease [7].

5.1.2.4 Fall Prevention

Falls increase with age-related biological change, and they are prominent among the external causes of unintentional injury among older population (see Sect. 3.2). The serious physical injuries often sustained in falls can lead to associated decline in confidence and mental health as well as further physical complications and thus for decline in quality of life [12, 13]. The frequency of falls increases with age and frailty level. Falls and consequent injuries are major public health problems that often require medical attention. Falls occur as a result of a complex interaction of risk factors. The main risk factors reflect the multitude of health determinants that directly or indirectly affect well-being. Those are categorized into four categories [13]: biological, behavioural, environmental and socioeconomic factors.

Part of biological factors, for example, age, gender and race are non-modifiable. Biological factors are also associated with changes due to ageing such as the decline of physical, cognitive and affective capacities and the comorbidity associated with chronic illnesses. Instead, behavioural risk factors are at least partly modifiable as they are related to behaviour, emotions or daily choices. An example

of these is excess alcohol use. Environmental factors as cause of falling take place as the interplay of older person's physical conditions and the surrounding environment. These can happen both at home and public environment because of, for example, poor environment design, slippery floors or poor lighting. The fourth risk factors are socioeconomic which are related to social conditions and economic status of older population as well as the capacity of the community. These are such as low income, inadequate housing as well as limited access to health and social care [13].

As the reasons for older people's falls are often related to behaviour or environment, consequently, protective factors for older people's falls are related to behavioural change and environmental modification. The research suggests that a key factor to avoid falls is healthy lifestyle. The similar factors as discussed in health promotion are non-smoking, moderate alcohol consumption, normal weight as well as physical and social activity [13]. When investigating older people's motivation to participate in fall prevention interventions, Dickinson and colleagues found that motivating factors were personal invitation and discussion with the older adult as well as mass media campaigns [12].

5.1.2.5 Housing Adaptations and Practical Support

Appropriate and safe housing is a key aspect of a community's built environment. It can have an enormous impact on such aspects of daily life as mobility and safety (from crime and injury). Housing is also inextricably linked to other domains. For example, if housing is adequate and affordable, and allows for older population to age in place, there may be lower needs for some community support services [1].

Many older people in European countries prefer to live independently and stay in control of their lives for as long as possible. However, often ageing causes increasingly challenges and problems in health. Consequently, older adults require care and services at home. Developing services and access to funding for improvements to older people's homes has scope to promote autonomy, prevent illness and reduce demands on both families and formal services. As people age, some will want to stay at home, while others will want to move. Some will prefer to live with people of a similar age, while others will seek mixed age communities. The design and modification of housing and transport systems as well as assistive technologies in the home and more widely are very important in supporting the older people's safe housing. Regional, municipal and local government are key partners here, since they are usually responsible for these services on the ground [14]. These issues are discussed more in detail in the other sections of this chapter (Sects. 5.2, 5.3 and 5.4).

5.1.2.6 Telecare and Technology

There is growing exploration of the potential role of assistive technology in preventive approaches for older people. Technological innovation offers many ways of improving the quality of life and of mitigating some of the risks, and costs, of ageing [1, 15]. Technological trends related to older people care and services will be discussed later in detail (see Sect. 5.5).

5.1.2.7 Intermediate Care

According to Melis and colleagues (2004), there is no clear, agreed definition for intermediate care [16]. However, in this context, intermediate care describes services that are targeted at people who would otherwise face unnecessarily prolonged hospital stays or inappropriate admission to inpatient care or long-term care. Intermediate care services are provided on the basis of a comprehensive assessment, resulting in a structured individual care plan. These services have a planned outcome of maximizing independence and typically enabling clients to continue their lives at home. These services have a planned time period. Typically they involve cross-professional working, with a single assessment framework, single professional records and shared protocols [1]. These services are discussed more in other sections of this chapter (see Sects. 5.2, 5.3 and 5.4).

5.1.2.8 Reablement

Nowadays, in many European countries, there is a tendency to remodel home care services on a reablement basis (restorative focus), providing more intensive care and rehabilitative services for a short period of time with a view to reducing support as skills and confidence increase [1, 17]. This model completes or even replaces a conventional home care. A used concept of these kinds of services varies in different countries and regions (reablement, restorative home care, home rehabilitation). Anyway, reablement means learning or relearning the day-to-day skills needed to encourage an older person's self-confidence and support independence. Similarly, as the concept varies in different countries, there are different kinds of approaches and models in organizing these kinds of services. Reablement services may have developed out of traditional home care services or from hospital discharge or intermediate care schemes. In many cases these services are provided to older people who have just been discharged from hospital or otherwise need more support for living at home. Care and services are often delivered by multi-professional service and care teams [1]. Read more about these in the next section of this chapter (see Sect. 5.2).

5.1.2.9 Partnership Working Between Health and Social Care

In many European countries, there has currently been and is a tendency to intensify collaboration within health-care and social services. By working more closely together, it is argued health and social care partners could invest their respective resources more effectively and provide an earlier and more holistic response to need—which might prove successful in supporting people longer at home and prevent or delay admission to costly acute/residential care [1]. This approach is emphasized throughout this book when discussing older people care and services from different viewpoints [see in Chap. 9 “Case-Management” and in Chap. 10 “Care-Management”].

5.1.2.10 Personalization

By fully tailoring services to individual needs and circumstances, it is argued that there is scope to provide more innovative, higher-quality and better-organized support—potentially preventing or delaying future crises in people's health or social

situations. One objective of public policy is to enable older people to take greater control of their own lives and increase their engagement in economic, civic and social activity across the extending lifespan [1]. The viewpoint of personalizing care and services of older people is one point throughout this book—the related concepts are, for example, person-/client-/older person-centred care and services, individual needs for care and services and independence of older people. The idea behind all these concepts is the idea that the care and services have to be based on assessing each older person's individual needs. In addition, older people should be involved in decision-making concerning their lives. Consequently, collaboration with older people themselves is emphasized. Related to this view, the following concepts and approaches are used in this book in its different sections: placing the older person in the centre of care and services; provision of older person-centred, integrated and individualized care (see Sect. 5.2); and the 'emancipation' of the older people as genuine codesigners (see Sect. 5.6).

As this short review of preventive approaches indicates, it is important for social and health-care professionals to be familiar with different kinds of preventive approaches in order to be able to support older people's health, functional capacity and independency in different social and health-care settings.

5.2 Independent Living and Support and Care at Home

Most of older people are healthy and living in their own homes in a familiar environment [18]. Moreover, independent living at home is emphasized to be the main wish among older people as well with societies whose aim is to support this, for example, by planning and realizing support programmes. Based on statistics, the majority of older people (65 or over) lives alone (31.1%) or as a couple (48.3%). In the year 2009, approximately nine of ten people aged 65 and over in France, the United Kingdom, Germany and Finland lived independently in their own homes, whereas in the Netherlands, the percentage among home-living older people was even 95 percent. By contrast, this share was especially low in Spain, Portugal, Estonia and Cyprus. In these countries, older people more often lived in common households together with their children, while in Europe, this only concerns to 4.6 percent of all of older people [19]. It seems that the willingness to leave familiar surroundings declines in old age. The most significant factors which influence changes are, for example, changes in marital status, too large house to take care of or declining abilities [20].

5.2.1 Independent Living

Independent living at home can be enabled by using functional and social abilities [20, 21]. These abilities have been found to support independent living. Functional ability is defined in terms to perform activities of daily living (ADL). These abilities are also linked to comprehensive health but also strongly to everyday activities such as shopping and household chores. Functional abilities as well as health can be

assessed both objectively and subjectively. Health can be observed from the perspective of complete physical, mental and social well-being as was already discussed in the previous chapter (see Sect. 4.1). Objective assessment of health can be evaluated. When health is evaluated by using objective assessment, it mostly includes evaluation of chronic diseases, medication use, malnutrition, vision, cognitive status, physical activity, smoking and alcohol use and measurement of blood pressure. Subjective health, instead, is often considered more as an emotional view. Although objective health and ability to manage activities of daily living can weaken as an individual becomes older, subjective health can stay at good level for longer.

Social abilities such as relationships with family members, relatives and friends support older people's psychological well-being and life satisfaction and in managing their daily chores [22]. In addition, participating in social activities with other people increases well-being [23] and quality of life [24]. Independent living at home can be achieved by using older peoples' individual resources. Moreover, independent living is also associated with living circumstances and social environment. Individual resources are a significant part to maintain older peoples' well-being and to achieve individual goals [25]. Social environment and meaningful relationships with family members and friends may be a significant resource which may support older people's life satisfaction and their ability to deal with daily activities [24]. In some cases, social relationships can weaken the older people's capability of living at home, for example, in the case of caregiver taking care of a spouse with a memory disorder. Caring for a spouse with a memory disorder has many influences on caregivers' overall well-being, such as stress and even depression [26].

Some factors can be mentioned that can threaten independent living of older people. These factors can cause the situation where the own home is no longer a safe place for the older people. Declining functional abilities and health, or experience of it, can lead to difficulties to manage everyday activities. These difficulties are considered as the main reason why independent living can come under threat. For example, chronic diseases, especially cardiovascular diseases, diabetes and cognitive disorder, such as dementia, can weaken the ability to manage everyday activities and therefore threaten independent living. Furthermore, some situations such as loneliness, isolation and insecurity as well as falls and malnutrition can also threaten independent living [27].

It is evident that there are both individual and cultural differences that influence older peoples' independent living at home. Probably there are even more different factors that can threaten independent living than those mentioned above. Therefore, it is significant that identification of influencing factors is continuous because it enables proper allocation of health-care and social services targeted to the older people [28].

5.2.2 Homecare Services

Recently, social and health-care services are under economic pressure due to the demographic change caused by the increasing number of older people. In old age,

reduction in physical abilities can lead to loss of independence and the need for institutional care which is often costlier than home care [29]. Therefore, growing attention has been given to changing the care of older people from institutional to home care. In addition, in many countries, there is also a legislative responsibility to supply home care services consisting of support for older clients at home. These trends challenge health and social services to respond to expectations and require comprehensive care and service planning and daily care targeted at the multidimensional needs of individual clients [30, 31].

Older people are becoming older, and therefore the risk of diseases with loss of different abilities is increasing [20, 21]. The effects of ageing on the need for health and social services depend on the loss of abilities of older people. They mostly use the same social and health-care services as other age groups; however, there are some services that are headed at older people. In Europe, home care services consist of variety models, such as municipal home care services, the private and third sector as well as informal care. Private care and services are growing in several countries, such as Ireland, Finland, Sweden and England. Home care services are mostly organized by integrating services realized by case managers which coordinate the services, i.e. in England, Iceland, Sweden, Italy and Finland. In addition, other ways to organize services are through integrated care teams (e.g. Norway), integrated care trusts (e.g. the United Kingdom), residential homes and some domiciliary support services in Portugal and Denmark as well as in some Swedish municipalities. Nevertheless, how the home care services are organized, services consist of regular home visits, and the content of services are counselling and support for self-care and everyday activities. The contents of daily home visits consist of daily help, such as personal and physical care and care based on nursing, for example, taking care of medication [32].

Home care services are accomplished in clients' homes by home care professionals, such as practical nurses, home care nurses and home care service managers, in close collaboration with other social and health-care professionals. The execution of home care services is based on legislation and ethics, and it consists of care planning in collaboration with older people and their relatives and also professionals' practice in daily care. The target of home care services is to provide personal assistance for everyday activities such as hygiene, eating and dressing and nursing treatments such as the administration of drugs and wound care.

The basis of home care services is the individual care and service plan which is produced and documented for all home care clients in agreement with them. The plan has to include the individual description of care and services to each client according to the client's needs in order to support older clients' living at home as long as possible. Also, the goals of clients' care and services, planned daily care and evaluations of clients' situations have to be documented. The planning of care and service plan is the first phase of initiative care relationship. Home care professionals in collaboration with clients and, if needed their relatives, make assessments, decisions and goals and decide interventions by implementing care and services. It is important for home care professionals to notice that clients are experts on their own lives, they have self-determination and they bring their own expertise to the care

planning. Older clients' ability to influence on care planning and decisions of their care has direct consequences for their successful home care services.

Care planning is based on the assessment of older clients' functional and social abilities, self-care abilities, everyday activities, cognitive status, habits and preferences, including recognizing quality of life and well-being [30]. The requirement of home care services depends on clients' needs for care and services including daily help and support with everyday activities and personal care. This is based on assessment of individual needs for care and how the goals of care and services are to be achieved [33]. The form of documentation of care plan includes goals, interventions and expected outcomes of the care and service process that are planned and agreed upon in collaboration with clients, relatives and professionals [34].

In most European countries, the primary nurse has the main responsibility for planning and execution of care which is based on ongoing evaluation of clients' health condition. Furthermore, the primary nurse, as well as other professionals, has the responsibility to encourage and promote clients to play an active role in their own care and services, thus helping them to maintain their independence within the home and community [35].

Clients' care which is accomplished at homes consists of home care professionals' tasks such as assistance for everyday activities and nursing treatments [36]. It is significant for clients that individual assistance is based on the client's needs and resources. This kind of working habit will optimize clients' influence over how the care and individual support is arranged. In addition, when receiving assistance, the client has the right to decide what the professional should do and when and how it should be done. In practice, this means that primary nurses implement daily care in collaboration with clients and taking into account all life dimensions that affect clients' health condition, including their ability to function and use of individual capacity [37]. This kind of individual care is significant, especially for clients with chronic illnesses or disabilities and declining cognitive disability which need rehabilitative approach. The confidential relationship and communication between the client and the primary nurse support for the maintenance of individuality despite of declining cognitive ability with various symptoms [35]. By supporting clients' needs and individual resources, it is possible to enable their living at home by respecting their own lifestyle, quality of life and well-being. This kind of individual care which takes care of clients' needs increases clients' trust and satisfaction with home care services [38].

Demanding work at home care services requires that home care professionals possess skills to provide care and support which take into account the complexity of clients' numerous challenges. Therefore, home care professionals who work with older clients with complex needs have to be experts in planning and implementing care that supports the highest quality of care to clients [21, 35]. A respectful relationship between older client and primary nurse is related to reciprocal confidence. This kind of relationship is based on action where the primary nurses take into account older clients' autonomy and respect the various ways how clients live in their own homes. Older clients' confidence in home care professionals and especially in the primary nurse increases when professionals focus on clients' opinions

and perceive their needs in care planning as well as in daily care. This kind of respectful relationship between client and primary nurse is sensitive and based on the ethical perspective where the clients have their own equal authority and own values. However, in daily care, it might be a challenge for home care professionals to recognize and take clients' resources into account and support them in daily activities [24].

5.2.3 Technical Support

In addition to 'traditional' care, it is possible to support older people's independent living at home by using different technological solutions. As technology advances, many of these solutions can utilize informatics applications that promote well-being and enable monitoring in home. Technology-based home care refers to the use of ICTs to monitor well-being and to provide a secure home environment. Sensor technology is one solution which is used by measuring the physical environment as well as monitoring older people at home. The sensor technology makes it possible, for example, to communicate with one another and measure the amount of light, temperature and movement in the environment. For example, the use of furniture, such as beds, toilets, chairs and sofas, can be monitored using pressure sensors. Older peoples' activity can be monitored by using motion sensors attached to interior ceilings, wearable technology and video cameras [39].

In addition to sensor technology, robots have been developed to assist older people to stay healthy and safe in their own homes. These kinds of assistive social robots such as pets can be used for older people who feel themselves lonesome. In addition to providing companionship, robots can support independent living by assisting daily activities (eating, bathing and getting dressed) and mobility and providing domestic aid. Thus, robots can be used as medication reminder. There are also many functional apps such as smartphone and tablet apps that can improve older people's independent living at home. These apps can be used, for example, to enhance mental health, track health records and medications and follow individuals' sleep [39, 40]. For home care providers, the robots and smart home applications provide information about the current status of the daily activities of the older people. Measuring daily activities provide home care professionals with objective and regular information that could be used in better assessing the condition of the older people [39].

From the perspective of ethics, older people's care at home has to be organized and realized according to the following ethical principles. Moreover, clients have the right to be respected as the baseline for their care is the clients' best taking into account clients' autonomy. This refers to the clients' rights of self-determination in the context of deciding their available care and services. In addition, autonomy is related to dignity and is a remarkable aspect of ethical conversation in older peoples' care. According to the principle of autonomy, all older people should have the right to take a stand on their own care in collaboration with home care professionals based on their individual values. For older people, possibility to express their own

opinions and having home care professionals show consideration are prerequisites for accomplishing independence [41].

In summary, quality of care consists of individually planned services and individually delivered daily care. Client-based assessment and care planning which are based on client-centred approach confirm the promotion of autonomy and independence. In practice, it can be observed from the perspective of clients which means that even the ability to make quite small decisions about their daily lives can have a significant impact on their autonomy. The care and services of home care based on this approach require a process in which home care professionals assess and coordinate care and services in continuous collaborations with their clients [29].

5.3 Trends and Developments in Community Care

Health and social care services need to adjust in the contemporary circumstances. These include timely plans for changing health and social care delivery according to population changes. Not only the proportion of older people in general is growing, but also there are increasing proportions of the older and oldest old, who also continue living in the community and are in need of greater support because of their complex health and social care needs.

In 2007, the World Health Organization (WHO) published *Global Age-Friendly Cities: A Guide* [42]. In this guide, eight aspects of community life concerning older adults are identified: outdoor spaces and public buildings, transportation, housing, social participation, respect and social inclusion, civic participation and employment, communication and information and community support and health services. Kofi Annan, the former Secretary General of the United Nations declares: 'A society for all ages is multigenerational. It is not fragmented, with youths, adults and older persons going their separate ways. Rather, it is age-inclusive, with different generations recognizing—and acting upon—their community of interest' [43].

An example of government policy following this general human need for inclusion is the decentralization in the social domain, implemented in 2015 in the Netherlands. The transition is based on the idea that individuals and clients should be more self-reliant and arrange things themselves to a greater degree and that municipalities, care and welfare organizations and informal and formal carers should have a different role [44]. The transformation is accompanied by the shared awareness that future-proof care and assistance require individuals and clients to take an active role and health and social care professionals to take a supportive and complementary role.

Countries utilize different approaches to organize health and social care services, but nowadays it is accepted that these services should be organized within the community setting so that older people continue living in the environment they used to. Although community care is not a novelty, it is the focus in contemporary discussions on how the best possible care could be organized. WHO report on Ageing and Health [45] points out the necessity for organizing health and social care services as close to the place older people live as possible, services such as primary health care

and social care that will provide holistic care in collaboration with the older people themselves. Especially today that there is a tendency to provide more cost-effective services, community care seems to be the right solution. These services should take into account the specific cultural, social and economic circumstances of the country, so that they are acceptable by older people but also their social environment and health and social care professionals.

Community care services in most countries are funded by public money, either through taxation or social security funds, depending on the model generally used. There are also services organized by the voluntary sector, including religious organizations, but also private organizations. Access to the services should be driven by equity for all older people regardless of the model used. In addition to that, there is a tendency that the family is expected to assume a central role in helping keep and support older people within the community setting. The family's role is stronger in some countries than others; for example, in Europe, in the Mediterranean countries, traditionally the family assumes a greater involvement in the care of older people than in northern European countries. Anyhow, living at home requires a certain level of self-care; if that is not the case, then older people need to be supported in order to achieve independent living. This could take the form of living in their own home with either family or external support or assisted living premises, if this form of housing arrangement exists. Both forms entail that services are arranged in such a way that they are able to respond at different levels of care needs.

Community health and social care services aim at maintaining independence of older people, preventing health risks, promoting well-being and safeguarding self-care, as well as supporting social networking. It is, however, important to note here that community care should be organized in such a manner so that older people and their families have access at the level of care they need; otherwise those in most need may get the least of services resulting in inequalities. There are different ways of organizing community care; some countries use them all, others not. Examples of these are help at home, day care and primary health care.

Help at home is organized according to the specific needs of the older people in order to support them to continue living in their own home. This form of care can support the older person or the family to manage activities of daily living independently. Help at home is not equivalent with home health/nursing care (see Sect. 5.2); it refers to services that support the older person—and/or the family—to carry on with self-care and or independent living, such as:

- Help with housekeeping and shopping
- Assistance with personal hygiene
- Meals on wheels
- Transportation to and from health and social care services
- Relieving the family caregiver from the burden of continues care

Day care is another form of helping older people to carry on living in their own environment and at the same time being active. In this type of service, older people

have the opportunity to be involved in activities outside their home and also socialize with their peers. There are different forms of day care:

- It could be just a community setting where older people can meet with others and socialize and participate in activities that help them to continue feeling useful form themselves such as exercise, occupational therapy, etc.
- Another form is the place where older people—in addition to social activities—can also get basic health-care services, such as preventive services, health education, chronic problems management, patient education activities and physiotherapy, if they need them [46].
- Intergenerational activities could also be organized through day care, and such activities have the power not only to keep older people active but also provide the younger generations with a positive image of ageing, because they are having the opportunity to be in contact with the older people who are and feel useful. For example, older people can visit a nursery school to read for children, play with them traditional games or cook together traditional recipes.

Primary health care (PHC) is the most common form of community health care. In most countries, PHC includes basic health-care services, chronic diseases management, promotion of self-care and preventive services including immunizations and health promotion [47, 48].

Contemporary PHC, in the light of a society that ages, should place the older person is the centre of care. This approach takes into account the perspective of the older person and their family/caregiver and tailors the provided services to their needs. Such an approach is certain that it will be of better quality but also cost-effective as the services provided are not the same for everybody; some will need more, others less. This form of PHC—older person-centred care—can also be integrated and individualized; that means that it is provided by a team of health and social care professionals who are collaborating to provide the full range of necessary services as these are required by the specific individual, evaluate them and change them as needed [45]. Health literacy—that refers to the individual or group ability to acquire and understand information for health, health care and health services, so that they can use it in their everyday life and be able to act for the maintenance and promotion of their health [49]—of both the older person and their family/caregiver is essential in order to be able to participate in their care effectively and efficiently. Health literacy is instrumental for the involvement of the older person and their family/caregiver in their care, and the PHC team must ensure that they provide the necessary support.

In addition to the provision of older person-centred, integrated and individualized care within the framework of PHC, the PHC team has a duty to offer the opportunity to everyone to receive the appropriate services. It is their responsibility to locate and include all individuals or groups of older people that are in need of care but do not seek it by themselves; this can be achieved by employing community resources as well as working in partnership with other health and social care services.

Patient education occupy a special part in the community care; it includes education of the individual older person to improve his/her self-care but also promote self-management for chronic conditions, as older people have to live with these problems for the most part of their lives. It is very important to make it available to anyone that needs it as it can help them to avoid unnecessary hospital visits and hospitalizations or lead them to long-term care.

Health promotion interventions for all ages including older people are mainly organized within the community setting. Most health promotion interventions aim at the groups that have a high functional ability, but there are also interventions designed for older people with restricted abilities, even frail older people. Although there is no hard evidence that all kinds of health promotion interventions are of value in promoting health of older individuals, it is certain that these improve quality of life because they engage older people in group activities which are valuable for the promotion of psychosocial health [50].

Taking into account the older person who lives in the community with various health-care needs and is being cared for by different professionals and services, it is of paramount importance that there is collaboration among them. There is also a need for collaboration between services/professionals and the older person and his/her family in order that the services are appropriate and holistic. If this fails, then the results would be either gaps in the care needed or duplication of services that may cause, in addition to being ineffective and costly, additional problems to the older person [45].

Community care has also an important role to play in social support of the older person as it has been found that social support positively influences all aspects of health and quality of life. It is therefore very important that one aspect of community care should focus on how the older person continues living within a social environment that supports social relationships. Older people are also able to contribute by supporting others, either within day care or in older people's homes. Such volunteering activities organized for and with older people provide a safety net for both groups of older people, those offering social support and those receiving it.

Volunteering activities that older people participate within the community should not to be limited among older people themselves. Older people can remain active and offer their valuable knowledge and skills in various settings, such nursery care. They can also use their knowledge and abilities to train others in useful skills [47]. Community care can help organize such activities with the participation of older people, following a detailed assessment of the existing needs.

In order to achieve successful community care, there should be an inter-professional team that collaborates within and with older people so that their needs are met fully. The team should use a comprehensive assessment that is holistic and collaborative. In order to achieve this, health and social care professionals need to be trained not only in relation to their expert knowledge for providing their services but also in skills necessary for approaching the older person, recognizing his/her special circumstances and communicating with and engaging him/her in his/her care [51]. Moreover, community care should be accessible to all according to their needs, funded in such a way to ensure equity and coordinated in order to avoid

duplication and waste of scarce resources. If such community services are provided, the older person would be satisfied, and the professional/team would be motivated, while the final result would be high-quality cost-effective service.

5.4 Trends and Developments in Long-Term Care

As was discussed before in this chapter, most of older people want to stay at home as long as possible and remain active in the community, living in so-called age-friendly or senior-friendly communities. We have agreed that it is important to find solutions to handle the increase of older people in need of care and assistance and the decrease of professionals supporting them. Worldwide there is a need for social and health-care systems making optimal use of the available resources [52].

The consequence of this striving for age-friendly communities is that today a shrinking percentage of older people in Europe live in long-term care institutions. Nowadays the general opinion is that long-term care has to be person centred and should fit the individual. In most European countries, the number of nursing and old people's home beds is increasing, however, not as fast as the number of older people [53]. Most of older people live at home. When problems in daily functioning arise, first the informal network (family, friends and volunteers) is being called upon. When this is not sufficient anymore, professional home care is added to the informal care. When these two systems can't offer the increasing care needed, then admission in an institution is considered as the final option. This is congruent with the policy of the government. Only when living independently at home is no longer possible due to decreasing physical or cognitive functioning, admission in a residential or nursing home is considered.

Therefore the care needs of those who move into a residential care setting are more complex than they were a few years ago. The expectation is that, if present policy continues, the care needs of nursing and care home residents are set to increase further and that residential care homes will no longer exist in the coming few years. Nursing homes subsequently develop into care organizations for older people with complex care needs and severe disabilities. This appears to be a worldwide phenomenon [54] recognized by all nations and cultures, leaving nursing home care as the last resort [55]. As a result, worldwide, a variety of different housing and community-based care-delivery programmes have been developed that provide alternative options to traditional nursing home care.

A recent published Dutch study [56] revealed that "in 2015, there were approximately 117,000 older people living in nursing or care homes in the Netherlands. The majority (over 60%) were women aged 80 years or older. Four out of five residents have severe physical constraints. Most residents (85%) face multiple functional problems, comorbidity. Almost 75% of the residents have memory complaints. A quarter of the residents has pain complaints, and also a quarter of the residents regularly have problems sleeping. Almost all residents use medicines (94%). Most nursing home residents receive help from their informal network on a regular basis. In most cases (75%) one of the children provides help on a weekly basis with things

like administration, transport, shopping and washing. Forty percent of the residents are helped by a volunteer for trips out and at mealtimes (daily). Friends also offer help mainly during trips out, but this help is much less frequent.”

5.4.1 Developments in Nursing Care for Older Persons Living in Long-Term Care Facilities

Capezuti and Hamers [57] conclude in their systematic review focusing on the improvement of the nursing care of older adults that ‘current practices and systems of care have yet to let go of traditional provider centred paradigms to allow patients and families to express their care needs and priorities’. In caring for older people in long-term care facilities (nursing homes and care homes), resilience, self-management and functioning are core principles [58] besides advanced care planning, healthy ageing, well-being, adaptation and coping with the consequences of disease, dialogue and empathic, person-centred care not only focusing on the patient but also on the family. It is all about person–family-centred care. Together they form a unit of care [57]. Besides all these care characteristics, nursing home care should not only concern the quality of life but also the quality of dying (fitting the needs, hopes and aspiration of residents), because nursing homes are increasingly the place where people are dying.

In 2017, a new quality standard for Dutch nursing home care was published operationalizing these core principles [59]. The quality framework describes what residents and their relatives may expect from nursing home care. Furthermore, the quality framework describes the consequences of these standards for care organizations and care professionals. A principle of the quality framework for Dutch nursing home care is the importance of the care professional in obtaining quality of care. Professional craftsmanship serves as basis for professional quality.

For care professionals working in nursing homes, the increase of residents with heavy care demands means that their work becomes more complex and that they must have a great deal of knowledge and skills in the area of geriatric disease and how to deal with it. They need to have somatic as well as psychogeriatric knowledge. The challenge for the care personnel is to help the nursing home residents in fulfilling their needs, including end of life care. End of life care reduces stress, anxiety and depression of family members and increases the residents’ satisfaction with care. However nursing home staff often fails to recognize actual residents’ end-of-life preferences according to Mignani et al. [60].

Boersma [61] describes that besides personal and meaningful contact with other human beings, pleasant daytime activities, company, adequate support when feeling distressed and preservation of self-esteem are relevant to the quality of life of people with dementia. Finnema et al. [62] relate the adaptive tasks people with dementia are confronted with when admitted to a nursing home to emotion-oriented care. The integrated emotion-oriented care approach strives for an application of (suitable elements from) emotion-oriented approaches, such as validation, sensory stimulation and music therapy, integrated in the daily care (Table 5.1). Integrated

Table 5.1 Integrated emotion-oriented care in relation to adaptive tasks [62]

Adaptive task	Integrated emotion-oriented care
Coping with own invalidity	Help the person with dementia to cope with the constraints. Support him and encourage him to do the things he still can
Developing an adequate care relationship with the staff	Behave empathetic and make use of knowledge of the life history of the person with dementia. Accept the resident as the person he was and is today
Maintaining an emotional balance	Respect emotions and confirm or weak them off. Offer pleasant sensory stimuli (music, good food, etc.)
Maintaining a positive self-image	Promote the dignity of the person with dementia to let him remember positive events and encourage him to do activities that he can
Preparing for an uncertain future	Show understanding for the feelings of the person with dementia about present and future and offer activities that make it here and now makes sense
Coping with the nursing home environment	Let the person with dementia feel at home and continue to maintain his habits to prevent hospitalization. Involve the person with dementia in recreational activities
Developing and maintaining social relationships	Match the needs of individual contacts and encourage the person with dementia to fulfil several social roles

emotion-oriented care is defined as ‘the integrated application of emotion oriented approaches and communicative skills, customized to the individual person with dementia, taking into account his needs and physical and mental disabilities, for the purpose of offering feelings of security and trust to the person with dementia and helping him to adjust to the consequences of his illness [63, 64]’.

Kitwood [65] developed in the 1990s a person-centred care from the view that our frame of reference should no longer be person with *dementia*, but *person* with dementia. He has the opinion that the behaviour of persons with dementia is strongly influenced by the social environment surrounding the person with dementia. The idea behind person-centred care is that it has a positive influence on the quality of life of people with dementia.

Summarizing, we can state that different psychosocial and person-centred approaches have been developed in the last decades, for example, validation, reminiscence, multisensory stimulation, movement activity and music therapy. Beerens et al. [66] conclude in their systematic review that currently there is no convincing evidence about which factors are associated with quality of life of people with dementia living in long-term care facilities. In addition Finnema et al. [62] say “(...) that nowadays there are no standard prescriptions for the way caregivers should communicate with people with dementia. In every situation, it is necessary to tune into the unique personality of the person with dementia, his particular personality, his situation, his life history, his needs and his way of coping with the disease.” ‘The most important question for the caregiver is not whether a particular method was applied as described, but whether there was a situation or a moment of mutual understanding and contact [67]’. The challenge for care professionals is to choose which care approach best fits the individual nursing home resident.

Dewar and Nolan [68] found ‘a positive relation between strong leadership supporting provider-patient therapeutic relationships combined with education in appreciative care conversations positively affects compassionate, relationship-centred care’. Liu et al. [69] also concluded that education and positive clinical experiences are associated with positive attitudes about older adults. But not only knowledge on caring for persons with dementia is needed for health and social care professionals working with older people. They also have to know about (chronic) diseases affecting the functioning of persons in daily functioning and activities. The way to look at these impairments in a more dynamic way is not with a focus on illness but with a focus on functioning. This is also reflected in the definition of positive health formulated by Huber et al. [70]: *Health as the ability to adapt and self-manage, in the face of the physical, emotional and social challenges of life, as mentioned in Chap. 4*. It stands for a broad view on health, in which health is no longer considered as a static condition but rather as the dynamic ability to adapt and to manage one’s own well-being [71]. This new health concept in combination with changing care concepts, for example, shared decision-making, person-centred care, integrated care, respite care, family care and high-quality standards for long-term care, implicates that providing high-quality care to nursing home residents is an impressive task force. The changing work environment, as it regards both content and organizational aspects, demands a great deal of flexibility and resilience from the professionals.

It is important to start and continue with investing in future and current professionals in order to give the best possible care to our most frail population, nursing home residents.

5.5 End-of-Life Care

5.5.1 End-of-Life Care Legislation in European Countries

Because of the global ageing and increasing of dementia and chronic diseases, the need to end-of-life care (EoL Care) or palliative care (PC) is rising in Europe [72]. It is evident that there are differences between end-of-life care services and the quality of death in different European countries. A great number of European countries do not have national palliative care strategy [73]. Woitha and colleagues [74] mapped on the year 2015 PC policy and legislation in the WHO European region and found that about one-half of EU countries have legislation related to PC. In addition to legislation, PC may be mentioned in other national strategies. They state that most often PC is mentioned in national cancer strategies due to the history of PC: initially cancer patients were the target group. They recommend that it should be considered to include other chronic conditions, for example, dementia [74]. As the matter of the fact, the European Association for Palliative Care (EAPC Onlus) has defined palliative care in dementia and described the key domains of it. Many of these recommendations are similar as emphasized in older people’s care and support in general: patient- and family-centred care, good communication and including patient and family in decision-making, holistic approach and optimal care of symptoms as well as educated personnel [75].

5.5.2 Definition of End-of-Life Care

Moreover, concepts related to the end-of-life care vary, and there is no agreed definition of end-of-life care. The most used definition is palliative care definition of WHO [76]: ‘An approach that improves the quality of life of patients (adults and children) and their families who are facing the problems associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and correct assessment and treatment of pain, and other problems, whether physical, psychosocial or spiritual’ [76]. In European countries, different kinds of concepts are used. Gysels and colleagues [77] in their study found the following terms: end-of-life care, palliative care, terminal care, supportive care, advanced care, advanced care planning and shared care. The authors also state that often terminal care and palliative care are used as synonyms taking not into account the difference. When Gysels and colleagues [77] analysed the concepts used, they concluded that the most problematic in defining are the specification of time frames as well as boundaries between cure and care. They state that it would be important to develop a shared language for end-of-life care in order to find its ethical basis and specificity [77].

5.5.3 End-of-Life Care Facilities

In addition to different regulations and definitions, PC is managed in different facilities, for example, in terminally ill patients’ homes, hospital wards or in-patient hospice settings. It can also be provided by general medical and surgical services, residential and nursing homes or by acute oncology or acute care settings [78–81]. There are also mobile palliative care teams operating from hospitals as well as primary care teams (physician, nurses, psychologists and social workers) in many countries [82]. PC services can vary in non-urban areas compared with an urban environment. PC is multidisciplinary teamwork between social and health-care professionals. Volunteers have a pertinent role in it, though their involvement across health care may vary between countries. It seems that in the United Kingdom, Belgium, the Netherlands and Sweden exist the most relevant PC services and the best capacity development. It is also supposed that in the United Kingdom, Luxembourg and Belgium, the number of palliative care wards and hospices and support and home care teams is high [78–81].

Centeno and colleagues [83] investigated specialized palliative care services (home care teams, hospital support teams and inpatient palliative care services) and their development on the years 2005–2012 across the World Health Organization European Region. They conclude that there has been positive development over the years; however, the services of palliative care are still insufficient in many European countries to meet the needs of patients [83]. Similarly, WHO in its declaration published in 2014 states that in many countries around the world, patients have a limited access for palliative care services. The declaration emphasizes the importance of palliative care services in primary, community and home-based care. Moreover, it is emphasized that palliative care should be included in the continuum of care for

people with chronic diseases. It is not only the care in the terminal stage; instead, it should be provided alongside potentially curative treatment and consist of holistic care including physical, psychosocial and spiritual care [76].

WHO emphasizes that issues that seems to be efficient in palliative care are multidisciplinary and multi-sectoral approach, taking into account cultural and economic setting. Moreover it is important to integrate palliative care services into existing social and health-care systems of each country or region. However, the emphasis should be on primary health care as well as community- and home-based care. The education and training of professionals are important [76].

The culture of care can vary in different health-care settings. Social and health-care professionals may have different perceptions of comfort, and the role of the family may have a significant influence on patients and families' experiences of care [84]. Core attitude in palliative care is the way in which social and health-care professionals perceive themselves and the world and form the base for their thinking and actions. It includes personal characteristics such as authenticity, honesty and mindfulness. The experience of care becomes apparent in relationships with the patient. The competence in PC acquires a high degree of perceptiveness and ability to listen and learn from the patient. It is important to listen to the patient's wishes and expectations about the rest of life. Social and health-care professionals must be sensitive to the patient's possible fear of dying and ensure the patient's safety and comfort. They also must seek spirituality and existential issues as important dimensions of PC and pay attention to the patient's wishes about their own meaningful rituals and religious services without forgetting social concerns. It is also pertinent to create active communication between professionals, patient and near ones and to share information between multi-professional team members [85, 86]. It is important to develop the end-of-life care according to the needs of population. Daveson and colleagues [73] investigated the opinions related to the end-of-life care of public around Europe. According to their research, the public finds it important that death and dying are recognized as well as the end-of-life care to be of high quality. People also emphasized that it is necessary to improve especially palliative care of older people including support of their families [73].

5.5.4 Euthanasia

In spite of the fact that euthanasia is not a part of palliative care, it is discussed here briefly because euthanasia and related questions may arise within patients in palliative care as well as with their families.

In many European countries, there is ongoing discussion related to euthanasia and physician-assisted suicide (PAS). This was recognized by the Board of the European Association for Palliative Care (EAPC) which published a white paper of palliative care on 2015, as well as the International Association for Hospice and Palliative Care which (IAHPC) prepared the statement on euthanasia and physician-assisted suicide on 2017 [87, 88]. The aim of both associations was to provide patients, caregivers and health-care providers evidence-based knowledge of these

issues [87, 88]. In the white paper, the EAPC board members discuss the definitions, philosophy and values of palliative care as well as concepts of euthanasia and physician-assisted suicide. The similar content is dealt with the statement of IAHP [88]. It is stated that euthanasia and PAS are currently most discussed and also most sensitive ethical issues in social and health care in Europe [87, 88]. The EAPC board adds that there is no consensus to be achieved in these issues which include ethical, moral and medical dilemmas [87]. So, in this brief text, it is neither possible to deal profoundly with these issues nor meant to take position. Instead, the aim is to emphasize the importance of social and health-care professionals working with older people being aware of the ongoing debate and be prepared to discuss these sensitive issues if the need arises within older people they encounter in their work. It is important to mention here that the EAPC position paper states that euthanasia is not a part of palliative care [87].

In the literature, there are different kinds of definitions for euthanasia and PAS. EAPC [87] defines euthanasia as follows: 'A physician (or other person) intentionally ending the life of a person by the administration of drugs, at that person's voluntary and competent request'. Moreover, EAPC's definition for PAC is: 'A physician intentionally helping another person to terminate his or her life by providing drugs for self-administration, at that person's voluntary and competent request'. [87].

In most countries, assisted suicide and euthanasia remain illegal; however, in many European countries, there is discussion and debate on legalizing euthanasia or assisted suicide. Moreover in Europe, there are three countries where euthanasia is legalized [89].

IAHPC emphasizes that an important part of palliative care is to listen carefully the patient also if she or he have request for hastened death. According to the authors of the IAHP statement [88], it is rare that these kinds of discussions often really include a real request to act accordingly. They emphasize that it is important that professionals acknowledge these wishes and understand that these should lead to holistic care which include physical, psychological, social and spiritual care. It is of great importance for professionals to have a good relationship with the patient in order to understand his or her underlying motivations [87, 88].

5.6 The Use of eHealth in the (Self) Care of Older Adults

Other authors in this book have mentioned the demographic developments concerning older people and the increase of care and support this implies (see Chaps. 2 and 3). Further, senior health consumers have other demands about the provision of care than previous generations. They expect it to be more personalized and tailored to their needs [90]. They also expect they can make their own decisions and value their autonomy and self-management highly [91].

Parallel to these changes in demographics and consumption of care, there has also been a significant change in technological possibilities in health-care and social support. Considering how technology works, looks, reacts and is being used by people, it has become a bigger part of our lives, and we rely on it more heavily each day. Also, eHealth and assistive technology becomes more and more ubiquitous

[92–95]. These technological innovations may help to face the challenges in health and social care, also for older target groups.

Against this background, there are three significant trends in health and social care for older adults that can be identified. The first one is the importance of monitoring and early detection of a person's health and social issues. To prevent matters to get worse is foremost in the benefit of the persons itself but also prevents higher expenditures to more severe and long-lasting care and support.

As the second trend, more emphasis is put on keeping older adults residing in their homes, since most people—also at advanced age—have the desire to remain independent for as long as possible [96, 97]. A variety of technological solutions is focused on facilitating older people in dependent living, such as ambient assistive technology (sensors, automated facilities at home), telemedicine solutions and serious games.

The third trend is that of making clients and patients more in charge of their own health process and to tailor care and support to their personal needs. Many digital solutions have been developed to make decision-making and data-recording between professionals, clients and informal caregivers more open. This facilitates a more co-creative and client-centred approach.

In Sect. 5.6.3, we give an impression of what are feasible solutions in health and social care for older adults.

To actually see the benefits of technological innovation in health and social care for older adults, an important issue should be addressed: For a long time, senior target groups were seen as the slower and more reluctant groups to adopt (health) technologies. Is this still the case at the end of this decade? What insights can be used to motivate wider and more sustained use? In Sect. 5.6.2, we explore the latest developments on these issues.

Designing innovative health technology that fits to the needs of older people is a delicate matter, since age-related challenges (i.e. cognitive, perceptual and physical) require special attention. In the last part of this section, we want to argue that successful and meaningful innovation in health and social care does *not* start from technology. To develop technology that actually is used by older adults, it should start with a user-centred mindset, actively involving members of the (older) target group and also health and social care professionals as codesigners.

5.6.1 Technology to Support Health and Self-Management for Older Adults: A Brief Overview

In this section, we try to give a short line-up of several technological applications that can help older adults to manage their health and self-management. This list is far from comprehensive, since the number of technological solutions is vast and new ones are introduced every day. We make a distinction between three important domains in which health technology is applied. The first is about monitoring personal health and early assessment. The second domain is about assisting self-management at home and health maintenance. The third is on assisting people in (shared) decision-making once they receive care and/or support.

5.6.1.1 Monitoring Health and Early Assessment

Since most of the older adults prefer to stay in the comfort of their own homes, prevention of calamities and early detection of health or well-being issues is important. A wide range of sensor technologies, like infrared, optical sensing, gyroscopes, accelerometers, GPS, thermometers, glucometers, EEG and so on, can be used to monitor important health markers. It is possible to monitor heart rate, blood pressure, body temperature, sleep quality and physical activity but also blood glucose levels or even brain activity [98]. Many of these health markers can nowadays be monitored by technology available on the regular market. Think of body-worn devices (wearables like *Fitbit*[®], *Jawbone Up*[™]), rings (*NFC Smart Ring*[™]) and smart garments (like *OM Signal*). But also certain smartphone technology is used [99]: this can be standard hardware in the phone (GPS, gyroscope, microphone) or with additional hardware (external sensors or other hardware designed for certain medical conditions).

Less mainstream, but nonetheless available in the near future, are sensors embedded in floors and beds (to monitor behaviour) or toilets and bathtubs (to monitor frequency of use). But also technology to put in or on a person's body (like chip implants or so-called bio-stamps) may not stay 'science fiction' for very long.

Apart from monitoring physical health, there is also much development on monitoring psychological health. There are many apps that facilitate monitoring psychological well-being and cognitive functioning (like *Moodnotes* or *Optimism*). More advanced, there are also applications in development to screen signs of clinically relevant memory impairment to detect early-stage Alzheimer's disease. The *Cantab Mobile* app is an example of this.

Although these tools gather all kinds of information about a person's health, it is important to ask ourselves: What to *do* with it? It is of great importance to accurately assess the different types of information these tools generate, see meaningful patterns and base adequate decisions upon them. For safe and prudent use, clear instructions and guidance are needed. Careful design of these applications, i.e. intuitive user interfaces and well-chosen features to handle the data, is important. Moreover, additional support from health professionals may also be required.

5.6.1.2 Self-Management, Living Independently and Health Maintenance, (AAL, Gaming, Robotica, Pillenbox)

Monitoring and assessing a person's health status is often just a means to a more important goal: for older adults, the tools and applications we discussed in the previous part can eventually support them in self-management and independent living. Some of these tools not only monitor health information but also gather other data that is helpful to sustain self-maintenance of older adults.

Wearables and smartphones can monitor a person's physical activity patterns in and outside the house. Moreover, Ambient Assisted Living (AAL) technology can do this, with motion detection in rooms or pressure sensors in floors, beds or toilets to detect (deviations in) patterns to signal possible accidents (people that fell or are disorientated). However, AAL technology goes a step further than that. Older adults can benefit from more active support using apps that manage daily schedules and

send reminders for important appointments or activities. This kind of technology is called ‘cognitive orthotics’. Social robots, such as *Pepper*, *Zora*, *TinyBot*, etc., can be used for the same purposes; a few robots can even provide in some—yet primitive—social interaction. The latest developments indicate that robots will soon run errands in the house (fetch the newspaper, help with dressing or eating). It is very probable that these new forms of technological assistance at home become more regular now that big tech companies invest in personal assistant products like *Siri*[®], *HomePod*[™] (Apple[®]) and *Echo* (Amazon[®]). The accelerated development this implies could be of great benefit for the older adult population. Besides these mainstream products, there is also an array of more specific tools that focus on (older) people in care situations. For instance, automated medication dispensers (e.g. *Medido*) are rather simple but already a widely used tool to help people to take the right pills at the right time of the day.

A different type of technology that facilitates self-maintenance is that of serious gaming. Regular psychical and cognitive exercising is important, certainly for older adults. Serious exergaming with easy, intuitive controls (e.g. *Wii*[™], *Kinect*[™]) can motivate people for physical training (e.g. *Wii Sports*, specialized games made by independent game companies) but also cognitive exercising (e.g. *Dakim*[®] *Brainfitness*[™]). Older adults are typically more motivated to play these games when a social component is involved: playing competitively or, even better, playing together [100].

Up to here, we mainly talked about technology that aims to prevent care dependency. But when people already are in care, self-management could be stimulated by employing forms of telemedicine. There are already many telemedicine systems that facilitate people to consult a health professional or somebody in their own social network. To be able to do this at home and at more convenient times makes the care process less interfering to people lives. For people in long-term care, this can make a huge difference. Telemedicine is often used for verbal consults, with the visual contact to enrich the social interaction.

Moreover, other types of telemedicine emerge. For instance, the healing of wounds or irregularities of the skin can be monitored using the visual channel of telemedicine [101]. One of the latest developments is that telemedicine technology can do real-time 3D-modelling of joint movement, such as knees or shoulders (Extreme Reality, www.xtr3d.com).

Of course, there are many more technological tools and applications that support self-management and autonomy. We left out very obvious technological aids that are already widely used, like stair lifts, scoot mobiles, visual and auditory aids or other (technological supported) limb prostheses.

For many specific physical, mental or social challenges, some solution probably has been developed, whether it is a portal that supports people with rheumatic arthritis, an app that helps to communicate when speech is impaired or tools that improve sleep patterns. The ease to come up with many more examples such as these just illustrates a more over-arching trend: in the near future, technological applications will tune in more and more to the specific needs and wishes of older adults and help them to maintain their self-management and independence.

5.6.1.3 Assisting Shared Decision-Making and Proactive Coordination of Care

In the circumstance that people are already (long-term) health consumers, technology can also be of assistance in taking greater control over, and people can be more active participants in their health and social care process. Since *shared decision-making* and *patient-centred care* have become important paradigms in health and social care, it is only logical that this is supported by the technological possibilities available [90].

More and more, patients' data are recorded digitally (electronic patient records, EPRs) and can be shared with them. This implies that patients can review what is written about them and are able to make additions to their records (with applications like *Patients Know Best* and *Lable Care*), together with informal caregivers. This not only creates accurate and personalized records; it also helps to coordinate care according to the needs and wishes of the older person while involving all relevant parties. This way technological applications can really help to shift the control and responsibility from formal caregivers to (care dependent) older adults and informal caregivers.

Apart from keeping open health records, there are also other tools that support coordination of informal caregivers (*Decide Guide*) which can be relevant in cases of long-term care, and support is needed when people suffer from chronic and/or increasing health issues.

5.6.2 Technology Acceptance Among Older Adults

From the movie *I, Daniel Blake* [102]:

(At the social service office, Daniel Blake (a man in his 60s) tries to sort out an administrative problem. However, he is told he should visit the website and solve his problem there.)

Daniel Blake 'I hear this all the time "we are digital by default"' Well, I'm more 'pencil by default' [...]

Clerk: There is a special phone number if you're diagnosed as dyslexic'.

Daniel Blake: Right, can you give me that, because with computers, I am dyslexic!

Clerk: You'll find it online, sir...

A common belief is that older people are reluctant to use new technologies, such as computers, the Internet, smart home technologies, apps, etc. [103]. In general, they rather stick to the (outdated) technologies of their own generation, as is illustrated in the movie transcript above. In part, this is true. Older people tend to be later in adopting new technologies [103, 104] and also tend to use less technology compared to younger adults. These inequalities in digital skills may lead to what is called a 'digital divide' [105]. This raises the question about the consequences of technological innovation in health and social care: Will it create barriers for older adults to receive proper care and support?

To answer this question, we want to look at into what makes (older) people accept and use technology, specifically for their health and self-management. What

are the main determinants and what role does age specifically play in this? In a well-established model on the acceptance of technology, the UTAUT-model [106], two important determinants influence the willingness to use technology. The first is ‘effort expectancy’: How much time and effort does a person expect to invest to use this certain piece of technology? Older adults report the following reasons for not using computer/Internet technology: the cost of the computer/other equipment and Internet access, functional impairments such as arthritis and joint pain that interfere with typing, visual deficits, ergonomic barriers (e.g. small font sizes), lack of computer knowledge, lack of computer efficacy (beliefs about their ability to use computers/Internet technology) and general self-efficacy (e.g. ‘too old to learn new things’) and mistrust of Internet systems and privacy-related concerns [107–109].

So, looking at this range of barriers, it is safe to say older adults feel somewhat digitally divided from other demographic groups using (health) technology. Albeit that, other factors, like lower social economic status and (e)literacy, are also important barriers. These factors can be but are not necessarily connected to older age [105, 110].

But there is another—more positive—side to the story as well. The aforementioned UTAUT model also recognizes ‘performance expectancy’ as one of the most important factors to predict use of (health) technology: if a person expects the product or service (a certain health app or sensors that track in-home activity) to be actually useful and relevant to them, chances of use will increase.

This insight may be the reason that, somewhat surprisingly, older target groups do not seem to hold negative attitudes towards technology, i.e. electronic or digital products and services [103, 111]. According to these studies, these opinions are actually predominantly positive, especially when it is evident that these technologies are beneficial to older target groups.

Universal design: suitable for older adults probably means suitable for other (most) target groups as well.

For example, one of the factors that made the iPhone popular among its (younger) first users was its intuitive interface design (big tiles, just pressing on the screen with nothing but your fingers). It did not take much time until also older target groups recognized the usability of this gadget, which led to many sales of iPhone among senior adults (which in turn had a slight negative effect on the ‘hipster’ image of the iPhone) [113].

When older adults gain some experience with computers/Internet, it reduces anxiety and increases self-confidence and positive attitudes about computers/Internet use, regardless of income and educational levels [112]. Moreover, as technology and also health and assistive technology is getting more mainstream (i.e. cheaper and more intuitive to use), more older adults start using it and getting more confident doing so. Indeed, user rates seem to point in that direction: although older cohorts may still be underrepresented in the use of (health) technology, they are the fastest growing group of Internet users [104] and smartphone users [114]. So, the differences in use of (health) technology between age groups seem to reduce over time.

Does this mean the adoption of health technology among older adults is a problem that will take care of itself? No it is not. Despite the growing numbers of older persons that use technology and a predominantly positive attitude towards technology, this does not imply that older users will have no usage difficulties for digital technologies, especially when not designed with older adults' capabilities and limitations in mind. When a device or smartphone app seems too difficult to operate, people will expect too much effort is needed to master it. While this is a factor for many technologies to fail, older people may be even more vulnerable to this [115].

Up to the present day, the developments of assistive and health technology have mainly been driven by a 'technology push' (i.e. products and services based on what's technologically possible) and less by a 'technology pull' that is based on actual needs of the target groups (i.e. designing products and services based on what a user-centred design process proves relevant). In the following section, we want to elaborate on the importance of designing health and supportive technology in participation with older adults.

5.6.3 Meaningful Assistive Technology for Older Adults by Human-Centred Design

In Sect. 5.6.2, we established that it is too simple to assume that most of older persons wish to avoid new technology. On the other hand, dealing with (health assistive) technologies surely does not go without confusions or frustrations [103, 115] among older adults.

Attention to good design can improve the usability of these technologies, especially for older adults. Fiske and his colleagues [115] performed a focus group study about the problems that older adults encounter in daily activities (getting on a bus, reading instructions, using a technological device, household activities, etc.). They found that over 50% of these problems could, at least in part, be improved by a *redesign* that better fits to the needs of older adults. We expect the attention specifically to the design of health and assistive technology for this target group to be of at least equal importance. Core of the problem is that many health IT tools have been designed and implemented without—sufficient—participation of user groups in the design process. By not doing so, there is a greater risk that the (senior) target groups will not adopt these technologies [116–118].

There are two main reasons older adults should have an important role in the design for technology assistive care. The first lies in the fact that a person's health and/or well-being is involved. Ill-designed technology not only leads to annoyances about user interfaces (e.g. searching for the right button) or inconveniences about functionalities (e.g. buttons that do not do things you want). It is conceivable that poor design may lead to a level of misuse that it could actually threaten a person's health or well-being: When a person does not know how to operate a pill dispenser, there is a risk the person is deprived of the proper medicine. Or, an older lady suffering from dementia may panic when a social robot is suddenly talking to her. So, the consequences of substandard design are potentially more severe, making it is

also of ethical importance to involve the target group [119]. This way, unforeseen issues can be tackled in earlier stages in order to design secure and reliable technology.

The second reason is about the ‘emancipation’ of older adults as genuine code-signers: If the prospect is that assistive technology will become more important in care and support for people of older age, then they should be regarded as the pivotal stakeholder in the design process. This involves more than having people just test a prototype on its technical or functional performances. They should be involved from the earliest stages of the design process, by giving the opportunity to articulate their needs and wishes—before any technological solution even is being introduced [120–122].

Since the population of ‘older adults’ is very heterogeneous, it is crucial to *empathize* with members of this group and gain a deep understanding of the specific physical, social, emotional and cognitive challenges they face [121, 123]. These challenges may also change significantly over time. For instance, a person may experience cognitive decline because of dementia. Or, on a more positive note, a person regains her physical mobility after a successful hip surgery and picks up her social activities as a result of this.

These interactions and continuous changes in health and well-being call on any assistive health technology to be highly flexible and adjustable. For the design of these applications and the use of technology, this tailoring and personalization are paramount [115, 124]. The close participation of older adults that this implies does raise an important dilemma: It can be quite difficult for the designer to include older people with (severe) psychical or cognitive impairments in the design process. Where do you find people who are able and willing to participate in the design of something they may hardly understand? How meaningfully and validly can an older adult articulate his insights about an eHealth tool while he/she is in a developed stage of dementia? Despite these practical and more principal arguments, Span et al. [120] and Lindquist et al. [121] argue that, in any case, great efforts should be made to *always* include the end-user, not despite their impairments, but actually *because* of them. Only then technology can be designed that is truly meaningful and responsive to older people’s needs and wishes.

Next to the older adults as end-users, there is yet another group often overlooked in the design of innovative technology: the health and social care professionals. Apart from the older adults themselves, these professionals should bring their valuable knowledge and experience with the target group and methods of practice to the design table. In upcoming decennia, their roles as professionally skilled yet innovative change agents will become more important in order to secure that the (continuous) technological development is truly relevant and beneficial to their work/to the betterment of the care and support they provide.

Health and social care professionals also play a pivotal role in the eHealth education of their patients. Those who cultivate a holistic approach to health and social care must adopt a view that sees individuals not just in their social but also in their technological context. Health and social care professionals should regard eHealth solutions as complementary to other health and social care interventions. Health and

social care professionals can inform their clients about the practicalities of eHealth solutions based on other clients' experiences.

References

1. Allen K, Glasby J. 'The Billion Dollar Question': embedding prevention in older people's services—Ten 'High-Impact' changes. *Br J Soc Work*. 2013;43:904–24. <https://doi.org/10.1093/bjsw/bcs024>.
2. World Health Organization. Noncommunicable Disease Prevention and Health Promotion Department. Ageing and life course. Active ageing. A policy framework. A contribution of the World Health Organization to the Second United Nations World Assembly on Ageing, Madrid, Spain; 2002. http://apps.who.int/iris/bitstream/10665/672151/WHO_NMH_NPH_02.8.pdf. Accessed 21 Jan 2018.
3. Tambor M, Pavlova M, Golinowska S, Arsenijevic J, Groot W. Financial incentives for a healthy life style and disease prevention among older people: a systematic literature review. *BMC Health Serv Res*. 2016;16(Suppl 5):426. <https://doi.org/10.1186/s12913-016-1517-0>.
4. World Health Organization. Health promotion glossary. 1998. <http://www.who.int/healthpromotion/about/HPR%20Glossary%201998.pdf?ua=1>. Accessed 15 Feb 2018.
5. World Health Organization. Ottawa charter for health promotion. 1986. http://www.euro.who.int/__data/assets/pdf_file/0004/129532/Ottawa_Charter.pdf?ua=1. Accessed 12 Feb 2018.
6. Nolte E, McKee M. Caring for people with chronic conditions. A health system perspective. European Observatory on Health Systems and Policies Series. England: Open University Press; 2008. http://www.euro.who.int/__data/assets/pdf_file/0006/96468/E91878.pdf. Accessed 21 Jan 2018.
7. Strong K, Wald N, Miller A, Alwan A, (on behalf of the WHO Consultation Group). Current concepts in screening for noncommunicable disease: World Health Organization Consultation Group Report on methodology of noncommunicable disease screening. *J Med Screen*. 2005;12:12–9.
8. Boeckxstaens P, De Graaf P. Primary care and care for older persons: Position Paper of the European Forum for Primary Care. *Qual Prim Care*. 2011;19:369–89.
9. Golinowska S, Groot W, Bajji P, Pavlova M. Health promotion targeting older people. *BMC Health Serv Res*. 2016;16(Suppl 5):345. <https://doi.org/10.1186/s12913-016-1514-3>.
10. World Health Organization. World report on ageing and health. 2015. http://apps.who.int/iris/bitstream/10665/186463/1/9789240694811_eng.pdf?ua=1. Accessed 4 Dec 2017.
11. World Health Organization. The European Vaccine Action Plan 2015–2020 (EVAP). 2014. http://www.euro.who.int/__data/assets/pdf_file/0007/255679/WHO_EVAP_UK_v30_WEBx.pdf?ua=1. Accessed 29 Jan 2018.
12. Dickinson A, Machen I, Horton K, Jain D, Maddex T, Cove J. Fall prevention in the community: what older people say they need. *Br J Community Nurs*. 2011;16:174–80.
13. World Health Organization. WHO global report on falls prevention in older age. 2007. http://www.who.int/ageing/publications/Falls_prevention7March.pdf. Accessed 30 Aug 2017.
14. More years, better lives—the potential and challenges of demographic change, Brussels. 2014. <http://www.jp-demographic.eu/>. Accessed 8 Sept 2017.
15. Marchibroda J. New technologies hold great promise for allowing older adults to age in place. *J Am Soc Ageing*. 2015;39:52–5.
16. Melis RJF, Olde Rikkert MGM, Parker SG, van Eijken MIJ. What is intermediate care? An international consensus on what constitutes intermediate care is needed. *BMJ*. 2004;329:360–1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC509331/>. Accessed 21 Feb 2018.
17. Lewin G, Alfonso H, Alan J. Evidence for the long term cost effectiveness of home care reablement programs. *Clin Interv Aging*. 2013;8:1273–81. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3794867/pdf/cia-8-1273.pdf>. Accessed 21 February 2018

18. Hochhalter AK, Smith ML, Ory MG. Successful aging and resilience: applications for public health and health care. In: Resnick B, Gwyther LP, Roberto KA, editors. *Resilience in aging: concepts, research, and outcomes*. New York: Springer; 2011. p. 15–29.
19. Eurostat. Active ageing and solidarity between generations. A statistical portrait of the European Union. 2011. http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-EP-11-001/EN/KS-EP-11-001-EN.PDF. Accessed 30 Sep 2017.
20. Hayashi T, Nomura H, Ina K, Kato T, Hirose T, Nonokaki T, Suzuki Y. Place of death for the elderly in need of end-of-life home care: a study in Japan. *Arch Gerontol Geriatr*. 2011;53:242–4.
21. Salguero A, Martinez-Garcia R, Molinero O, Marques S. Physical activity, quality of life and symptoms of depression on community-dwelling and institutionalized older adults. *Arch Gerontol Geriatr*. 2011;53:152–7.
22. MacKean R, Abbott-Chapman J. Older people's perceived health and wellbeing: the contribution of peer-run community-based organisations. *Health Soc Rev*. 2012;21:47–57.
23. Low G, Molzahn A. A replication study of predictors of quality of life in older age. *Res Nurs Health*. 2007;30:141–50.
24. Coleman PG, Carare RO, Petrov I, Forbes E, Saigal A, Spreadbury JH, Yap A, Kendrick T. Spiritual belief, social support, physical functioning and depression among older people in Bulgaria and Romania. *Aging Ment Health*. 2011;15:327–33.
25. Turjamaa R. Older people's individual resources and reality in home care. 2014. http://epublications.uef.fi/pub/urn_isbn_978-952-61-1616-7/urn_isbn_978-952-61-1616-7.pdf. Accessed 16 Sep 2017.
26. Brodaty H. Meaning and measurement of caregiver outcomes. *Int Psychogeriatr*. 2007;19:363–81.
27. Beswick AD, Goberman-Hill R, Smith A, Wylde V, Ebrahim S. Maintaining independence in older people. *Rev Clin Gerontol*. 2010;20:128–53.
28. Bennett K, Stenhoff A, Pattinson J, Woods F. 'Well If He Could See Me Now': the facilitators and barriers to the promotion of instrumental independence following spousal bereavement. *J Gerontol Soc Work*. 2010;53:215–34.
29. Burt J, Roland M, Paddison C, Reeves D, Campbell J, Abel G, Bower P. Prevalence and benefits of care plans and care planning for people with longterm conditions in England. *J Health Serv Res Policy*. 2012;17:64–1.
30. Del-Pino-Casado R, Frias-Osuna A, Palomino-Moral PA. Subjective burden and cultural motives for caregiving in informal caregivers of older people. *Image J Nurs Sch*. 2011;43:282–91.
31. Janssen BM, Van Regenmortel T, Abma TA. Balancing risk prevention and health promotion: towards a harmonizing approach in care for older people in the community. *Health Care Anal*. 2012;20:1–21.
32. Genet N, Boerma WG, Kringos DS, Bouman A, Francke AL, Fagerström C, Melchiorre MG, Greco C, Devillé W. Home care in Europe: a systematic literature review. *BMC Health Serv Res*. 2011;22:207–21.
33. Stajduhar KI, Funk L, Roberts D, McLeod B, Cloutier-Fisher D, Wilkinson C, Purkis ME. Home care nurses' decisions about the need for and amount of service at the end of life. *J Adv Nurs*. 2011;67:276–86.
34. Lee UJ, Lee M, Moorhead S. Developing an electronic nursing record system for clinical care and nursing effectiveness research in a Korean home healthcare setting. *Comput Inform Nurs*. 2009;27:234–44.
35. Goodman C, Amador S, Elmore N, Machen I, Mathie E. Preferences and priorities for ongoing and end-of-life care: a qualitative study of older people with dementia resident in care homes. *Int J Nurs Stud*. 2013;50:1639–47.
36. Bosman R, Bours G, Engels J, de Witte L. Client-centred care perceived by clients of two Dutch homecare agencies: a questionnaire survey. *Int J Nurs Stud*. 2008;45:518–25.
37. Sockolow PS, Bowles KH, Lehmann HP, Weiner JP. Community-based, interdisciplinary geriatric care team satisfaction with an electronic health record. *Comput Nurs*. 2012;30:300–11.

38. Janlov AC, Hallberg I, Petersson K. Care managers' view of family influence on needs assessment of older people. *Scand J Caring Sci.* 2011;25:243–52.
39. Austin J, Dodge HH, Riley T, Jacobs PG, Thielke S, Kaye J. A smart-home system to unobtrusively and continuously assess loneliness in older adults. *IEEE J Transl Eng Health Med.* 2016; <https://doi.org/10.1109/JTEHM.2016.2579638>.
40. Wu Y-H, Wrobel J, Cornuet M, Kerhervé H, Damnée S, Rigaud A-S. Acceptance of an assistive robot in older adults: a mixed-method study of human–robot interaction over a 1-month period in the Living Lab setting. *Clin Interv Aging.* 2014; <https://doi.org/10.2147/CIA.S56435>.
41. Rees J, King L, Schmitz K. Nurses' perceptions of ethical issues in the care of older people. *Nurs Ethics.* 2009;16:436–52.
42. World Health Organization. *Global age-friendly cities: a guide.* Geneva: WHO; 2007.
43. Ontario Seniors' Secretariat (OSS), the Accessibility Directorate of Ontario (ADO), the University of Waterloo and McMaster University. 2013. *Finding the right fit. Age-Friendly Community Planning, Ontario, Canada.*
44. Movisie. Kennisdossiers: De drie decentralisaties in het sociale domein. 2015. <https://www.movisie.nl/artikel/drie-decentralisaties-sociale-domein>. Accessed 28 Dec 2017.
45. World Health Organisation. *World report on ageing and health.* Geneva: WHO; 2015.
46. Eliopoulos C. *Gerontological nursing.* 8th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2013.
47. European Commission. *Population ageing in Europe: facts implications and policies.* EUR 26426 EN, 2014.
48. WHO. *Age-friendly PHC Centres toolkit.* Geneva: World Health Organization; 2007.
49. Sørensen K, Van den Broecke S, Fullam J, et al. Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health.* 2012;12:80.
50. Frost R, Belk C, Jovicic A, Ricciardi F, Kharicha K, Gardner B, Iliffe S, Goodman C, Manthorpe J, Drennan VM, Walters K. Health promotion interventions for community-dwelling older people with mild or pre-frailty: a systematic review and meta-analysis. *MBC Geriatrics.* 2017;17:157.
51. Dijkman B, Roodbol P, Aho J, Achtschin-Stieger S, Andruszkiewicz A, Coffey A, Felsmann M, Klein R, Mikkonen I, Oleksiw K, Schoofs G Soares C, Sourtzi P. European core competences framework for health and social care professionals working with older people. *Ellan;* 2016. 43p.
52. Wieczorowska-Tobis K, et al. The Camberwell assessment of need for the elderly questionnaire as a tool for the assessment of needs in elderly individuals living in long-term care institutions. *Arch Gerontol Geriatr.* 2015;62:163–8.
53. World Health Organization. European health information gateway. https://gateway.euro.who.int/en/indicators/hfa_491-5101-number-of-nursing-and-elderly-home-beds/visualizations/#id=19556&tab=table. Accessed 28 Dec 2017.
54. Ontario Seniors' Secretariat (OSS), the Accessibility Directorate of Ontario (ADO), the University of Waterloo and McMaster University. 2013. *Finding the right fit. Age-Friendly Community Planning, Ontario, Canada.*
55. Katz PR. An international perspective on long term care: focus on nursing homes. *Am Med Dir Assoc.* 2011; <https://doi.org/10.1016/j.jamda.2011.01.017>.
56. Verbeek-Oudijk D, van Campen C. *Ouderen in verpleeghuizen en verzorgingshuizen. Landelijk overzicht van hun leefsituatie in 2015/16.* Den Haag: Sociaal Cultureel Planbureau; 2017.
57. Capezuti E, Hamers JPH. Perspectives on how to improve the nursing care of older adults. *Int J Nurs Stud.* 2013;50(9):1153–5.
58. Commissie Innovatie en Zorgberoepen & Opleidingen. *Anders kijken, anders leren, anders doen: grensoverstijgende leren en opleiden in zorg en welzijn in het digitale tijdperk.* Diemen: Zorginstituut Nederland; 2016.
59. Zorginstituut Nederland. *Kwaliteitskader Verpleeghuiszorg. Samen leren en verbeteren.* Diemen: Zorginstituut Nederland; 2017.

60. Mignani V, Ingravallo F, Mariani E, Chattat R. Perspectives of older people living in long-term care facilities and of their family members toward advance care planning discussions: a systematic review and thematic synthesis. *Clin Interv Aging*. 2017;12:475–84. <https://doi.org/10.2147/CIA.S128937>.
61. Boersma P. Person-centred communication with people with dementia living in nursing homes; a study into implementation success and influencing factors. Amsterdam: Proefschrift Vrije Universiteit; 2017.
62. Finnema E, Van der Kooij C, Droes RM, Wolter L. Psychosocial interventions. In: Schüssler S, Lohrmann C, editors. *Dementia in nursing homes*. Basel: Springer International; 2017. p. 29–53.
63. van der Kooij CH. Gewoon lief zijn? Het Maieutisch zorgconcept en het invoeren van geïntegreerde belevingsgerichte zorg op psychogeriatrische verpleeghuisafdelingen. Amsterdam: Academisch proefschrift Vrije universiteit; 2003.
64. van der Kooij CH, Dröes RM, De Lange J, Ettema TP, Cools HJM, van TW. The implementation of integrated emotion-oriented care: did it actually change the attitude, skills and time-spent of trained caregivers? *Dementia*. 2013;12:536–50.
65. Kitwood T, Bredin K. A new approach to the evaluation of dementia care. *J Adv Health Nurs Care*. 1992;1:41–60.
66. Beerens HC, Zwakhalen, SMG, Verbeek H, Ruwaard D, Hamers, JPH. Factors associated with quality of life of people with dementia in long-term care facilities: a systematic review. *Int J Nurs Stud*. 2013;50(9).
67. Halek M, Bartholomeyczik S. Verstehen und Handeln. Forschungsergebnisse zur Pflege von menschen mit Demenz und herausforderndes Verhalten. Herdecke: Universität Witten; 2006.
68. Dewar B, Nolan M. Caring about caring: developing a model to implement compassionate relationship centred care in an older people care setting. *Int J Nurs Stud*. 2013;50(9).
69. Liu Y, Norman IJ, While AE. Nurses' attitudes towards older people: a systematic review. *Int J Nurs Stud*. 2013;50(9).
70. Huber M, Knottnerus JA, Green L, Horst H, van der Jadad AR, Kromhout D, Leonard B, Lorig K, Loureiro MI, Meer JWM, van der Schnabel P, Smith R, van Weel C, Smid H. How should we define health? *BMJ*. 2011;343:d4163.
71. Louis Bolk Instituut. New concept of health. 2011. <http://www.louisbolk.org/health-nutrition/integrative-medicine-3/new-concept-of-health>. Accessed 28 Dec 2017.
72. WHO. Worldwide palliative care alliance. Global atlas of palliative care at the end of life. 2014. http://www.who.int/nmh/Global_Atlas_of_Palliative_Care.pdf
73. Daveson B, Alonso J, Calanzani N, Ramsenthaler C, Gysels M, Antunes B, Moens K, Groeneveld E, Albers G, Finetti S, Pettenati F, Bausewein G, Higginson I, Harding R, Deliens L, Toscani F, Ferreira P, Ceulemans L, Gomes B, on behalf of PRISMA. Learning from the public: citizens describe the need to improve end-of-life care access, provision and recognition across Europe. *Eur J Pub Health*. 2013;24(3):521–7.
74. Woitha K, Carrasco JM, Clark D, Lynch T, Garralda E, Martin-Moreno JM, Centeno C. Policy on palliative care in the WHO European region: an overview of progress since the Council of Europe's (2003) recommendation 24. *Eur J Pub Health*. 2015;26(2):230–5.
75. van der Steen J, Radbruch L, Hertogh C, de Boer M, Hughes J, Larkin P, Francke A, Jünger S, Gove D, Firth P, Koopmans R, Volicer L, on behalf of the European Association for Palliative Care (EAPC). White paper defining optimal palliative care in older people with dementia: a Delphi study and recommendations from the European Association for Palliative Care. *Palliat Med*. 2014;28(3):197–209. <https://doi.org/10.1177/0269216313493685>.
76. World Health Organization (WHO). Strengthening of palliative care as a component of integrated treatment throughout the life course. Geneva: WHO; 2014. http://apps.who.int/ebwha/pdf_files/WHA67/A67_31-en.pdf.
77. Gysels M, Evans N, Menza A, Higginson IJ, Harding R, et al. Diversity in defining end of life care: an obstacle or the way forward? *PLoS One*. 2013;8(7):e68002. <https://doi.org/10.1371/journal.pone.0068002>.

78. Woitha K, Garralda E, Martin-Moreno JM, Clark D, Centeno C. Ranking of palliative care development in the countries of the European Union. *J Pain Symptom Manag.* 2016;52:370–7.
79. Woitha K, Hasselaar J, van Beek K, Radbruch L, Jaspers B, Engels Y, Vissers K. Volunteers in palliative care—a comparison of seven european countries: a descriptive study. *Pain Pract.* 2015;15:572–9.
80. Hall S, Petkova H, Tsouros AD, Costantini M, Higginson IJ, editors. *Palliative care for older people: better practices.* Copenhagen: WHO, Regional Office for Europe; 2011. (http://www.euro.who.int/__data/assets/pdf_file/0017/143153/e95052.pdf).
81. Robinson CA, Pesut B, Bottorff JL, Mowry A, Broughton S, Fyles G. Rural palliative care: a comprehensive review. *J Palliat Med.* 2009;12:253–8.
82. Boeckxstaens P, De Graaf P. Primary care and care for older persons: Position Paper of the European Forum for Primary Care. *Qual Prim Care.* 2011;19:369–89.
83. Centeno C, Lynch T, Garralda E, Carrasco JM, Guillen-Grima F, Clark D. Coverage and development of specialist palliative care services across the World Health Organization European Region (2005–2012): results from a European Association for Palliative Care Task Force survey of 53 Countries. *Palliat Med.* 2016;30(4):351–62.
84. Espinosa L, Young A, Walsh T. Barriers to intensive care unit nurses providing terminal care: an integrated literature review. *Crit Care Nurs Q.* 2008;31:83–93.
85. Vermandere M, De Lepeleire J, Van Mechelen W, Warmenhoven F, Thoonsen B, Aertgeerts B. Spirituality in palliative home care: a framework for the clinician. *Support Care Cancer.* 2013;21:1061–9.
86. Simon ST, Ramsenthaler C, Bausewein C, Krischke N, Geiss G. Core attitudes of professionals in palliative care: a qualitative study. *Int J Palliat Nurs.* 2009;15:405–11.
87. Radbruch L, Leget C, Bahr P, Müller-Busch C, Ellershaw J, de Conno F, Vanden Berghe P, on behalf of the Board Members of the EAPC Euthanasia and Physician-Assisted Suicide. A white paper from the European Association for Palliative Medicine. *Palliat Med.* 2016;30:104–16. <https://doi.org/10.1177/026921631561652>.
88. De Lima L, Woodruff R, Pettus K, Downing J, Buitrago R, Munyoro E, Venkateswaran C, Bhatnagar S, Radbruch L. International Association for Hospice and Palliative Care Position statement: Euthanasia and physician-assisted suicide. *J Palliat Med.* 2017;20:8–10. <https://doi.org/10.1089/jpm.2016.0290>.
89. Emanuel E. Euthanasia and physician-assisted suicide: focus on the data. *Med J Aust.* 2017;206(8):339–40. <https://doi.org/10.5694/mja16.00132>.
90. McLean S, Sheikh A, Cresswell K, Nurmatov U, Mukherjee M, Hemmi A. The impact of telehealthcare on the quality and safety of care: a systematic overview. *PLoS One.* 2013;8(8):e71238.
91. Barrett LL. *Healthy@Home.* AARP Knowledge Management for Blue Shield of California Foundation. 2008. http://assets.aarp.org/rgcenter/il/healthy_home.pdf. Accessed 22 Dec 2017.
92. Zheng RZ, Hill RD, Gardner MK. Engaging older adults with modern technology: internet use and information access needs. Hershey: IGI Global, Information Science Reference; 2013.
93. Nictiz. Meer dan Techniek: eHealth Monitor. Den Haag: Nictiz; 2016.
94. Islam SM, Kwak D, Kabir H, Hossain M, Kwak KS. The Internet of Things for healthcare: a comprehensive survey. *IEEE Access.* 2015;3:678–708.
95. Sadri F. Ambient intelligence: a survey. *ACM ComputerSurv.* 2011;43:1–66.
96. Dröes RM. Quality of life in dementia in perspective: an explorative study of variations in opinions among people with dementia and their professional caregivers, and in literature. *Dementia.* 2006;5:533–58.
97. Liu L, Stroulia E, Nikolaidis IA, Miguel-Cruz A, Rios Rincon A. Smart homes and home health monitoring technologies for older adults: a systematic review. *Int J Med Inform.* 2016;91:44–59.
98. Rashidi P. A survey on ambient-assisted living tool for adults. *J Biomed Health Inform.* 2013;17(3):570–90.

99. Agu E, Pederson H, Strong D, Tula B, He Q, Wang L, Li Y. The smartphone as a medical device: assessing enables, benefits and challenges. In: 10th Annual IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON), vol. 1; 2013. p. 76–80.
100. Kaufman D. Enhancing older adults' social connectedness through digital games. *Gerontol Geriatr Stud.* 2017;1:1–2.
101. Naka F, Lu J, Porto A, Villagran J, Wu ZH, Anderson D. Impact of dermatology eConsults on access to care and skin cancer screening in underserved populations: a model for teledermatology services in community health centers. *J Am Acad Dermatol.* 2018;78:293–302.
102. O'Brien R (Producer), Lavery P (Writer). I, Daniel Blake [motion Picture]. London: Sundance Selects; 2016.
103. Czaja SJ, Charness N, Fisk AD, Hertzog C, Nair SN, Rogers WA. Factors predicting the use of technology: findings from the Center for Research and Education on Aging and Technology Enhancement (CREATE). *Psychol Aging.* 2006;21:333–52. <https://doi.org/10.1037/0882-7974.21.2.333>.
104. Zickuhr K, Madden M. Older adults and Internet use. Pew Internet. 2012. <<http://www.pewinternet.org/reports/2012/older-adults-and-internet-use.aspx>>. Accessed 22 Dec 2017.
105. Choi NG, Dinitto DM. The digital divide among low-income homebound older adults: Internet use patterns, eHealth literacy, and attitudes toward computer/Internet use. *J Med Internet Res.* 2013; <https://doi.org/10.2196/jmir.2645>.
106. Venkatesh V, Morris MG, Davis GB, Davis FD. User acceptance of information technology: toward a unified view. *MIS Q.* 2003;27:425–78.
107. Gatto SL, Tak SH. Computer, internet, and e-mail use among older adults: benefits and barriers. *Educ Gerontol.* 2008;34:800–11.
108. Carpenter BD, Buday S. Computer use among older adults in a naturally occurring retirement community. *Comput Hum Behav.* 2007;23:3012–24.
109. Berry R. Older people and the Internet. London: International Longevity Centre. 2011. http://www.ilcuk.org.uk/images/uploads/publication-pdfs/pdf_pdf_181.pdf. Accessed 24 Aug 2017.
110. Latulippe K, Hamel C, Giroux D. Social health inequalities and ehealth: a literature review with qualitative synthesis of theoretical and empirical studies. *J Med Internet Res.* 2017;19:e136.
111. Mitzner TL, Boron JB, Fausset CB, Adams AE, Charness N, Czaja SJ, Sharit J. Older adults talk technology: technology usage and attitudes. *Comput Hum Behav.* 2010;26(6):1710–21. <https://doi.org/10.1016/j.chb.2010.06.020>.
112. Xie B. Effects of an eHealth literacy intervention for older adults. *J Med Internet Res.* 2011;13(4):e90.
113. Forbes. Is Apple's iPhone No Longer Cool To Teens? 2013. <https://www.forbes.com/sites/larissafaw/2013/01/09/is-apples-iphone-no-longer-cool-to-teens/#6c2f924133b1>. Accessed 21 Dec 2017.
114. Pew Research Center. Tech adoption climbs among older adults. Washington: Pew Research Centre.
115. Fiske AD, Czaja SJ, Rogers WA, Charness N, Sharit J. Designing for older adults: principles and creative human factors approaches. New York: CRC; 2009.
116. Eysenbach G. Poverty, human development, and the role of eHealth. *J Med Internet Res.* 2007; <https://doi.org/10.2196/jmir.9.4.e34>.
117. Haggstrom DA, Saleem JJ, Russ AL, Jones J, Russell SA, Chumbler NR. Lessons learned from usability testing of the VA's personal health record. *J Am Med Inform Assoc.* 2011;18:13–7.
118. Zayas-Cabán T, Dixon BE. Considerations for the design of safe and effective consumer health IT applications in the home. *BMJ Qual Safety.* 2010;19:i61–7.
119. Friedman B, Kahn PH. Human values, ethics, and design. In: Jacko JA, Sears A, editors. The human-computer interaction handbook. Mahwah, NJ: Erlbaum Associates; 2002. p. 1177–201.
120. Span M, Smits C, Jukema J, Groen-van de Ven L, Janssen R, Vernooij-Dassen M, Eefsting J, Hettinga M. An interactive web tool for facilitating shared decision making in dementia-care networks: a field study. *Front Aging Neurosci.* 2015;7:128.

121. Lindqvist E, Nygard L, Borell L. Significant junctures on the way towards becoming a user of assistive technology in Alzheimer's disease. *Scand J Occup Ther.* 2013;20(5):386–96.
122. Tiwari P, Warren J, Day K. Empowering older patients to engage in self care: designing an interactive robotic device. *AMIA Ann Symp Proc.* 2011:1402–11.
123. van der Roest HG. Care needs in dementia and digital interactive information provisioning. Amsterdam: Academisch proefschrift Vrije Universiteit; 2009.
124. Oinas-Kukkonen H. A foundation for the study of behavior change support systems. *Pers Ubiquit Comput.* 2013;17:1223–35.