

DECEMBER, 2021

Healthcare Digitization beyond Pandemic



Introduction

What's happening in Healthcare?

I. Digital health popular trends since the pandemic

II. Trends' insights

III. Questions Asked to Open Innovation Council

I. Digital health was accelerated through the pandemic

In order to observe the active areas of innovations in digital health, NineSigma looked into 1600 global healthcare startup companies who received latest funding round between **2019-2021 Q3**. We categorized those companies based on services they provide as below.

1. Smart coordination and communication

Connect patients, clinicians, and other stakeholders, to achieve individualized and patient-centered smart health care management (Ex. Booking/appointment, teleconsulting)

2. Monitoring, intervention and optimal treatment

New device, new technology and monitoring sensors for better treatment and diagnosis

3. Preventive and proactive care

Patient apps and services to suggest preventive and proactive actions and healthier lifestyle

4. E Commerce

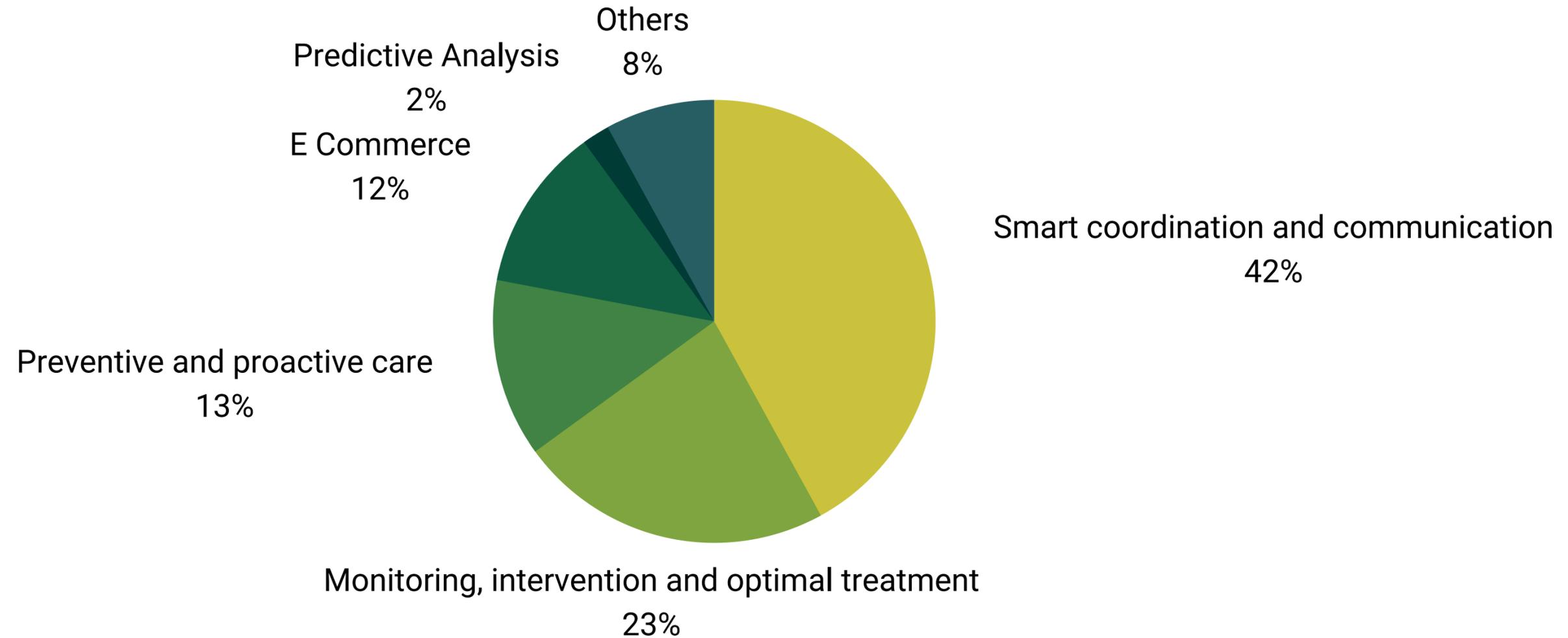
5. Predictive Analysis

Predict and evaluate risks for diseases based on patient information using tools such as AI, big data and genome analysis

Latest Fundings in Healthcare 2019-2021 Q3

100% = \$23.6 Billion

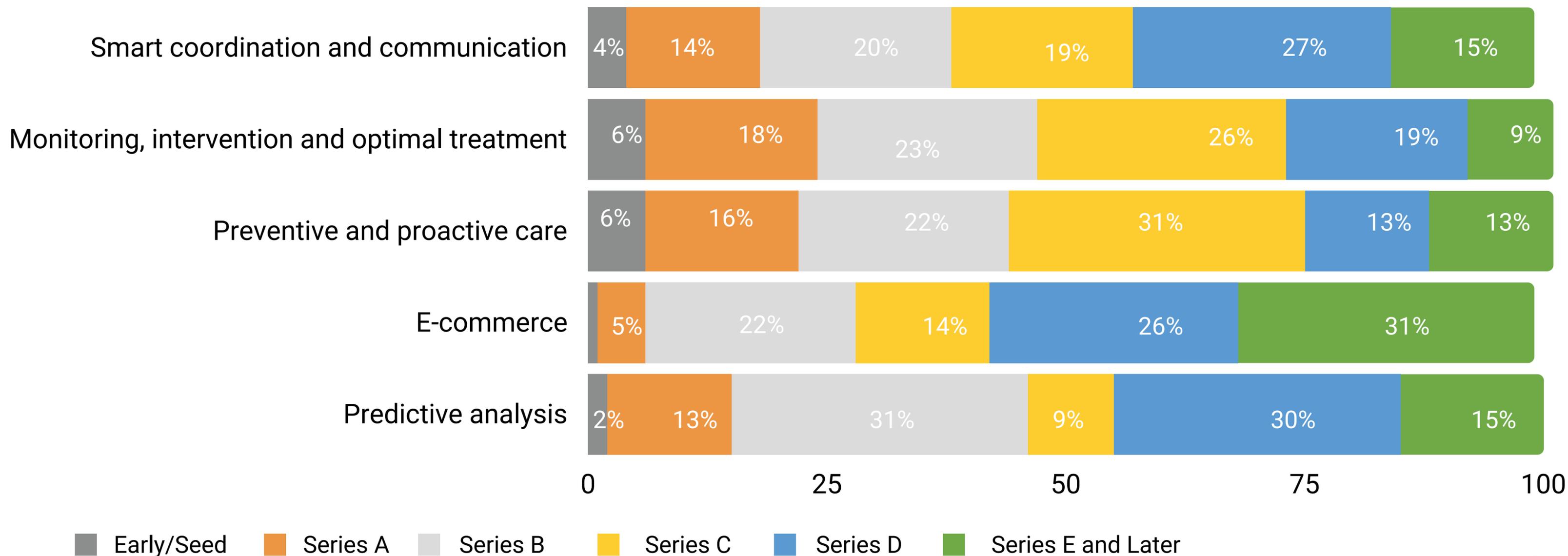
Figures on Latest Fundings in Healthcare



Others includes e-recruiting, administrative tools non-digital services.

II. How "Monitoring, intervention and optimal treatment" and "Preventive and proactive care are" are gaining momentums?

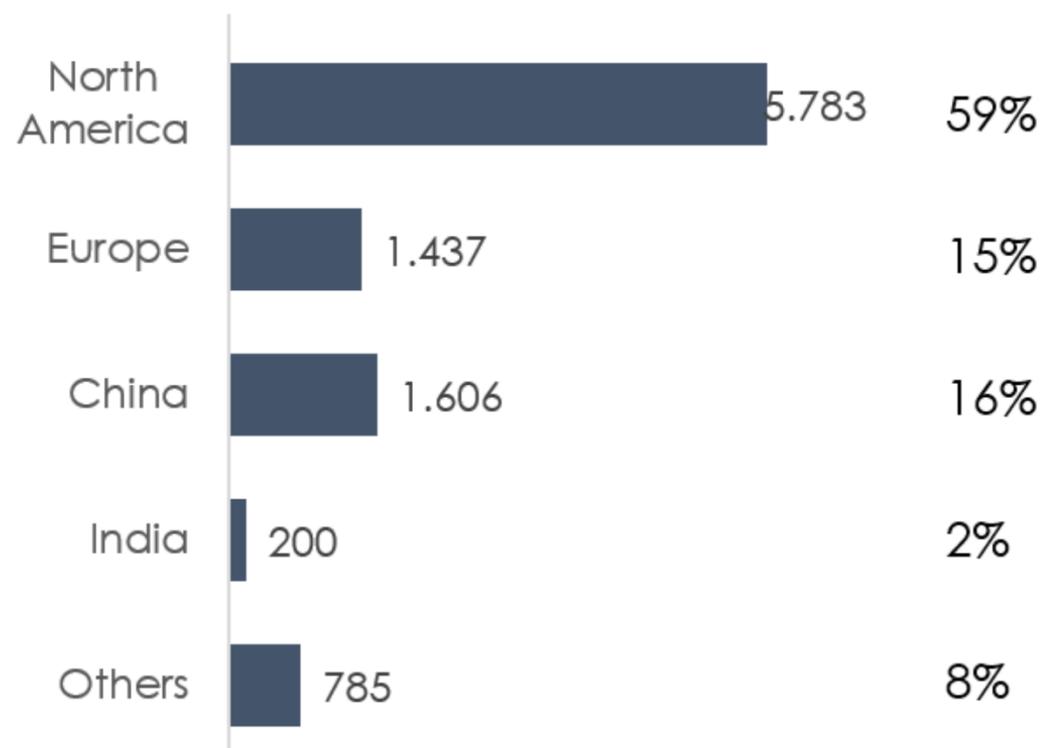
Latest Funding in Healthcare 2019-2021 Q3, % \$ Investment by Company Stage



1. Smart coordination and communication

Latest Funding in 2019-2021 Q3 by Region

US \$ Million, % Total



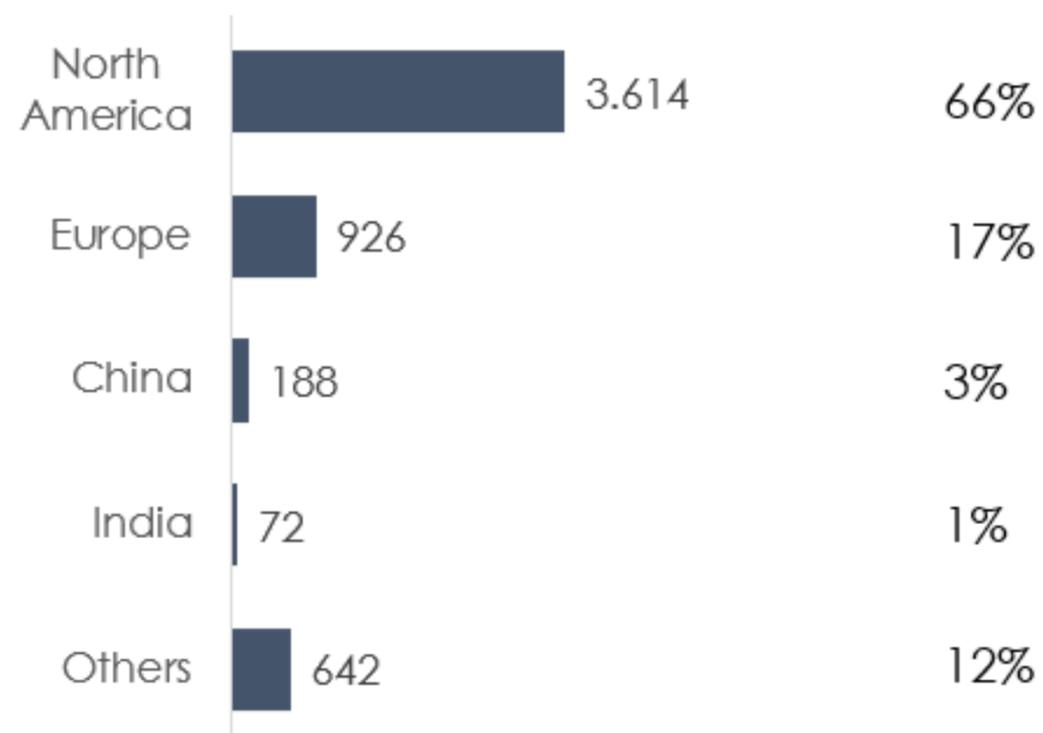
Companies with High \$ Latest Rounds

Company	City/Country	Latest Round	Latest Funded Date	Description
DXY	Beijing /China	\$500M/ Series E	Dec 28, 2020	Online community for physicians, health care professionals, pharmacies and facilities
Carbon Health	Washington/USA	\$350M/ Series D	Jul 21, 2021	Provider of appointment booking platform for COVID-19 test in tech heavy clinics
WeDoctor	Zhejiang Sheng/China	\$350M/ Series D	Dec 17, 2020	Provider of software for doctor appointment booking and healthcare information
KRY	Stockholm County/Sweden	\$317M/ Series D	Apr 27, 2021	Provider of tele-consultation platform for patients
Miaoshou Doctor	Beijing Shi/China	\$231M/ Series F	Aug 11, 2021	Provider of online information for patients by doctors through videos

2. Monitoring, intervention and optimal treatment

Latest Funding in 2019-2021 Q3 by Region

US \$ Million, % Total



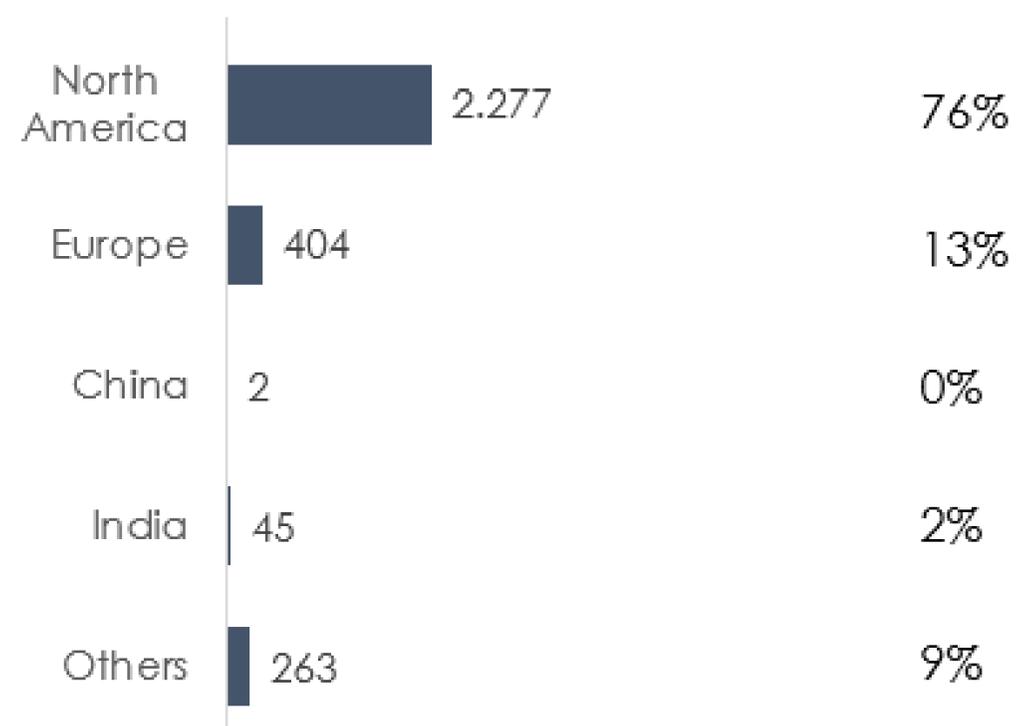
Companies with High \$ Latest Rounds

Company	City/Country	Latest Round	Latest Funded Date	Description
LumiraDx	Waltham/USA	\$400M/ Series D	Apr 07, 2021	Cloud based diagnostics platform for point-of-care diagnosing
Exo	Redwood City/USA	\$220M/ Series C	Jul 29, 2021	Provider of AI-based software for the analysis of ultrasound image
Whoop	Boston/USA	\$200M/ Series F	Aug 30, 2021	Provider of a smart wearable device for physical activities monitoring
PathAI	Boston/USA	\$165M/ Series C	May 18, 2021	AI based solutions for clinical diagnosis
DDA Technology	Princeton/USA	\$150M/ Series D	Apr 07, 2021	Provider of surgical robots for radiologists

3. Preventive and proactive care

Latest Funding in 2019-2021 Q3 by Region

US \$ Million, % Total



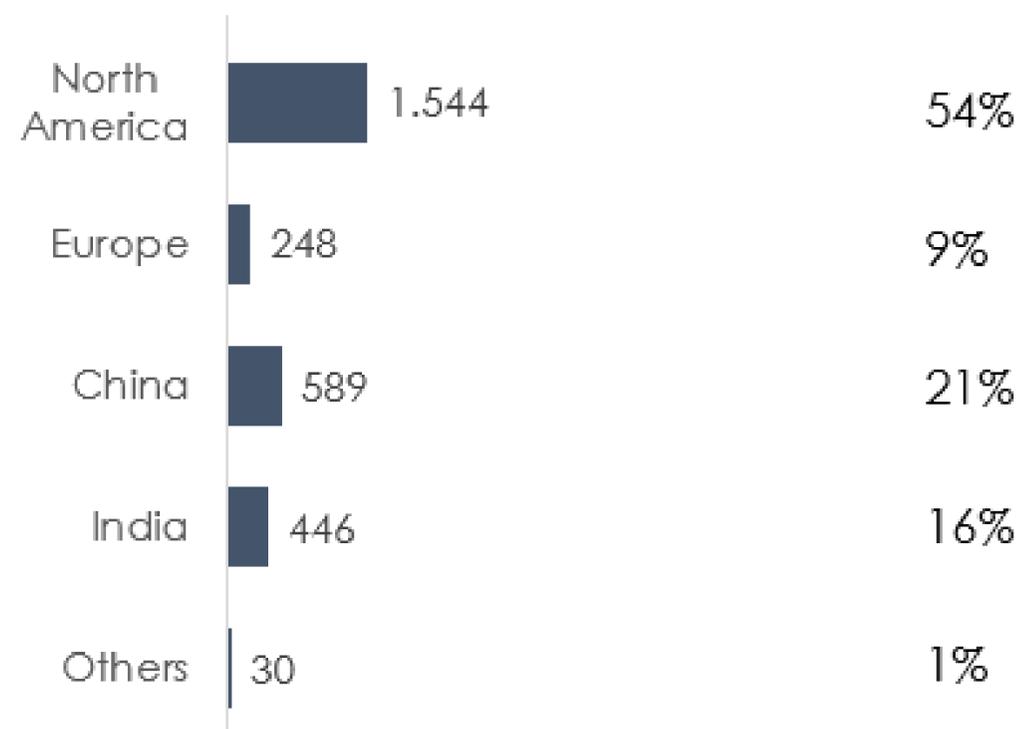
Companies with High \$ Latest Rounds

Company	City/Country	Latest Round	Latest Funded Date	Description
Hinge Health	San Francisco/USA	\$300M/ Series D	Apr 07, 2021	Provider of digital solutions for employees recuperating from chronic pain for musculoskeletal disorders
Tonal	San Francisco/USA	\$250M/ Series E	Jul 29, 2021	AI-based digital full body motion analysis and training system
Tempo	San Francisco/USA	\$220M/ Series C	Aug 30, 2021	Provider of AI-based home gym training platform
Virta	San Francisco/USA	\$133M/ Series E	May 18, 2021	Provider of therapies for metabolic health in chronic disease patients
Cerebral	San Francisco/USA	\$127M/ Series B	Apr 07, 2021	Provider of mental health telemedicine solutions

4. E Commerce

Latest Funding in 2019-2021 Q3 by Region

US \$ Million, % Total



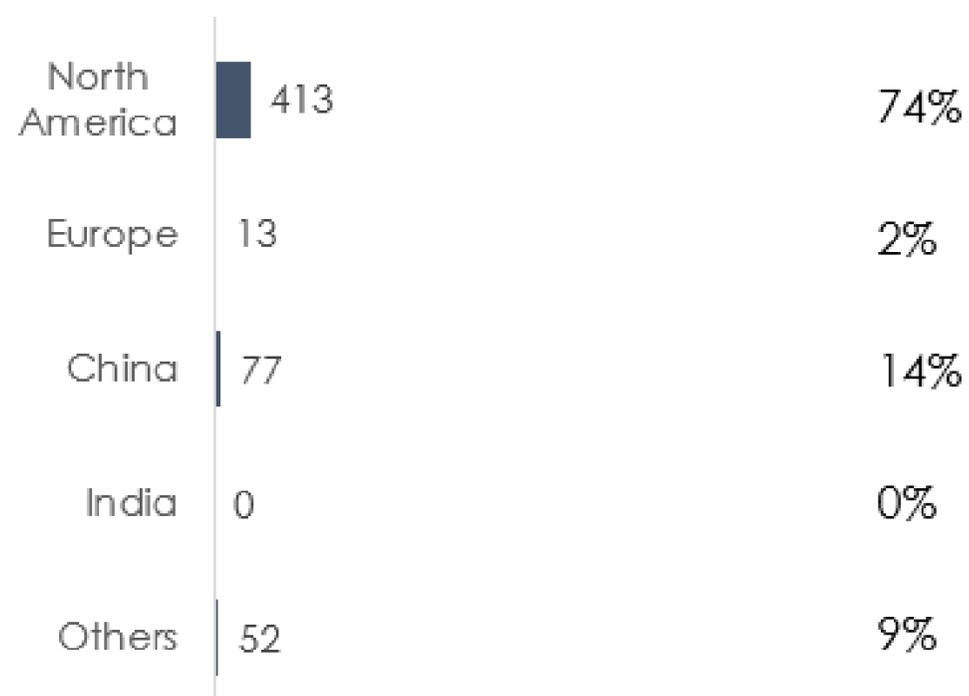
Companies with High \$ Latest Rounds

Company	City/Country	Latest Round	Latest Funded Date	Description
Clover Health	San Francisco/USA	\$500M/ Series E	Jan 29, 2019	Online healthcare insurance platform for senior citizens
PharmEasy	Mumbai/India	\$300M/ Series D	Jun 28, 2021	Online platform for ordering medicines, healthcare products, and diagnostic tests
Capsule	New York/USA	\$300M/ Series E	Apr 28, 2021	Provider of an online pharmacy for selling medicines
Pharmapacks	New York/USA	\$250M/ Series D	Nov 12, 2020	E-commerce platform for pharmaceutical, nutritional and daily use products
Jingle fast medicine	Beijing/China	\$220M/ Series C	Jun 08, 2021	O2O platform for medicines

5. Predictive Analysis

Latest Funding in 2019-2021 Q3 by Region

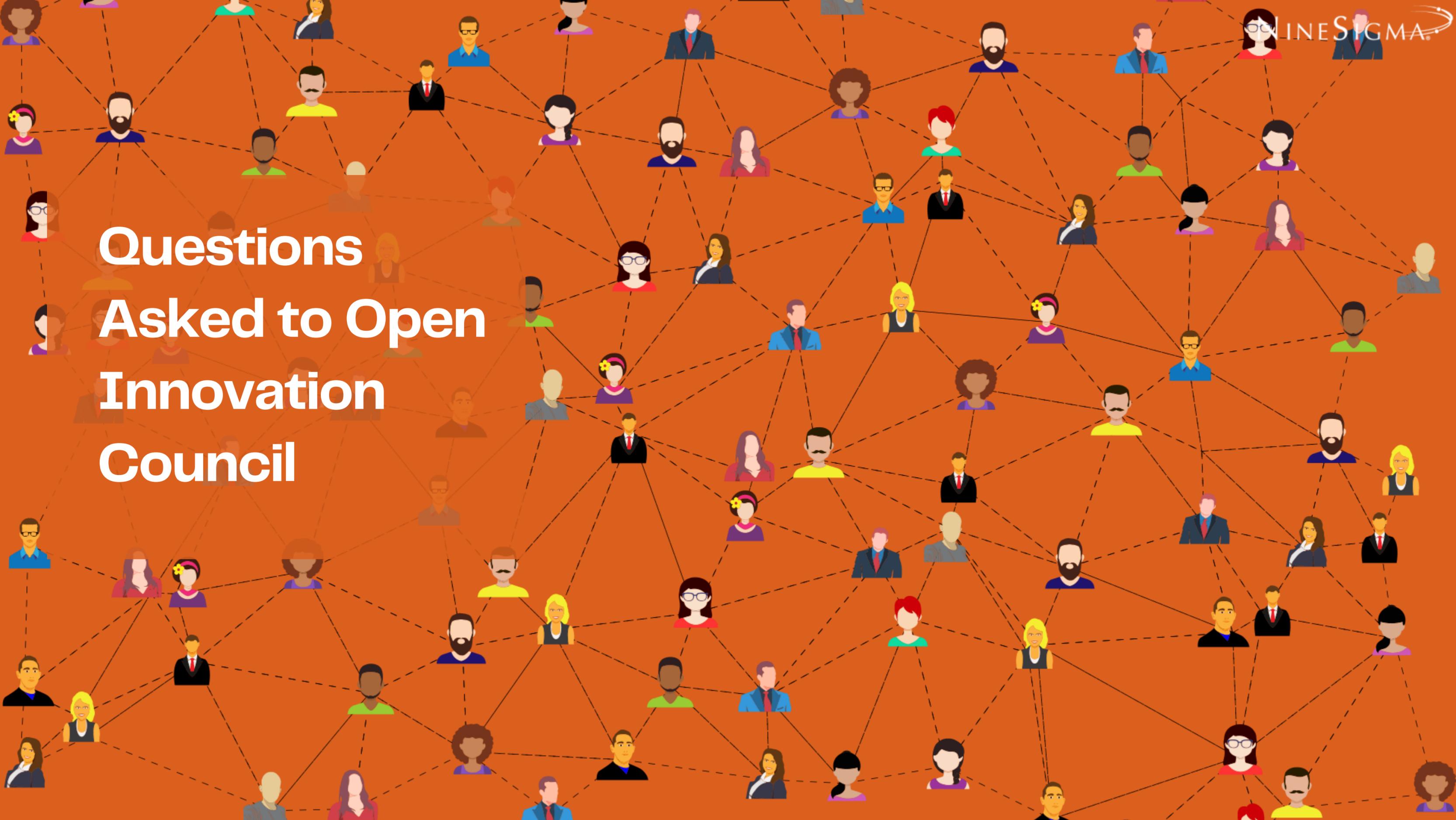
US \$ Million, % Total



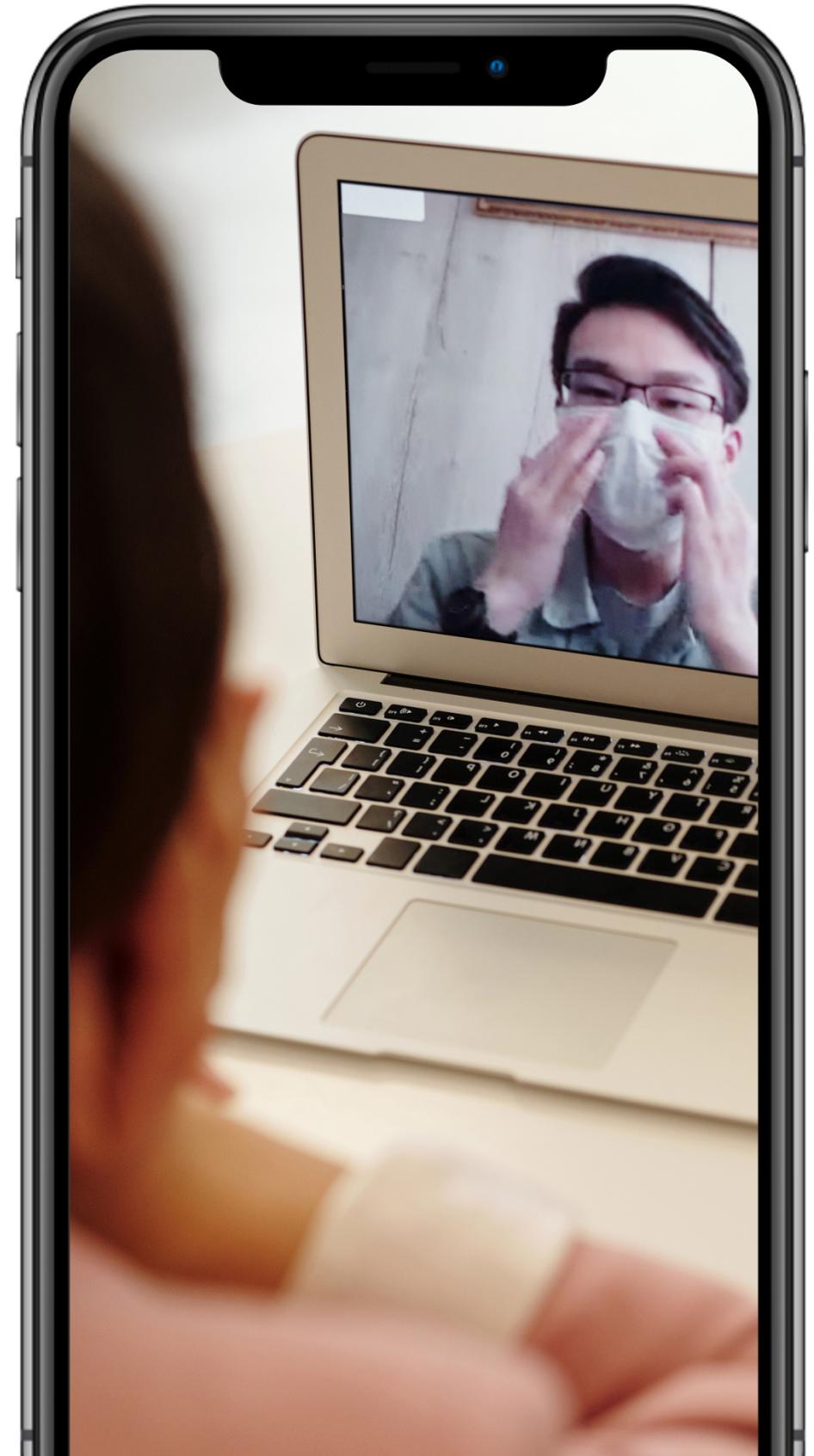
Companies with High \$ Latest Rounds

Company	City/Country	Latest Round	Latest Funded Date	Description
Color	Burlingame/USA	\$167M/ Series D	Jan 04, 2021	Developer of a saliva test kit to detect genetic risk of various disease for clinicians and individuals
23andMe	Mountain View/USA	\$82M/ Series F	Dec 23, 2020	Provider of genetic test solutions to study ancestry, genealogy, and inherited traits
Flo	San Francisco/USA	\$50M/ Series B	Sep 09, 2021	Provider of AI-based mobile app that tracks and predicts menstrual cycles
Helix	San Francisco/USA	\$50M/ Series C	Jun 03, 2021	Connecting people with insights into their own DNA
Wing Jian Technology	Shanghai/China	\$46M/ Series B	Jul 29, 2021	AI based research platform for pediatric assisted diagnosis

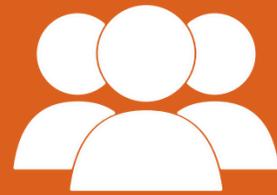
Questions Asked to Open Innovation Council



NineSigma asked Open Innovation Council's medical experts to hear progression of digitization at the frontline world wide



Questions asked to OI Council



Q1. Q1 What is your current role in medical services?

Q2. In 2020 and 2021, in which of the following area of service you have experienced the progression of digitization?

- Smart coordination and communication
- Monitoring, intervention and optimal treatment
- Preventive and proactive care
- E-Commerce

Q3. Please describe the progression of digitization you experienced in the area you selected in Q2.

Q4. Beyond 2021, which of the following area of service needs further progression of digitization in your country for the better care for patients?

Q5. Please explain the reason that you think the area of selected in Q4 needs further progression of digitization in your area of treatment/country.

Q6. For the progression of digitalization beyond 2021, which is the most crucial factor that affects the speed of adoption?

Regulation/compliance change

- Technology advancement
- Readiness of care providers/patients
- Affordability of the service/device
- Others

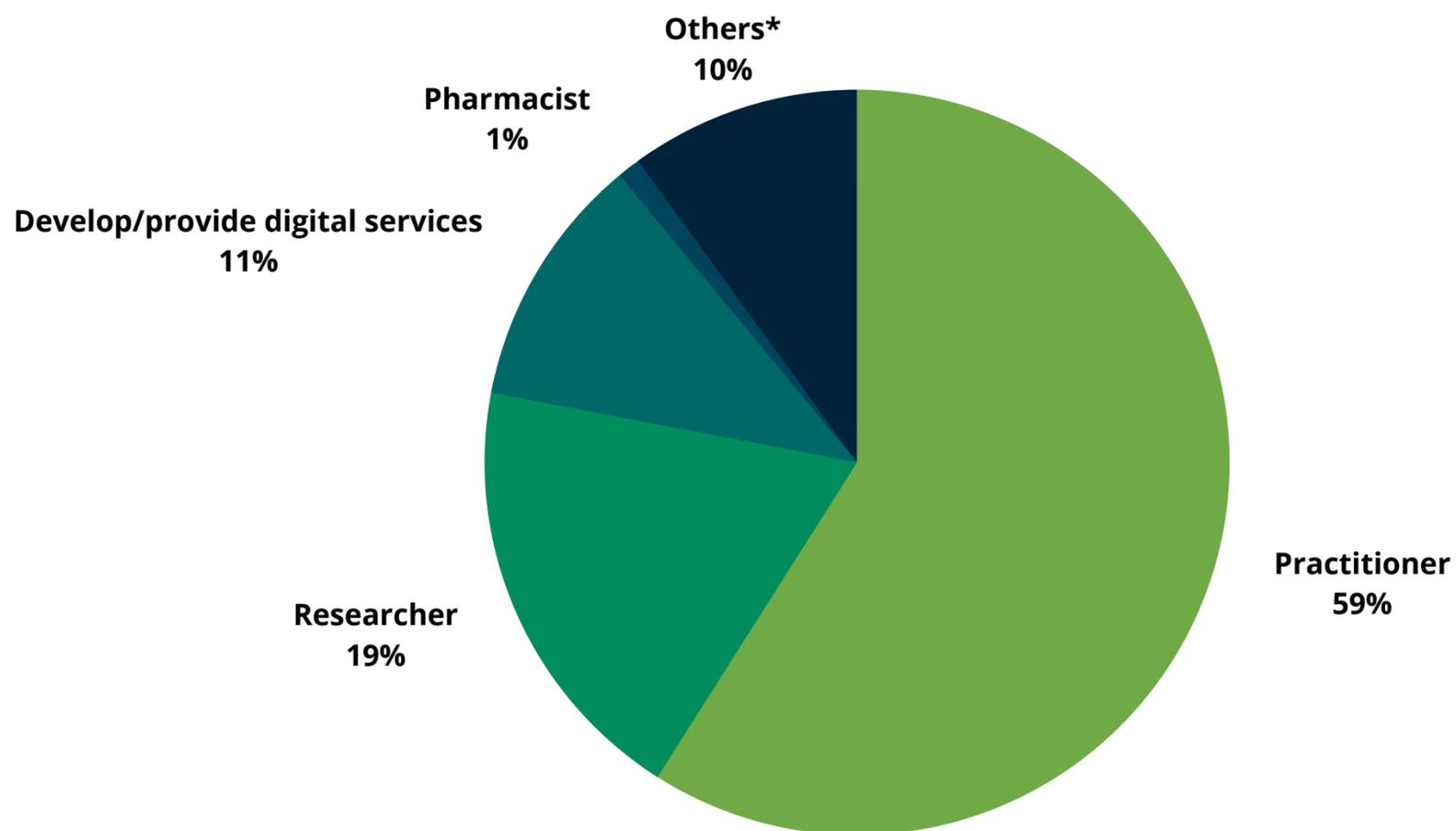
Q7. Please elaborate the changes that needed for adoption based on what you selected in Q6.

Q8. Please name a disease area where you believe that predictive analysis will be most useful.

Q1. What is your current role in medical services?

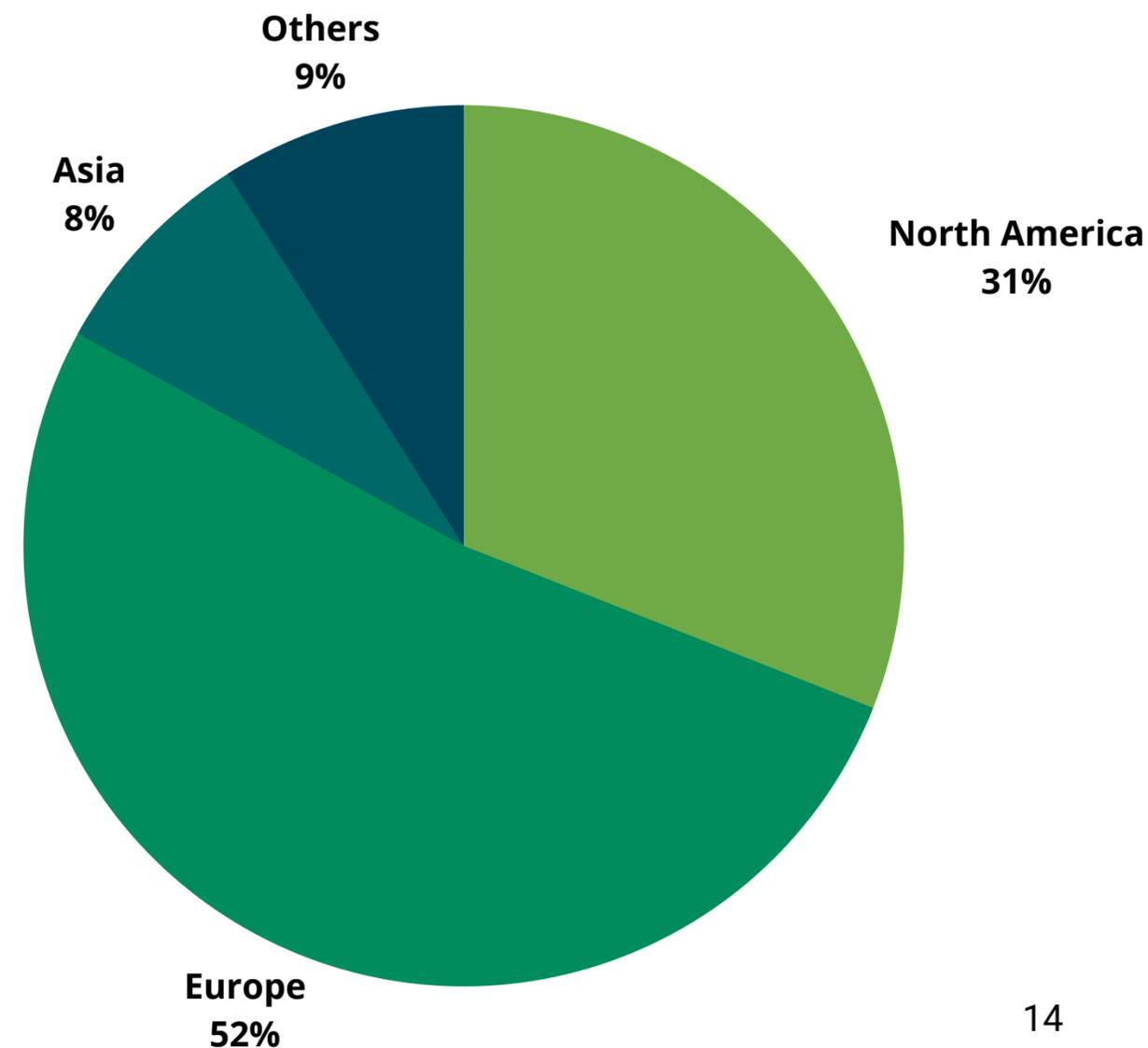
Industry of experts who answered the Open Innovation Council survey

100% = 81



Industry of experts by Region

100% = 81

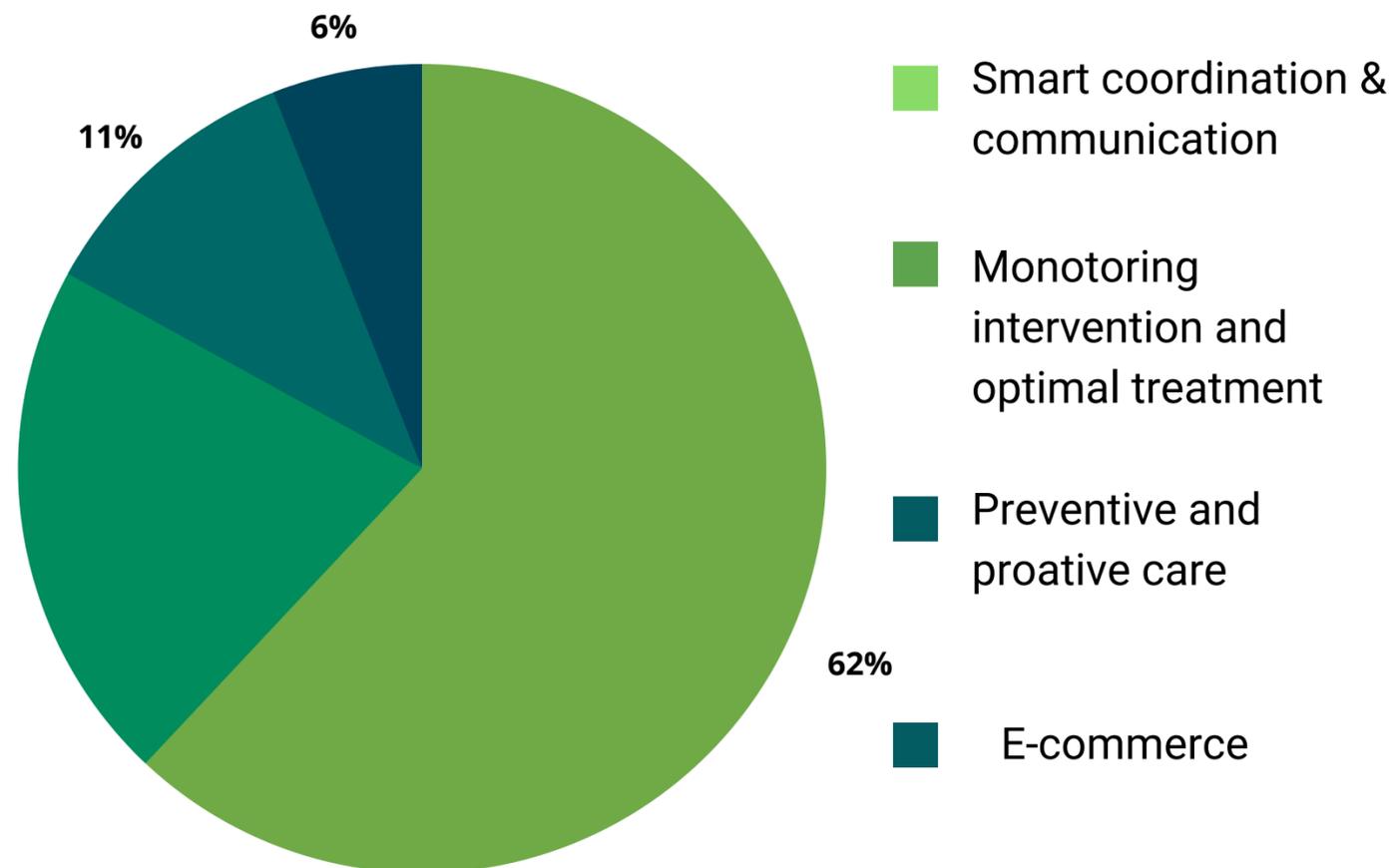


*Others include medical device engineer, physical therapist, consultant

Q2. In 2020 and 2021, in which of the following area of service you have experienced the progression of digitization?

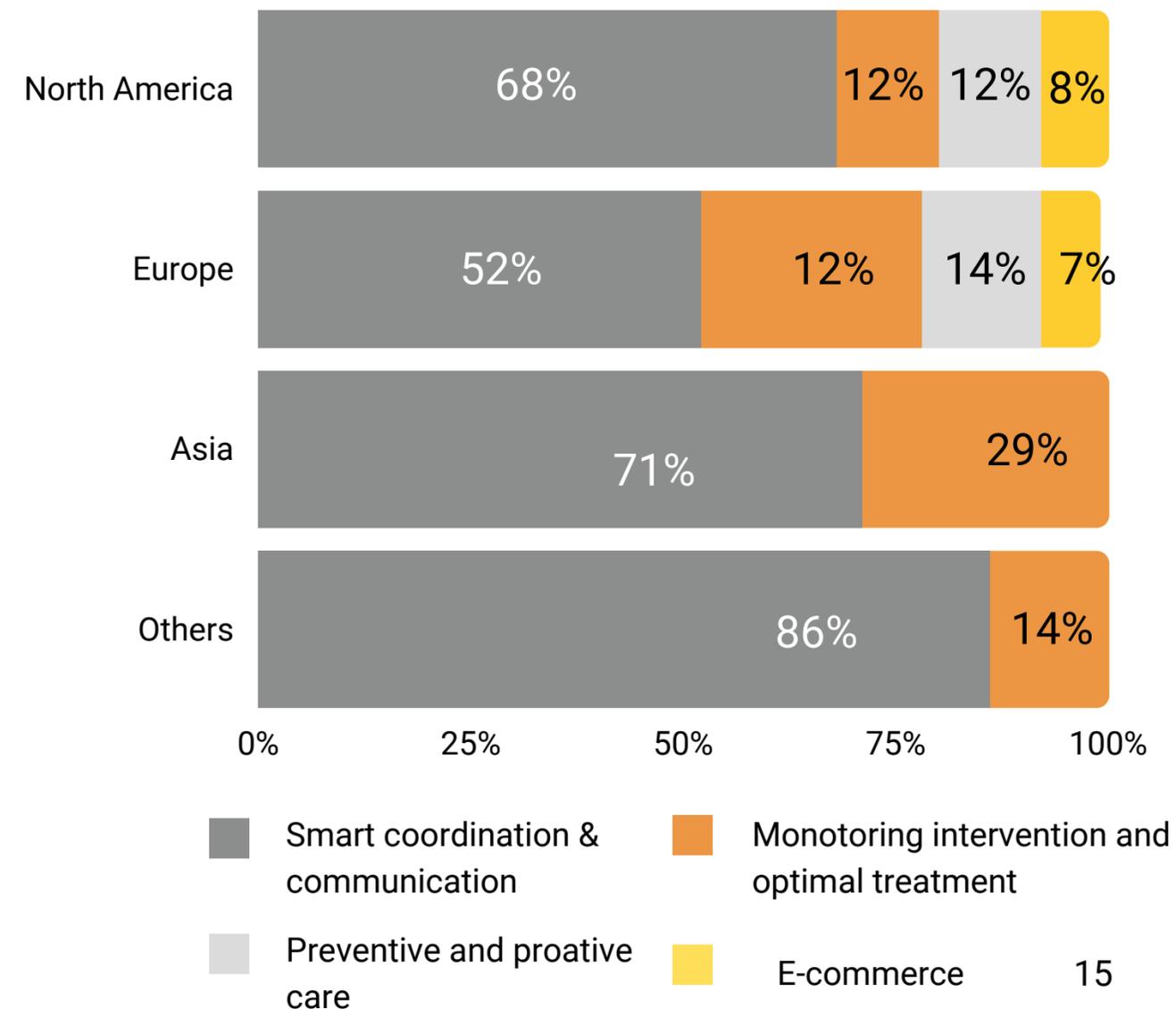
Answers to Q2

100% = 81



Answers to Q2 by Region

100% = 81



Q3. Please describe the progression of digitization you experienced in the area you selected in Q2.

Smart coordination and communication

In general **patients and physicians have accepted this new practice feeling satisfied** with this way of giving medical appointments. Not every pathology can be evaluated by **teleconsulting** but the majority can be done as long as the patient provides us with good photographs of their skin disease and an adequate clinic history or interrogation done by us the doctors. Since the pandemic, the digital technology have emerge so much at a point this modality will stay forever with us.
(Dermatologist, USA)



The most challenging was to cater the cancer patients. Tele-consultation using video and telephone proved to be efficient for not only connect with the patients but also triage the seriousness of the cases. There was mixed reactions from both patient and surgeons perspective. This pandemic made **the digital technology more palatable for both patient and the surgeons.** (General surgeon, UK)

Monitoring, intervention and optimal treatment

In my field a project is set in place to help **IBD patients log into private accounts and document the progress of their disease as they perceive their symptoms.** This provides continuous monitoring of self-perceived severity and variety of symptoms which can be more representative than planned follow-up through the outpatient clinic. During the **pandemic this was accelerated** as much of daily activity switched to distanced alternatives. Both doctors and patients perceive this as a step forward, although still in progress. (Resident doctor in Gastroenterology and Hepatology, Sweden)



During the **pandemic new tele-monitoring devices has been implemented: cameras for continuous visual contact both with patients and medical devices.** More effective data gathering to one place (monitor/system) from various medical devices and tele communication in-ICU application for better coordination of the staff who is operating next to the patient. (MD working in an ICU, Greece)

Q3. Please describe the progression of digitization you experienced in the area you selected in Q2.



Preventive and proactive care

Mobile apps for home kidney testing: albumin to creatinine ratio, urinary infections and, also for diabetics, assessing various lesions, healing of wounds. Patients overall satisfaction was variable, with a maximum of 75% in case of mid-aged people, medium-high literacy. **This pandemic accelerate the adoption of digital technology.** (Practitioner and researcher, UK)

Much of student/academic preventative care initiatives were transitioned to a telehealth environment during the COVID-19 pandemic, for better or for worse. (A third-year medical student approaching my board certification as a physician, USA)



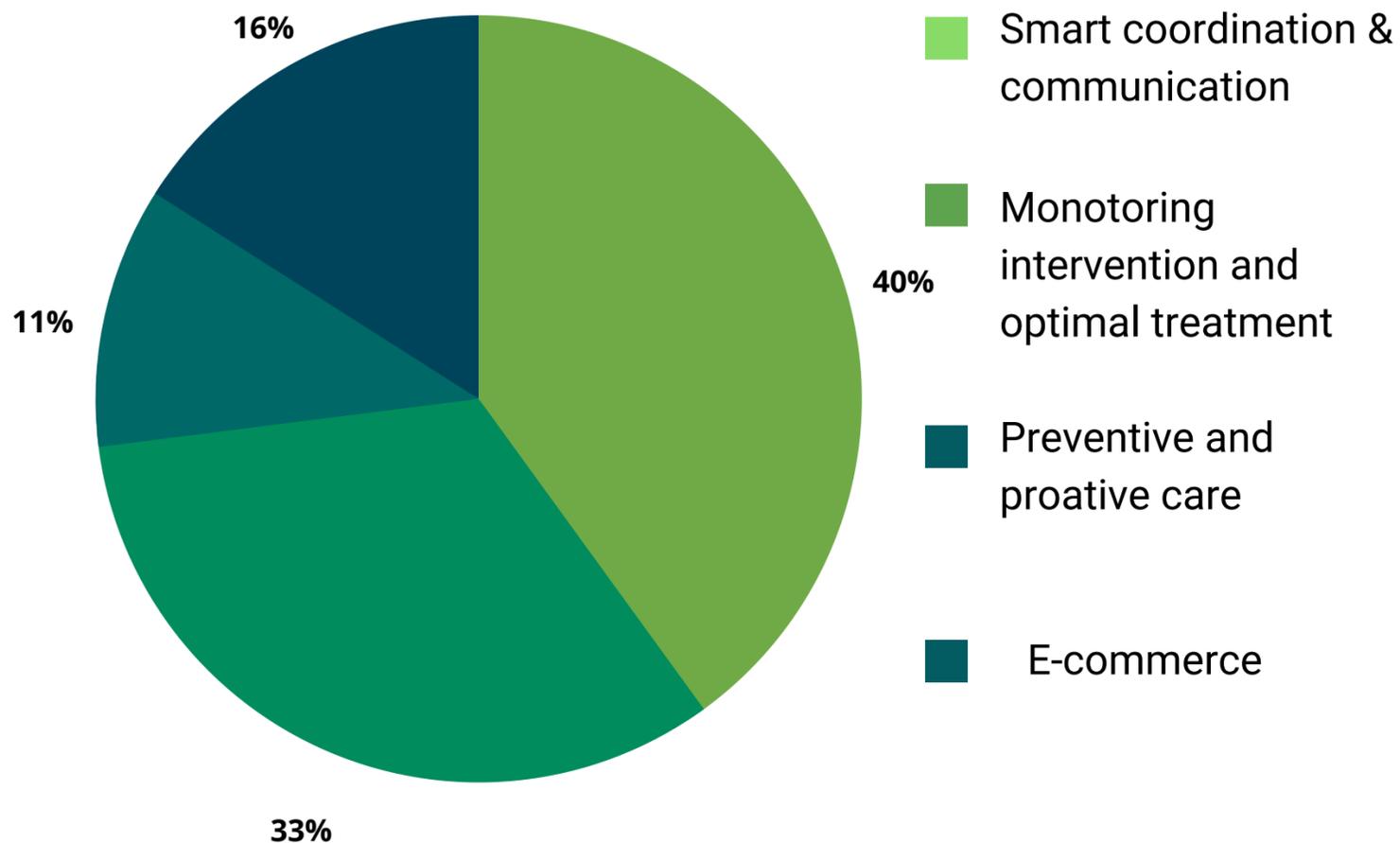
E Commerce

During 2020-2021, healthcare e-commerce evolution was radical. In the **pandemic, online channels were widely used to distribute healthcare products such as masks and antiseptics.** For both the majority of the patients and care providers, e-commerce progress was beneficial. Non-direct contact contributed to the maintenance of COVID restrictions, thus offering an extra layer of protection for both parties. (Medical student, Greece)

Q4. Beyond 2021, which of the following area of service needs further progression of digitization in your country for the better care for patients?

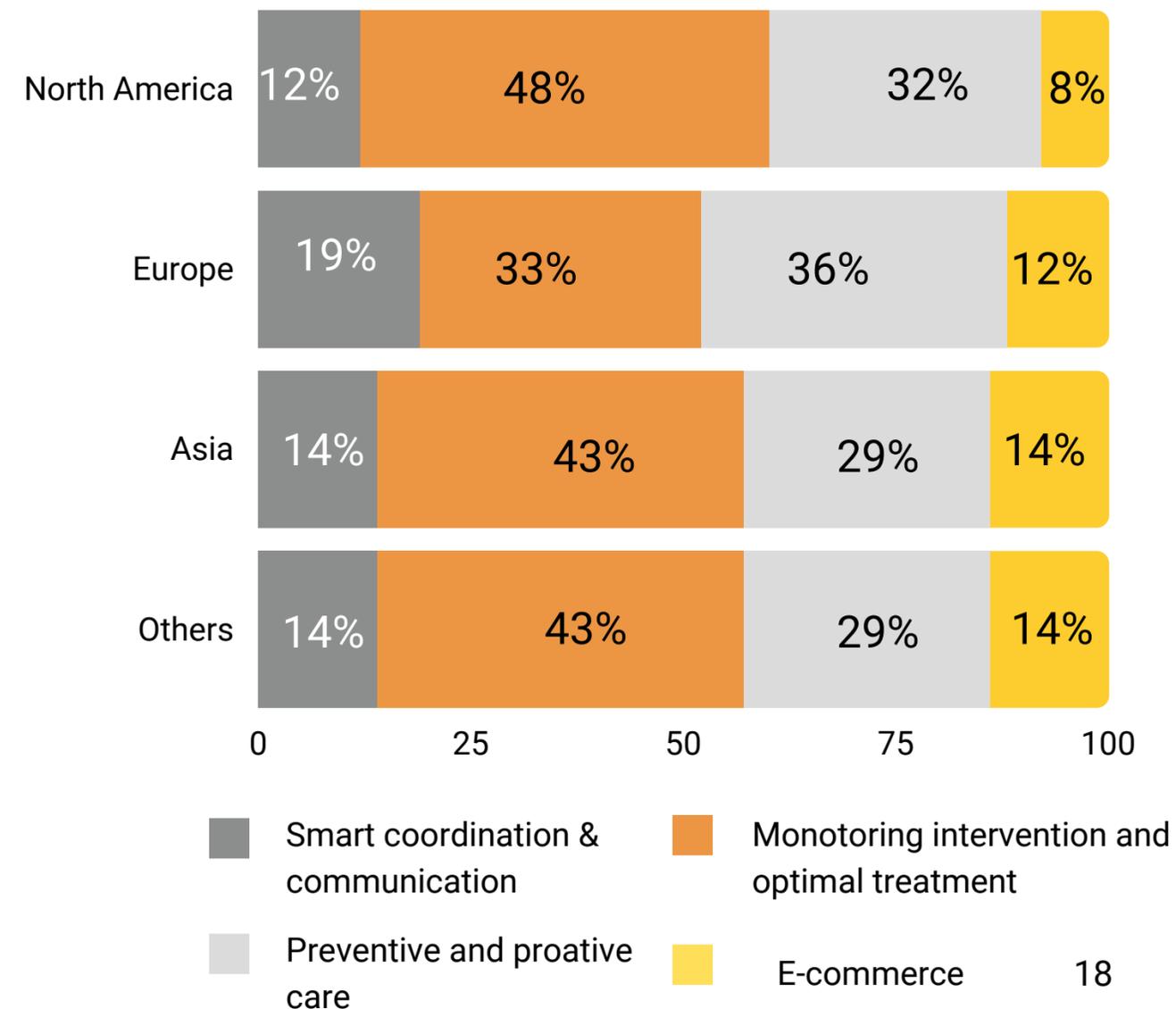
Answers to Q2

100% = 81



Answers to Q2 by Region

100% = 81



Q5. Please explain the reason that you think the area of selected in Q4 needs further progression of digitization in your area of treatment/country.

Smart coordination and communication

Telehealth will provide massive optimization of the clinical trial administration process (but cannot fully replace all in-person healthcare consultation). It will also reduce risks of infection and/or adverse events especially in the oncological or immunocompromised patient landscapes. (Clinical Research Coordinator in Hematology/Oncology, USA).



A lot of the problems that the Swedish health care system faces stem from the lack of coordination and communication between its employees. **Coordination and communication between health care professionals** who work in the same country is paramount for optimization of health care services and patient security. (Resident doctor in Gastroenterology and Hepatology, Sweden).

Telemedicine has shown that the evaluation of the patient could be diagnosed and treated at a distance, **this part should continue growing for better approaches to patients in remote locations.** (Infectious diseases, Costa Rica).

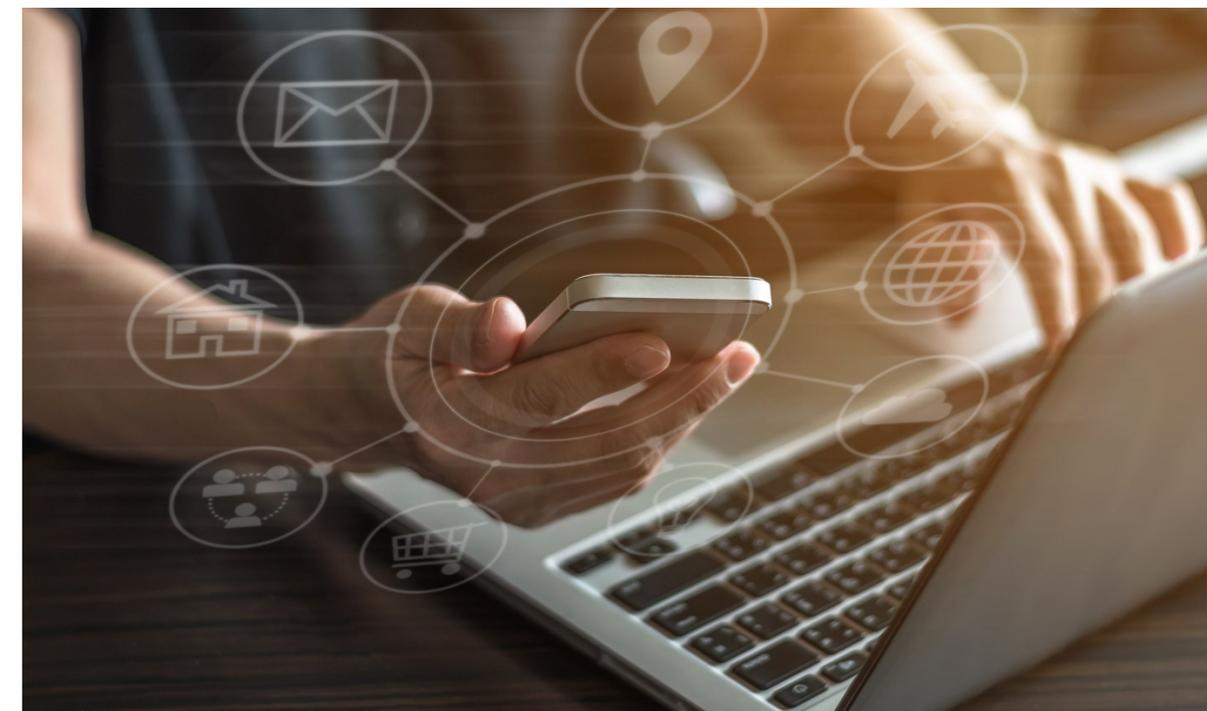
Monitoring, intervention and optimal treatment

The amount of information that can be saved or recorded and viewed would be enormous. A digitized system with a bigger memory allowing tight control and more precise monitoring is becoming easier for the patient, would save time visiting a doctor, would send important information to the doctor that the patient might forget, not understand or misinterpret. This would be **time saving, more precise, more frequent, and most importantly more objective in the evaluation and treatment of the patient.** (Nephrology, Cardiology, USA).



Most the fatal case of death are caused unawareness and no treatment prior to see it's one problem, **so predispose according to monitoring becomes more important, and smart interventional operative with it is important.** (Medical device R&D, China).

Q5. Please explain the reason that you think the area of selected in Q4 needs further progression of digitization in your area of treatment/country.



Preventive and proactive care

Urgent care and/or necessary follow ups seems to predominate telemedicine, whereas **preventative medicine is further marginalized due to the massive backlog of missed appointments and acute developments during the COVID-19 pandemic.** (MD, USA)

Proactive approach in chronic disease patients-e.g. **diabetes mellitus, heart failure, arterial hypertension, osteoarthritis.** In Covid era availability of specialist appointment is dramatically reduced and this cause delay in healthcare and complications (Orthopedic and trauma surgeon, Lithuania)

Most of people search on popular apps such as google to search and even to self medicate themselves. We have **a tremendous lack of apps with scientific background information for people or patients to educate themselves in order to prevent diseases.** (Dermatologist, USA)

E-Commerce

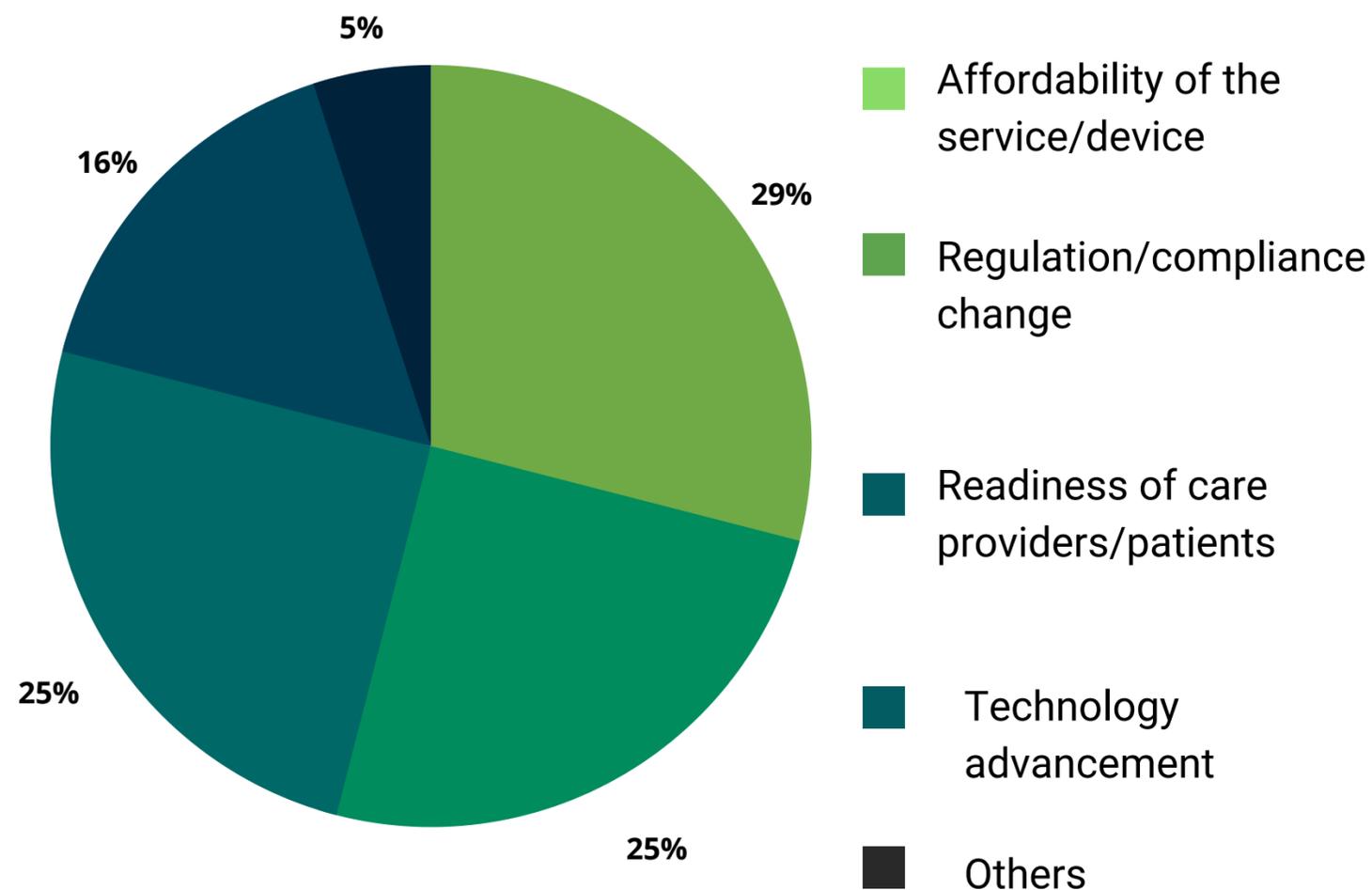
The soft and hard infrastructures for coordination and communication either existed before the pandemic or were developed rather quickly. Preventive care as well as Monitoring and intervention were adopted by many and became more sophisticated. **The e-commerce, on the other hand, was and still is a real problem. Pharmacies can handle healthcare e-commerce but the individual research center must also be able send individualized medications (or treatments).**(Mental health, USA)

During the pandemic I think the smart coordination and communication improve a lot. And there are now some apps that helps with the prevention and with the monitoring, intervention and optical treatment. But, **there isn't progressions on the digitization on the area of healthcare e-commerce.** There is not an app that helps the patient to get them in a easier way. Now patients are able to get delivery from some pharmacies but I think it is not so popular yet. (MD, Spain)

Q6. For the progression of digitalization beyond 2021, which is the most crucial factor that affects the speed of adoption?

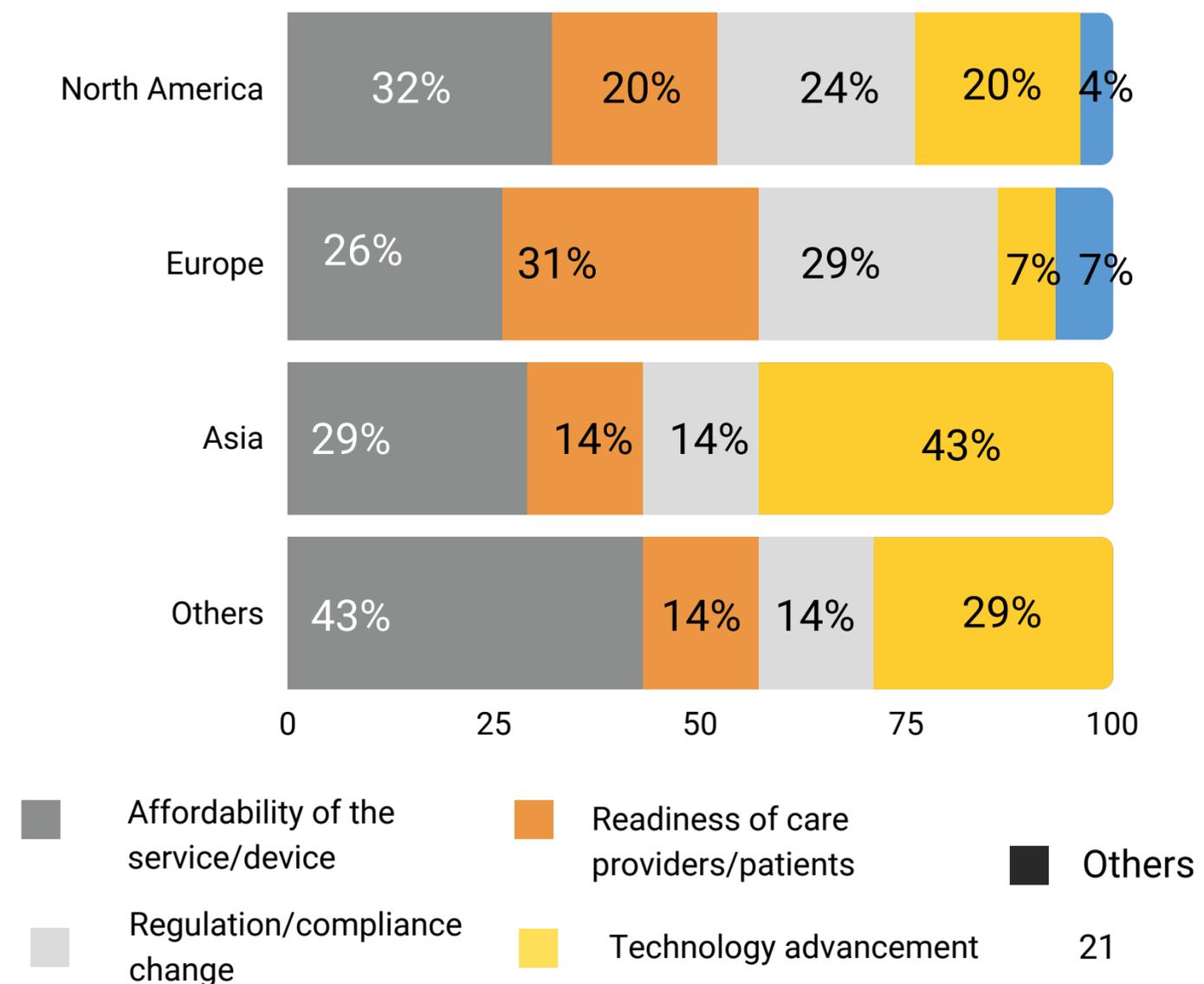
Answers to Q2

100% = 81



Answers to Q2 by Region

100% = 81



Q7. Please elaborate the changes that needed for adoption based on what you selected in Q6.

Affordability of the service/device

Needs to be inexpensive so can be affordable for patients and healthcare systems insurance companies to **automatically and easily authorize so can also implement in nursing homes or adult family homes** (MD, USA)

Some technological devices are very expensive, a way must be found to guarantee access to these treatments for ordinary citizens. For **example a state subsidy or health insurance coverage**. (MD, France)



It is hard to digitalize the health care in rural areas because the people living in those areas can't afford expensive digital devices. In our country there are lot of poor people in rural areas. **Digitalization is good for urban areas in our country**. (MD, Sri Lanka).

Regulation/compliance change

HIPAA protections and validation of efficient informed consent and/or information dissemination procedures is key to widespread adoption of telehealth in clinical trials. (Clinical Research Coordinator, USA).

It is a steady rise in commercial apps so-called medical with nothing in common with medical diagnostics. **Only a bunch of wellness / mindfulness / anti-stress mobile apps connected to private clouds that are storing personal information. In my opinion, regulations in this area are too vague**. (MD, UK).



The MDR regulations in EU and the fact that it is notoriously **difficult to medically approve AI, due to that you don't know what is going on at the core, is a problem**. (Developing a neuromodulation software solution, Denmark).

Q7. Please elaborate the changes that needed for adoption based on what you selected in Q6.

Readiness of care providers/patients

It has been **difficult train physicians who have been using paper charts for years** altogether to use electronic medical records. This leads to slowing down of the adoption process significantly. (Electronic Medical Records specialist, USA)

This pandemic accelerate the adoption of digital technology. (Practitioner and researcher, UK).

The rapidly aging population in the US would benefit most from telemedicine but faces the greatest difficulty in accessing the technology. (MD, USA).



The readiness of the health care professionals for such technology is considered a problem. **Lack of knowledge, the clinical and technical burden leads to burnout and biases by reporting, data entry, classification, and others.** (Researcher, Germany).

Patient believe **the care providers but the care providers are reluctant to adopt new technologies.** Communication with the care providers and patients regarding the ease of use, associated benefits has to be communicated. (Researcher in corneal wound healing, India).

Technology advancement

Digital monitoring systems must be accurate, safe and effective. it must also be user friendly to reduce/eliminate errors due to its implementation. (Medical device engineer, USA).



First we should see which are the simplest tech solutions to objective measurements obtained in the medical office. For example, auscultation, temperature, blood pressure, etc. This can reduce the time in the medical office and make both patients and providers more comfortable with adoption. **As these technologies are adopted there will be more credibility in advancing tech** to measurements such as blood testing and palpation of the body areas with robotic pressure sensors, etc.

Those companies that succeed in the simple monitoring devices can grow their financial strength to add devices in the complex space of devices. (MD specializing in physical medicine/pain medicine, USA) .

Nowadays there are plenty of smartwatches that can monitor blood saturation, HR, Lead 1 ECG, BP. With the collection of these data and their continuous analysis using state-of-the-art AI platforms, the prognosis of cardiac patients would drastically improve. (MD, Greece)

Diabetes and other chronic disease

Diabetes Mellitus or Hypertension could be predicted with the right AI analysis. These diseases like many others have risk factors like "history in the family of these diseases", weight, adipose tissue, blood pressure, blood sugar, or even signs that can be seen. (MD, USA)

Cardiovascular

Cancer

Risk factors for cancers and have recommended tests for particular risk factors automatically scheduled or at least offered. (MD, USA)

Other diseases mentioned include; autoimmune diseases, arthritis, infectious disease, sleep apnea and others

Thank you!

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