DiMiCare

Digital Mindset for Carers

NATIONAL REPORT ON TECHNOLOGY'S ROLE IN CARE PROFESSIONS: THE NETHERLANDS

Landstede, Zwolle, The Netherlands, 01-09-2024

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Introduction

The digitalisation of the care sector is changing the way care services are delivered, managed and accessed worldwide, including in the Netherlands. This national report aims to analyse current digital trends in the Dutch care sector, examining the integration of digital tools and technologies in care practices and their impact on both care workers and service recipients.

The report provides an overview of the technological advances that are shaping the care landscape, such as the adoption of e-health platforms, telemedicine and wearable health devices. It also identifies the existing training available to care workers to help them adapt to these changes, and highlights gaps in training that are preventing the full realisation of the sector's digital potential.

Desk research

A comprehensive desk research was carried out, identifying the current trends of digital tool application in the long-term care sector and the digital literacy of care workers.

Target group of care workers

Background:

In the Netherlands, many healthcare professionals are not very keen on technology in healthcare. Their attitude is usually indifferent, sometimes sceptical. It is not uncommon for professionals to be dismissive of the use of technology in healthcare. In curative health care, they say, technology is familiar, but not so in long-term care. Technology is often seen as something that does not fit in with the basic principles of care, something that conflicts with the human side of care. This is strange when you consider how pervasive technology has become in our daily lives and how hard it is to live without it. Can you imagine life without a mobile phone, the internet or a Tom-Tom to show you the way? In the practice of long-term care we hardly use such technologies.

But how can we in the Netherlands use technology to improve the quality, effectiveness and efficiency of long-term care? That is, care for the elderly with disabilities, care for the disabled and care for people with chronic illnesses. This central question is very important because it is precisely in these areas of care that enormous challenges lie. It is now well known that the demand for care will increase significantly over the next 10-20 years, while at the same time we are faced with a relatively declining number of people working in the care sector. At present, around 15% of the workforce is employed in the health and wellness sector and only a small proportion in long-term care.

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In perhaps more telling figures: already in 3 years, it is expected that there will be more than 22,000 vacancies for level 3 caregivers in our country, mainly in nursing and care homes.

This is impossible and therefore care will have to be organized differently.

So we will have to do things differently, we will have to organize care differently. Technology offers good opportunities, provided it is used intelligently and sensibly.

Many clients increasingly want their own direction and control over their lives and the care they receive.
In the care of people with chronic illnesses, as well as in disability care and elderly care, the concepts of “self-direction” and “self-management” are becoming increasingly important. Clients no longer want to accept without question what the healthcare professional says, but want to take responsibility, choose for themselves, act for themselves.
There is also evidence that therapies based on self-management and self-responsibility are more effective. In any case, so-called compliance or therapy adherence is greater. This trend requires a different organization of care and it is important that clients receive information about their own situation, so that they can choose and act for themselves.
Simple examples are the diabetic patient who determines how much insulin to inject and how much to eat based on his self-measured blood sugar levels, and the asthmatic who regulates the dosage of his medication based on the results of a simple spirometer. This really does not require a doctor or nurse.
This trend toward more self-direction and self-management will certainly continue, just as with remote care on the one hand because of increasing numbers and on the other hand because we prefer it that way, and because it is effective.

How big is the healthcare sector?

In 2018, there were 1.7 million jobs in healthcare in the Netherlands. This means that 1 out of every 6 jobs of employees and self-employed workers can be found in this sector. This makes healthcare - after a break of several years - the largest industry in the Netherlands again. And the number of jobs will continue to grow for the foreseeable future, according to a report by Actiz, an organization for healthcare entrepreneurs. Indeed, life expectancy will rise from 81.5 years in 2018 to 86 in 2040. Of course, it is nice that we are all getting older, but this also requires more care and therefore more employees.

Where do care workers work?

Of the 1.7 million care workers, over a third (37%) work in nursing, care and home care (VVT), according to a UWV report. Over a quarter (26%) of the number of jobs in care are in hospital and 15% in disability care. The other branches are smaller.

How old is the healthcare employee?

Most employees (43.3%) are between the ages of 50 and 69, Actiz reports. The average age of the care employee is about 43. After that, the largest group (36.8%) is between the ages of 30 and 49.

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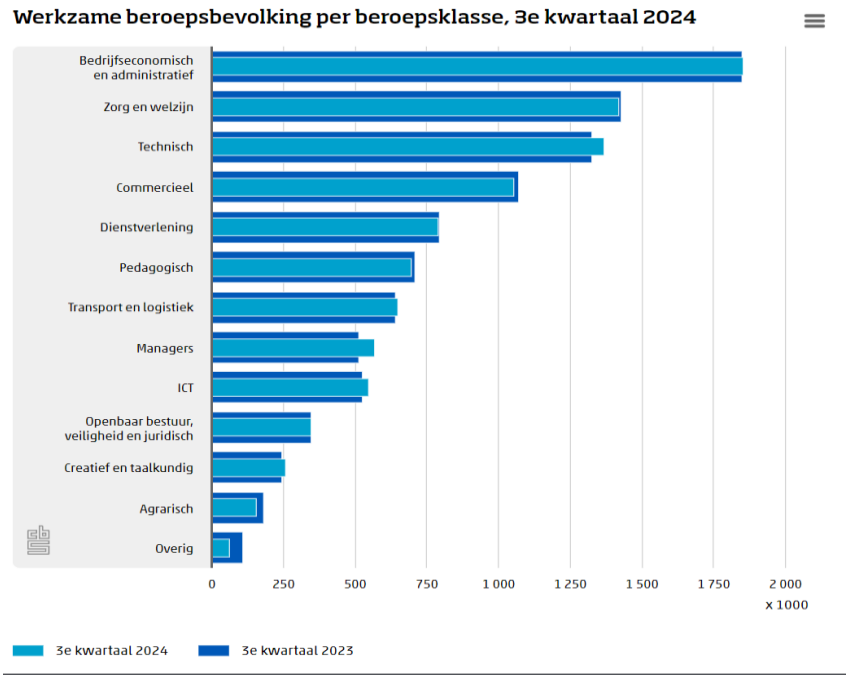
Men vs women

It is common knowledge that women are strongly represented in healthcare. CBS figures confirm this: more than 5 in 6 healthcare workers are women. The most popular female occupations are almost all in healthcare.

How do employees feel about working in healthcare?

Working in healthcare requires the most emotionally of all professions. Healthcare workers face emotionally difficult situations most often. Care workers face these more than twice as often as the average. Not only the emotional work but also the shortage of workers affects the health of care workers. According to the UWV, a majority (60%) of workers have to work extra shifts. More than two-thirds indicate that the workload has increased in the past year. Not only does this affect the quality of care, but also the health and private lives of care workers. For example, 71 percent experience more stress. This also affects absenteeism. In 2018, the national average employee absenteeism rate was 4.3. Of course, this rate varies by industry. For example, we see that this rate is highest in healthcare, where the sick leave rate is 5.7. This confirms what you all know: the workload in healthcare is high. Reason enough to thank the 1.7 million healthcare workers for the important work they do.



THE PRESENT STATE OF TECHNOLOGY USE IN LOWER QUALIFIED CARE PROFESSIONS IN ELDERLY CARE

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The use of technology in elderly care and electronic documentation systems has become more common in nursing homes and other elderly care facilities. In recent years, the use of technology in elderly care has increased in the Netherlands, but it can vary depending on the level of care and the qualifications of the caregivers.
As a level 2 caregiver, you can read the electronic documentation, but you cannot make the plan for the patient.

ANALYSIS

A wide range of digital tools is already being utilized in elderly care. While there are some experts in the field, there remains a significant lack of digital proficiency among caregivers at all levels.

Digital innovations have a profound impact on healthcare delivery, making it essential to empower caregivers with the necessary digital skills. Without these skills, investments in digital technology lose much of their value and effectiveness. To truly benefit from digital advancements, care facilities should prioritize developing the digital competencies of their caregivers before fully digitizing their services. This foundational step ensures that technology is used effectively to improve both care delivery and outcomes.

NATIONAL PROJECTS AND INITIATIVES

Innovation in medical devices

The Netherlands is at the forefront of the development of new and improved medical devices. This is partly due to the cooperation between technical universities, university medical centers and the business community.

Role of government in developments in medical devices and technology

The Dutch government encourages the development of new and better medical devices because:
medical devices and technologies enable people to live independently at home for longer;
devices can provide support in the event of a chronic illness and thus improve the quality of life.
Think of a digital blood pressure monitor that sends the results directly to the doctor. Or the new blood glucose meters that make it easier for diabetic patients to control their disease;
new aids increase patients' chances of life. For example, quickly detecting diseases.
Innovations in healthcare also help to keep healthcare affordable. They can also save time for caregivers who have more time for other tasks.

Vision

There are many developments going on in the field of aids and medical technology.
That is why the Ministry of Health, Welfare and Sport (VWS) is developing a vision on medical devices and technology together with the parties involved (patients, care providers, insurers and companies).

The vision indicates how healthcare can make better use of medical devices and technology. Think of e-health and technologies that allow healthcare providers more time for the patient. Or how innovations can be used more quickly.

Schemes and programs that support innovation

There are a number of schemes and programmes that also encourage innovation in medical devices.

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Subsidy scheme for promising care

The government provides support for research into the effectiveness of promising medical devices and technologies. This means that the patient does not have to wait as long for promising innovations. The subsidy scheme for promising care has been set up for this purpose. This scheme will apply from 2019 and is mainly intended for smaller companies, hospitals and individual researchers.

Socially responsible innovation of NWO

How do responsible innovations come about that can count on broad support? How will better products and services be developed? For this purpose, NWO developed the research program Socially Responsible Innovation (NWO-MVI). NWO-MVI maps ethical and social aspects of (technological) innovations at an early stage. This can be taken into account in the design process.

MW's program IMDI

Innovative Medical Devices Initiative (IMDI) develops new technologies to keep healthcare affordable and feasible. The ambition is to have a new generation of instruments available within 10 years. This will enable Dutch healthcare to better meet the requirements of an aging population and remain affordable.

Ehealth

The national government is encouraging the healthcare sector to offer more digital healthcare (e-health). And to bring its possibilities to the attention of their patients. To support digital innovation in long-term care, 2 new subsidy schemes will be introduced in the autumn of 2018.

VIP Care

This regulation focuses on the exchange of data between professionals, the elderly and their personal health environment. More about this can be found in the letter to the House of Representatives Program longer at home.

Working smarter through innovation and technology

The government in the Netherlands stimulates innovation and the use of smart (information) technology.
For example, the exchange of data between healthcare professionals, healthcare institutions and the patient. But also the use of Virtual Reality in therapy. This is elaborated in, among other things, the program Werken in de Zorg.

IMDI

Technology plays a crucial role in ensuring that healthcare remains accessible and affordable, particularly in the face of growing shortages in healthcare personnel. The Innovative Medical Devices Initiative (IMDI) focuses on developing and implementing medical technologies that address these challenges while enabling healthcare to be delivered in patients' own living environments.

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To optimise healthcare delivery and reduce the strain on healthcare personnel, it is essential to develop innovative medical technologies and accelerate the practical application of research findings. For instance, technologies that enable self-care or informal care can reduce reliance on professional caregivers. Similarly, tools that prevent existing health conditions from worsening or becoming chronic can significantly lower the demand for medical interventions. Technologies that enhance the accuracy and effectiveness of diagnosis, treatment, and follow-up care are equally vital in alleviating the pressure on healthcare systems.

The IMDI programme aims to catalyse the development of cutting-edge medical technologies, transform these innovations into practical and marketable products, and validate them in real-world healthcare settings.

The IMDI initiative operates through two primary programme lines, each comprising targeted subsidy calls to support different stages of technological development:

- Technology for Personable Care

This program line includes: Breakthrough Projects: These grants support novel ideas for technological solutions in medical technology. The aim is to foster unexpected breakthroughs that lay the foundation for future research and collaborative opportunities.

- Demonstration Projects: This subsidy call helps advance promising innovations from laboratory validation (TRL4) to the development of a Minimal Viable Product (MVP).
- Technology for Sustainable Care

This program line features: A subsidy call launched in 2017 to advance ongoing medical technology innovations, making high-quality care more affordable and accessible.

- Heart for Sustainable Care: Focused on developing medical technologies for the early detection and improved treatment of cardiovascular diseases, this initiative aims to prevent disease progression and reduce chronic care demands.

By driving medical innovation and fostering cross-sector collaboration, the IMDI program ensures that healthcare systems evolve to meet current challenges, enhancing care delivery and improving patient outcomes while optimising resource use.

EXISTING PRACTICES

As society evolves, so does the landscape of healthcare. In the Netherlands, there is a growing trend of vulnerable individuals living independently for longer periods and the provision of increasingly complex care within healthcare institutions. Alongside these shifts, technological advancements are rapidly transforming healthcare delivery, offering new solutions to meet emerging challenges.

However, these advancements also bring questions about the future of healthcare: How will these technologies integrate into everyday practices? What implications do they hold for caregivers and patients?

This section highlights 12 notable technological developments currently shaping healthcare in the Netherlands. These innovations are already visible today and are expected to become integral components of healthcare delivery within the next 20 years, paving the way for a more efficient, accessible, and patient-centred healthcare system.

1. Everything connected online

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More and more objects are equipped with sensors and an internet connection. For example, there is a growing market in self-measuring equipment for sports activities and exercise or lifestyle patterns (Quantified Self). For example, lifestyle monitoring is already being applied to elderly people living independently. A sensor network is used in common places in the home to monitor the resident's movement activities. You can also keep track of how much you walk in a day, how many calories you consume and what your sleeping pattern is like. In fact, this data can be read anywhere. This is also referred to as the Internet of Things (IoT). The possibilities are numerous: ranging from receiving information about the road surface, to receiving a signal when the potting soil is too dry, the refrigerator is open, or a nappy is full. Just a little while and the sensor in your toothbrush will give a signal, which will automatically make an appointment with your dentist. New technology is built in such a way that applications and devices are connected to each other and to the internet. The word 'smart' is now often used for this. This creates an open system of apps and data.
https://youtu.be/aqwnE-JMx4U

2 . Shift to the consumer market and DIY

Where healthcare technology used to be offered by the healthcare organization, you can now see the shift to consumer electronics. Citizens can buy technological products themselves and get to work with them (Do It Yourself). Tools to automate your home (domotics) can be found in all kinds of hardware stores and web shops. Think, for example, of smart lamps that you can control remotely with a smartphone. A lot of technology is offered through crowdfunding platforms such as Kickstarter, which allows you as a citizen to help pre-finance the developments.
https://youtu.be/h6BFDa4pvvs

3.. Big data With big data you get solutions for problems you didn't know you had.

Smart software is able to recognize patterns and correlations in a large amount of unstructured data. By collecting, combining and analyzing data, new improving and cost-saving insights can be found. This phenomenon is often referred to as “big data”. Important factors here are the size and speed with which information is generated and the diversity of which it can consist. Companies and consumers are producing and storing more data than ever before. Consider, for example, the enormous data growth that you generate with your smartphone: calendar appointments, Word documents, financial transactions, music and video files. The possibilities seem endless, but dilemmas are just as common. After all, how do we ensure that we can use that data in the right way? For example, how valuable would it be to be able to predict when Mrs. Jansen is going to fall, so that we can take measures in time to prevent this?
https://youtu.be/b4CCGek9PL0

4. Artificial Intelligence

A development related to big data is the emergence of Artificial Intelligence (AI). In fact, Big Data and AI cannot do without each other, because AI helps to make those huge information ponds productive. We need the help of computer systems or software applications that can reason and solve problems. In principle, it is referred to as 'intelligence' because the system reasons on the basis of knowledge from human experts. Special algorithms are used to collect and analyze information from the user and learn from it. It is increasingly possible to perform almost instantaneous, real-time analysis on

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information. Moreover, there is often built-in learning capability in the application, which means that the system becomes smarter as more data is collected. For example, a self-driving car becomes more reliable with every kilometer driven. AI will be integrated into every app, application and service in the future. Yet you are probably already dealing with AI without knowing it. For example, if you watch movies and series on Netflix, you will see an 'Also suitable for you' on the screen. Personal recommendations on webshops also fall under AI. More and more forms of AI are being used in healthcare. Think, for example, of software that helps diagnose a certain disease or determines which treatment will be most successful.

https://youtu.be/1bDys_OoQVo

5. Risk and security solutions

Partly due to the rise of IoT, big data and AI, security and privacy have become increasingly important and sensitive topics. Because if something is connected to the internet, there is a chance that it will be hacked, for example. What do you do if your thermostat, lock or pacemaker is externally taken over by a hacker? All that personal data in many heaps and in many clouds makes privacy (which some already claim is dead) a very important issue. If all those smart devices keep track of our data, what will happen to it? And who can join? And when? Maybe we think we have nothing to hide now, but we will look back on it very differently in 10 years.

https://youtu.be/fD1dDb7qwWM

6. Robots in healthcare

A lot is happening around robotics and there are many opportunities for healthcare. Robots offer countless possibilities. For example, a robot can support healthcare professionals in their work and encourage clients to exercise, keep them company or give reminders for medication use. Moreover, we can make robots increasingly smarter and more effective by incorporating AI. Then the robot can, for example, return to previously discussed topics. But there are also questions about the use f robotics. How does the robot relate to the work of the healthcare professional and what about personal contact and safety?

https://youtu.be/hukhKUfjWOE

7. Cyborgs

In addition to the emergence of robots in healthcare, in the near future we will simply encounter cyborgs on the street or become one ourselves. A cyborg is part human and part machine and these are already in the making! As humans, we are becoming more and more physically equipped with techniques that remove a certain limitation or make our body stronger. In principle, this is now only done for medical purposes, for example if your heart is no longer working properly or if you are disabled. You will then be fitted with a pacemaker or a prosthesis. Some prostheses can even be controlled by the wearer's brain. There are even rumors that our brain can be connected to the cloud in the future. Anyway, we are getting more and more opportunities to tinker with the body and the senses.

https://youtu.be/eP9XHE0IemM

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8. Drones

Drones can offer a solution if you live in a remote area and something needs to be delivered to you quickly. For example, the mini planes or helicopters can quickly deliver a defibrillator or medicines. The first drone center has already opened in Denmark..

https://youtu.be/WDujc6lRiBc

9. Reality Technology

Augmented reality (AR), virtual reality (VR) and mixed reality (MR) are different forms of Reality Technology that have the ability to partially or completely immerse the user in a simulated environment. AR has become known in the Netherlands mainly through the dinos promotion of Albert Heijn and the Pokémon-GO app. You will still see the people and objects around you, but additional information will be added. VR attempts to create a new virtual reality. By wearing special glasses, it seems as if you are in another world, in which you can look around. In addition, there is also mixed reality (MR), which is somewhere between AR and VR. You do not get a complete VR environment, but an interplay between digital objects and physical ones. Such technology offers great opportunities for healthcare. For example, it can help surgeons remotely control surgical robots, it can help in education and training to gain more lifelike, practical experience and it can help patients with the treatment of physical complaints. In mental health, VR has already been used to help patients overcome their worst fears through exposure therapy. In addition, there are also holograms. For example, doctors can project holographic projections, or 3D images of body parts, in front of them to explain to patients. And it is even possible to operate virtually on the hologram, after which a robot performs the actual operation. For example, a home care employee can also provide home care, while he is not physically present with the client. Screen care new style!

https://youtu.be/4Xr9l6C5gvI

10. Blockchain

Blockchain would be a development that will soon have more impact than the introduction of the internet. Would it really be? Blockchain is all about capturing and transferring value online. A blockchain consists of a network of computers, each with a copy of a database that is jointly managed. This creates a “block chain” that cannot be cracked. Therefore, blockchain is very suitable for sharing and storing sensitive information. It is also interesting in forms of cooperation in which we do not want or cannot rely on each other's system, for example when writing out the personal budget. Blockchain has the potential to become the leading infrastructure for electronic health records and personal health records. This could mean that most of the technologies that act as 'middlemen' will disappear.

https://youtu.be/wttCz7VDa8I

11. 3D printing

Not only blockchain is cutting out the middle man. 3D printing also ensures that there are no steps between production and distribution or brokering. For example, more and more products go directly from designer to end user. In addition, 3D printing is driving a future where everything is personalized for the end user. With the cost-effectiveness that 3D printing offers, companies are better able to customize products for their customers. As a result, consumers will no longer have to choose from the same old standardized models. Customization is therefore a piece of cake. This applies to works of art, toys, building materials, tools and weapons, but also to food, medicines, bones and joints, prostheses

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and even organs based on their own DNA. Who knows what we will soon be printing out for ourselves to stay healthy or get better.

https://youtu.be/326eWmcZ0t0

12. Biotech

In the coming decades we can also expect a lot from biotechnological research in solving urgent health problems. Biotechnology uses animals, plants, bacteria or other living beings to develop medicines, food or new substances. This ranges from making cheese to growing bacteria that produce vaccines. Biotechnological research may lead to the prevention of Alzheimer's disease and the cure of various forms of cancer and heart disease. There are even breakthroughs that could just contribute to the fight against ageing. This could significantly change our lives and the demand for care and support. Meaningful testing of technology Although these developments are sometimes already clearly visible in healthcare and society, they are still largely in their infancy. At the same time, the speed at which technology is developing is almost paralyzing. Because if you don't know what will be different in ten or twenty years from now, how can you prepare for that? Still, it is not an option to keep waiting with your arms crossed. It is important to be open to innovation, to create space for experimentation and to translate that into vision and policy. An experiment does not have to be an extensive pilot, a small test of a few weeks can already provide a lot of insight. The distance from these developments to trying out things yourself often seems unbridgeable. And it is almost impossible to respond to all developments, but that is not necessary. It is important to discover which developments and technology or eHealth applications suit your organization and healthcare needs. You can find out, for example, by 'meaningfully trying out' technology.

https://youtu.be/Iz3iMMiO_zE

MAPPING OF NATIONAL TRAINING NEEDS AND OFFERS FOR HOME HELPERS AND CARE ASSISTANTS WITH REGARD TO DIGITAL COMPETENCES

There is a significant need for targeted training in e-health for lower-level caregivers, such as home helpers and care assistants. While many organisations in the Netherlands offer training programs in digital competences, these are primarily designed for higher-level healthcare professionals, such as nurses.

For lower-level caregivers, most training is provided on the job and focuses on the specific systems used within their workplace. However, these programmes often presuppose a basic level of digital literacy, leaving a gap for those who lack foundational digital skills. Addressing this gap is crucial to ensuring all care workers can effectively engage with the growing use of e-health technologies in their roles.

MAPPING OF NATIONAL FORMAL CARE PROFESSIONS/ NATIONAL VET SYSTEMS AND REGULATIONS OF CARE PROFESSIONS

In the Netherlands, the education system for healthcare professionals operates at different levels to meet the diverse needs of the care sector. This structured approach ensures that care workers, from home help to specialist nurses, are equipped with the skills and knowledge required for their roles.

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The Vocational Education and Training (VET) system plays a key role in preparing individuals for formal care work. It offers programmes ranging from entry-level certification for home care workers to advanced training for registered nurses and allied health professionals. Each level is designed to meet specific job requirements and is aligned with national regulations for care professions.

This system provides a clear pathway for career progression within the healthcare sector, allowing individuals to upskill and move to higher levels of responsibility. In addition, the structured training programmes ensure that care workers meet the regulatory standards required to provide quality care, while also addressing the growing need for digital skills in the sector.

Intermediate vocational education (mbo)

In MBO you can follow a continuation education after secondary school. The vmbo prepares you for the mbo, but also with a havo or vwo diploma you can move on to the mbo. MBO courses often prepare you for a specific trade or profession, such as baker, electrician or healthcare worker.

There are about 500 courses in which you can get an MBO diploma.

The MBO has four levels:

MBO level 1: entrance training for simple executive work

MBO level 2: basic vocational training for practical executive work

MBO level 3: vocational training for independent professionals

MBO level 4: middle management training and specialist training, after which someone can practice a profession completely independently, with broad employability and/or specialization

The next level is :

Higher vocational education (HBO)

In the Netherlands, higher vocational education (HBO) offers a pathway for students who have completed havo or vwo (secondary education) as well as those who have finished an mbo4 program. HBO programs are provided by universities of applied sciences and are distinct from academic education, as they focus more on preparing students for professional practice while still incorporating research elements.

HBO programs follow the internationally recognised bachelor-master system, enabling students to pursue advanced studies and align their qualifications with global standards. This approach ensures that graduates are equipped with both practical skills and theoretical knowledge to succeed in their chosen fields.

There are three levels of higher professional education:

Associate degree (AD).

This is a practical, two-year programme that you study at a college. You will earn an associate degree that is at a level between an mbo4 degree and an hbo bachelor's degree.

Bachelor's degree

This is a four-year programme that you can enter with an havo, vwo or mbo4 diploma. You will complete this programme with a Bachelor's degree.

HBO Master

This is a one-, two- or three-year programme that you can take after completing a bachelor's degree at a polytechnic or university of applied sciences. In a master's programme, you study a specific subject in depth. You will graduate with a bachelor's degree.

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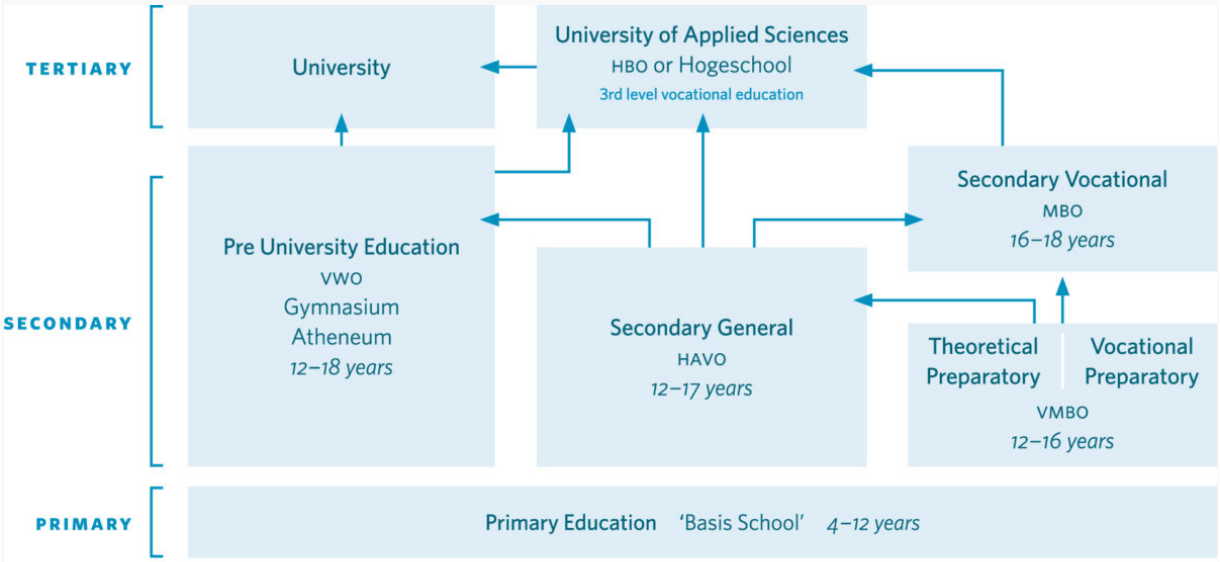

Table by Willemijn van Oppen, Educaide

In healthcare there are different types of activities:

- Nursing, Care, Home Care (VVT).
- Hospitals.
- Mental health care (GGZ).
- Disability care.
- Medical-technical/assistant professions.
- General practices/health centers.
- Other health care.

And also different levels of healthcare workers:

- **Level** 1 Zorghulp (MBO)

A care aide (or helper level 1) is the support and assistance of a caregiver or nurse. As a care assistant, you work in a hospital, nursing home or in home care. You help the nurse or caregiver with tasks such as cleaning, shopping or making beds.

- **Level** 2 Helpende of Verzorgende **Zorg** en Welzijn (MBO)

As a helper, you support caregivers with everyday things they can no longer do on their own. For example, help getting up, eating, personal care and dressing and undressing. As a helper you are literally the helping hand here.

- **Level** 3 Verzorgende (MBO) Individuele Gezondheidszorg (VIG)

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These clients need personal guidance and support. Your duties as a caregiver in elder care include helping the elderly get up, wash and dress. You will also supervise meals and think of fun afternoon activities for your clients, for example.

- **Level** 4 Verpleegkundige (MBO)

With a degree in Nursing, you can work as a nurse in nursing homes (residential care centers), mental health care, disability care and home care. You can also work in rehabilitation wards or hospitals.

- **Level** 6 Verpleegkundige (HBO)

With your Bachelor of Nursing in your pocket, you are a true healthcare professional. As a nurse, you are responsible for the physical and mental well-being of the patient. You perform nursing procedures (blood draws, wound care) and consult which care is best for them.

- **Level** 7 Verpleegkundig specialist.

The nurse specialist focuses not only on your illness and treatment, but also on its consequences. In addition to direct patient care, nurse specialists share their knowledge with colleagues. They also participate in scientific research and contribute to quality improvement and innovation.

MAIN FINDINGS OF INTERVIEWS

The interviews with students were all at school with students of level 1 and 2 of Healthcare workers. Different students were interviewed with a list of questions, this was face to face at 5 different classes so the number was 48 students.

Healthcare workers were interviewed at the internship places where the students do their internship. Here the numbers are around 26.

Students at level 4 (nurses) were also interviewed about their experience in healthcare technology as a reference. Here the knowledge was much higher and they had more experience with this subject.

Respondents:

The students are 80% women at the age of 17-23, the healthcare workers are also women at the age of 25-58. The few men were the same age.

Guiding questions interview care technology:

Questions	1 totaal niet mee eens	2	3	4	5 totaal wel mee eens
Technology in care is a valuable tool					
Deployment of (computer) care technology in caregiving reduces human contact in caregiving					
Technology in care makes clients more independent					
Care technology is part of my job					

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I am sufficiently informed about new developments in care technology					
Care technology increases client safety					

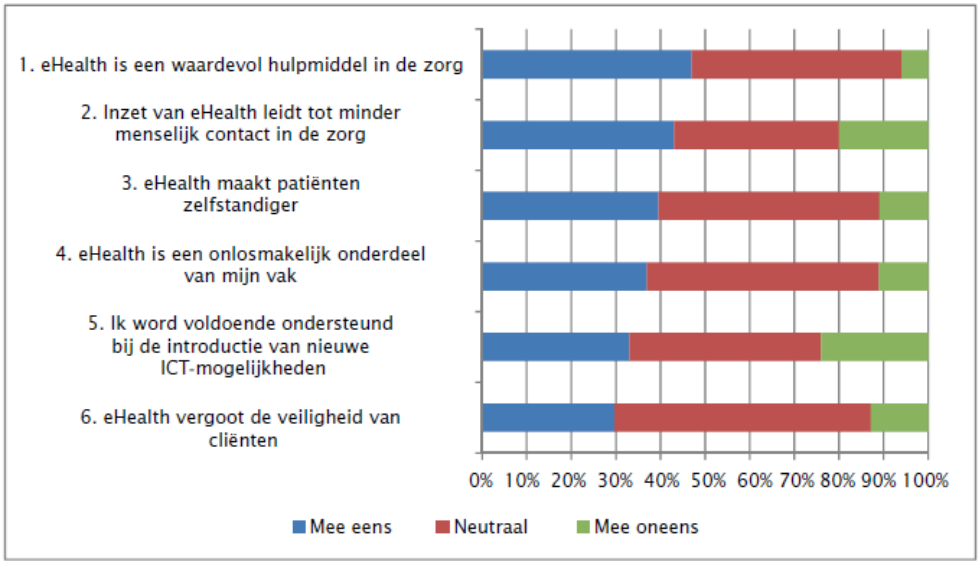
In the interviews with students and carers, the main thing was that there needs to be some sort of entry level to work with the digital tools that are being used. In many old people's homes they work with a digicoach and an i-nurse. They are the experts in digitalisation and work, for example, with e-health.

E-health is the use of information and communication technologies, especially Internet technology, to support or improve health and health care.

Examples of e-health applications in the VVT: electronic data exchange between healthcare providers (58% of nurses do this themselves or say that colleagues in the institution do it), supervision techniques (48%), tracking of health data by clients via an app (40%), medicine dispensers (23%), video calls (21%) and telemonitoring (13%).

In interviews with higher-level caregivers, such as nurses, there is a clear recognition of the importance of e-health in modern care. However, they often express concerns about having insufficient time to enhance their proficiency with these technologies, despite their willingness to engage with them.

For caregivers at level 2, the challenges are somewhat different. They struggle with creating concise and clear reports, particularly during handovers to colleagues. This difficulty often stems from language barriers and a lack of confidence in their ability to structure and articulate information effectively. They frequently feel inadequately equipped for this crucial aspect of their role, which can impact the quality of care continuity.



Figuur 1. Top 6 van stellingen over e-health waar verpleegkundigen het het meest mee eens zijn

https://tza-twente.nu/digitour/

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MAIN FINDINGS OF QUESTIONNAIRE

The questionnaire reveals that healthcare providers are generally enthusiastic about e-health. However, the availability of e-health solutions often exceeds their actual usage. This trend applies to both healthcare providers and users. A recurring issue identified is that the technology does not always function reliably, and e-health is not consistently well-integrated into healthcare practices.

When poorly embedded, e-health can increase rather than decrease the workload for healthcare providers. Despite this, the enthusiasm of healthcare providers for e-health remains a valuable asset. It is crucial for stakeholders to collaborate in advancing the integration of e-health into healthcare practices. This involves finding ways to align e-health solutions more effectively with healthcare processes and addressing existing barriers.

Level 2 caregivers, in particular, encounter greater challenges related to language and the use of digital tools. Properly implemented healthcare technologies can enhance job satisfaction among healthcare workers, especially when these tools support workflows and alleviate (or are perceived to alleviate) work-related stress. **Time-saving features are particularly impactful, enabling healthcare workers to serve more clients efficiently.**

Additionally, healthcare technology contributes to the quality of care by improving both the clients' quality of life and the care workers' ability to deliver high-quality services.

Healthcare workers across various internship locations expressed high expectations for the use of technology in caring for people with dementia. They noted that technology has the potential to delay or even replace admission to nursing homes while reducing the workload for both professional caregivers and family members. Additionally, technology can support people with dementia by helping them maintain independence through memory aids, safety enhancements, access to information, autonomy, and opportunities for social contact and companionship.

Interestingly, technological innovations originally designed for people with dementia often prove beneficial for other target groups as well. For example, the small robot Tessa, which has been in use in dementia care for some time, is now being studied to determine its applicability for individuals with mild intellectual disabilities, acquired brain injuries, or autism. Researchers are exploring whether Tessa can assist these groups in maintaining daily routines and improving their quality of life.

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