

Corsano CardioWatch

Impact framework and preliminary results

March 11th, 2024

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Executive summary

Context and objective

This study's **objective** is to assess the societal impact of the Corsano CardioWatch, which provides a non-invasive way of ambulatory blood pressure monitoring (ABPM), replacing more traditional, less precise, and uncomfortable monitoring systems. We expect the watch to provide:

- Better patient's comfort for the monitoring
- Better treatment (titration) reducing secondary effects
- Reduced risk of strokes
- Reduced costs to insurance and states by reducing risks (target market of Corsano in a first step)

The Corsano CardioWatch is used in two different settings:

- **ABPM monitoring** of patients (assuming that a CardioWatch is used to monitor 1,5 patients per week).
- **Individual diagnosed hypertension patients** for long-term monitoring.

Assessment scenarios:

Based on these types of customers, the assessment has been done considering two scenarios:

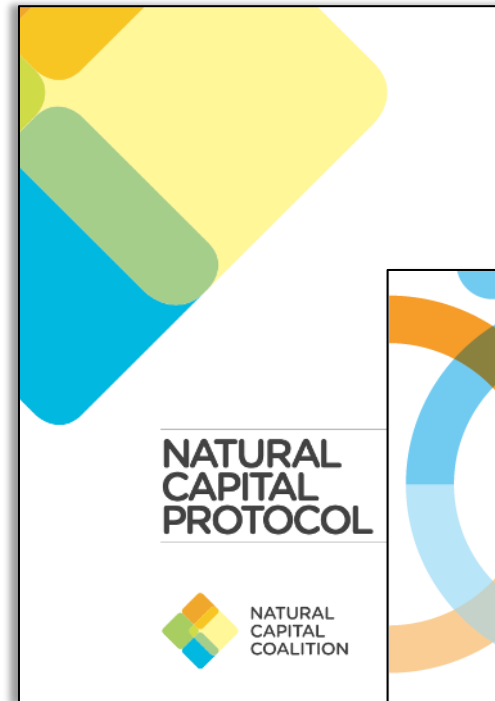
- The **ABPM scenario** focuses on the impact of using one medical bracelet at a hospital instead of the ABPM system, in the **United States and Europe**.
- **Individual use:** This scenario assesses the impact of the watch per each type of patient over one year at home in the **United States and Europe**. Results are in separate report.

Impact valuation - Reference frameworks

The method used to assess the societal impact of the investment is based on a range of frameworks including:

- The Social and Human Capital Protocol (2019, Capitals Coalition),
- The Natural Capital Protocol (2016, Capitals Coalition), and
- A Guide to Social Return On Investment (2012, The SROI Network).

The method used is also informed by (and compatible with) other impact frameworks such as the GIIN COMPASS, and the Impact Management Project.



Corsano CardioWatch benefits – ABPM Monitoring

One year activity covering approx. 80 individual patients uses.



**Economic benefit
(patient +
insurances/
hospitals/state)**

USD/year 27,400 – 36,500 potential economic value created, 18-23% for the patients, the rest for the hospitals/insurances/states (depending on specific cost structure)¹

Potential ROI

1: 200– 280 (depending on specific cost structure) **for the 2 years lifetime of the watch**

**Value drivers
(patients and
cost types)**

The **avoided income loss and hospitalization costs linked to strokes (economic benefit)**
Well-being from life expectancy gained and quality of life (societal Benefit)

**Patients health
benefit**

0.59 - 1.00 - QALY (or 215 - 365 days equivalent) generated per watch per year)²

¹ See slides 21-22

² See slide 24

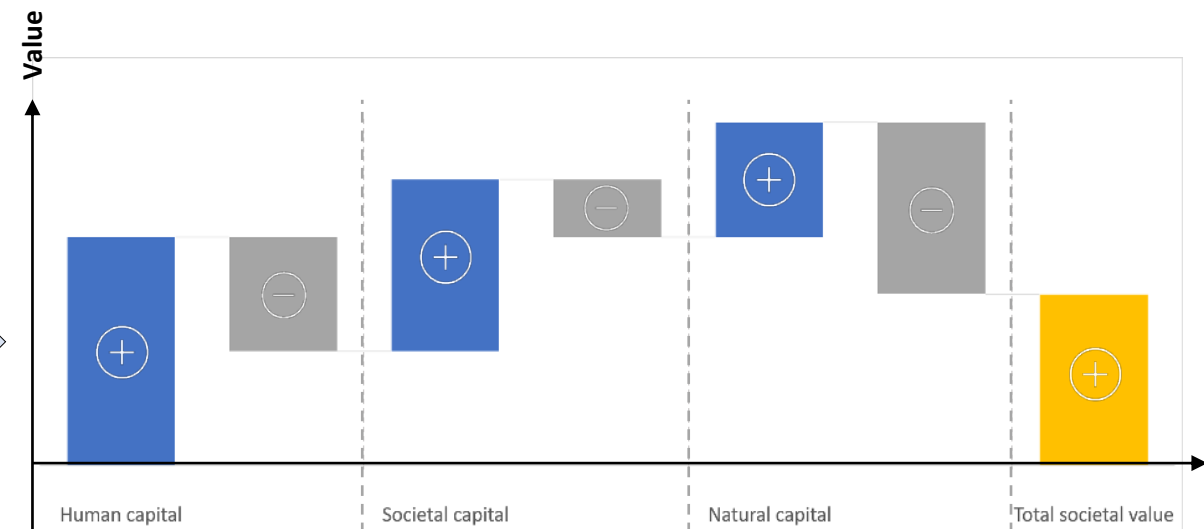
Scope and Methodology

Impact valuation – What is it?

- **Impact valuation** is a standardized approach for measuring organizations' impact on society, considering the value created on **human, natural, and social capital**.
- Organizations' **activities** create negative and positive societal impact across multiple stakeholders and the use of **impact pathways** is used to understand and quantify the changes experienced by people or nature.
- As a **final step of the approach**, **monetization factors** are used to translate impacts into societal value. Societal value can be expressed using the three capitals (natural, social, or human) or as a total value created.

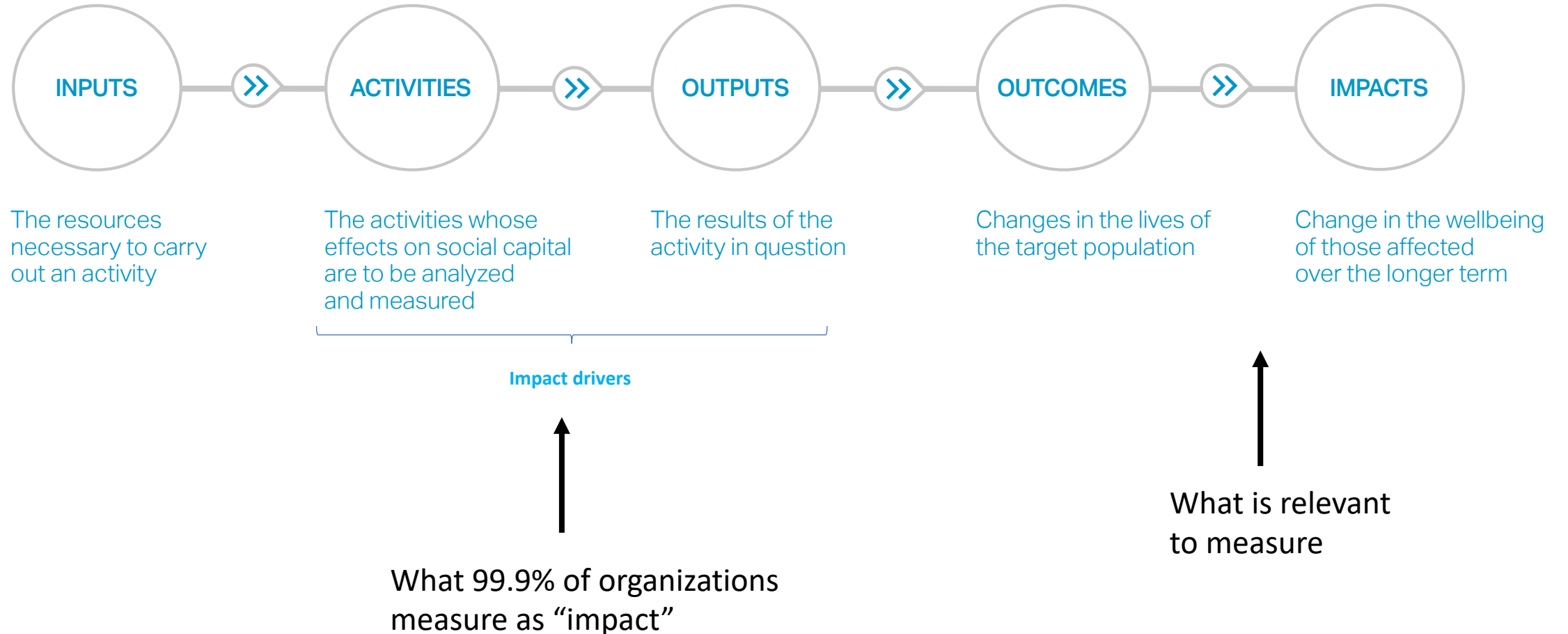


The impact pathway traces a series of events from a starting activity. An impact driver is a measurable quantity unit of an organization activity. The outcomes, are the changes in the lives of the target population, caused by the impact driver (activity or output). The impact is the change experienced by a person or group of people affected over the longer term.

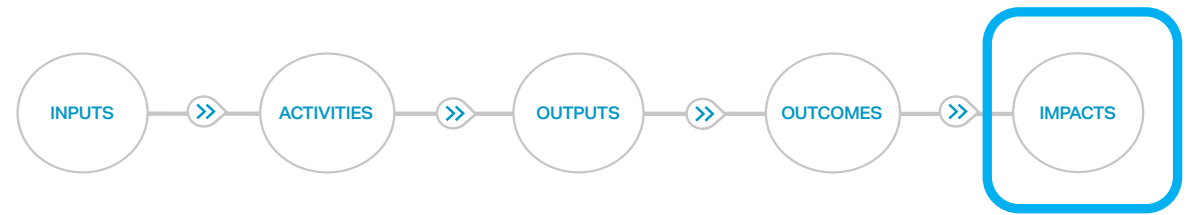


Societal value is expressed using the three capitals or as total impact created.

The impact pathway



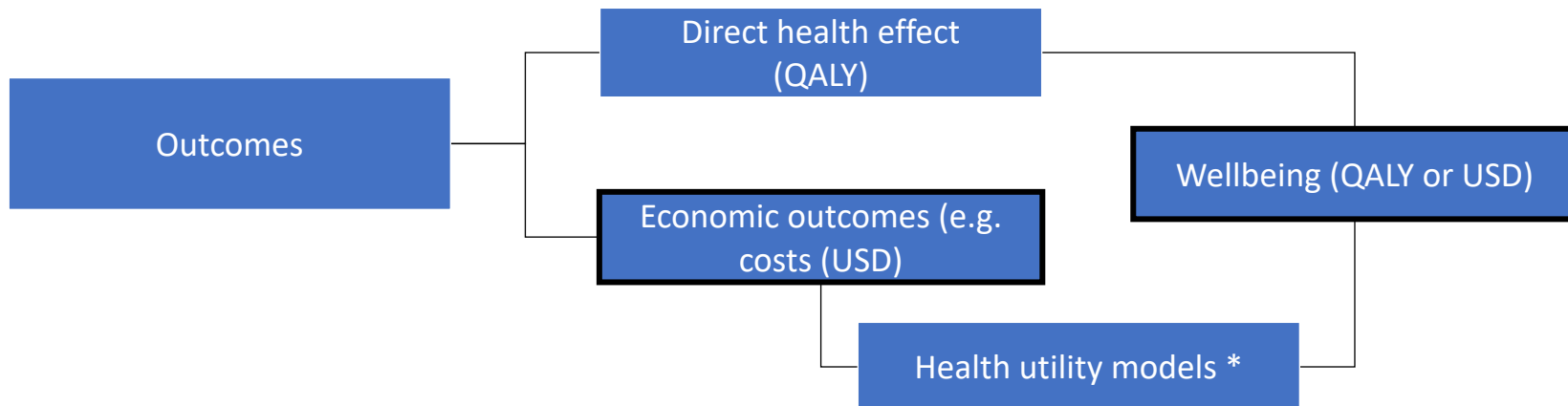
Indicators of Impact



- Direct health effect** Measures change in the health condition of patients, expressed in physical units (e.g., QALY).
- Economic outcomes** Measures change in the financial condition of individuals, population, or specific stakeholders (e.g. insurance, hospital, patients), expressed in monetary units.
- Wellbeing effects** Measures the change of well-being of individuals and populations using the unit of QALY (combining the previous two indicators). It considers direct well-being influences, as well as changes in health resulting from changes in economic outcomes (e.g., increase in income, cost reduction). These latter are assessed using utility models of income. The value of health can be then assessed using the valuation factor (Valuing Impact recommends 54,000 USD/QALY).

These indicators are connected to each other, as represented in the following figure.

Figure. Illustration of the main valuation pathways



(*) The Health utility models used translate the economic outcome into societal value. The two models used assess:

- **Health utility of income (HUI):** The contribution of income to an individual’s well-being in a given location.
- **Health utility of tax (HUT):** The contribution of taxes to a population’s well-being in a given location.

Scenario definition: Additivity

- In the context of this assessment, we are measuring the value that the Cardio Watch provides in addition to the existing monitoring options. The baseline in this assessment is the alternative traditional monitoring at-home system. We assess only the **additional impact** of the watch compared to the baseline.
- To measure this value created by the watch, we include an “**additivity factor**” which is a terminology used to designate the change from a baseline. This factor will influence the results as the higher the percentage, the more efficiently the bracelet delivers added value.

Beneficiaries

The expected stakeholders benefiting from Corsano Watch include:

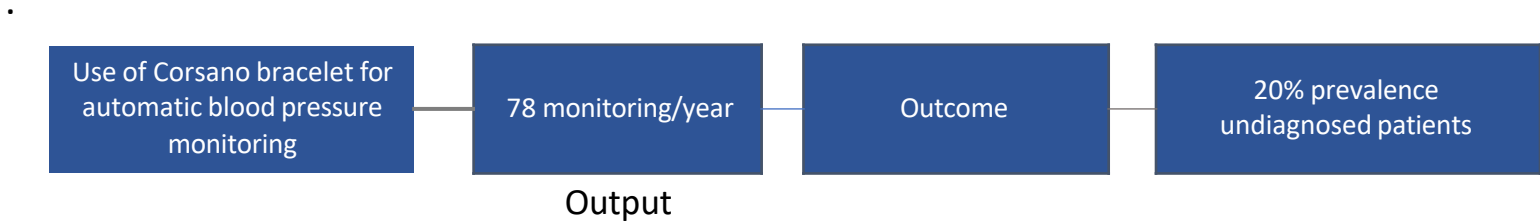
- **Patients**, who mainly benefit from:
 - Less invasive and more comfortable monitoring system, improving their quality of life.
 - More accurate monitoring system, leading to better treatments, improving patients' quality of life, and reducing their health expenses and productivity losses.
- **Insurance/state**, which mainly benefits from:
 - More accurate monitoring system, leads to better treatments and so, reduces long-term health care costs.
- **Hospitals** (ABPM monitoring scenario)
 - Time saving thanks to a reduction of diagnostic labour requirements (nurses costs).
- **Society** in general:
 - Environmental negative impact from the manufacturing of devices.

ABPM Scenario: Type of patients

Based on Corsano’s input, a watch allows monitoring one or two patients per week (as the monitoring can last 2-3 days approx.) at the hospital. Being conservative, this means that a watch allows monitoring **78 patients per year** [Based on: 52 weeks/year x 1-2 monitorings per week (1,5 monitoring per week on average)]

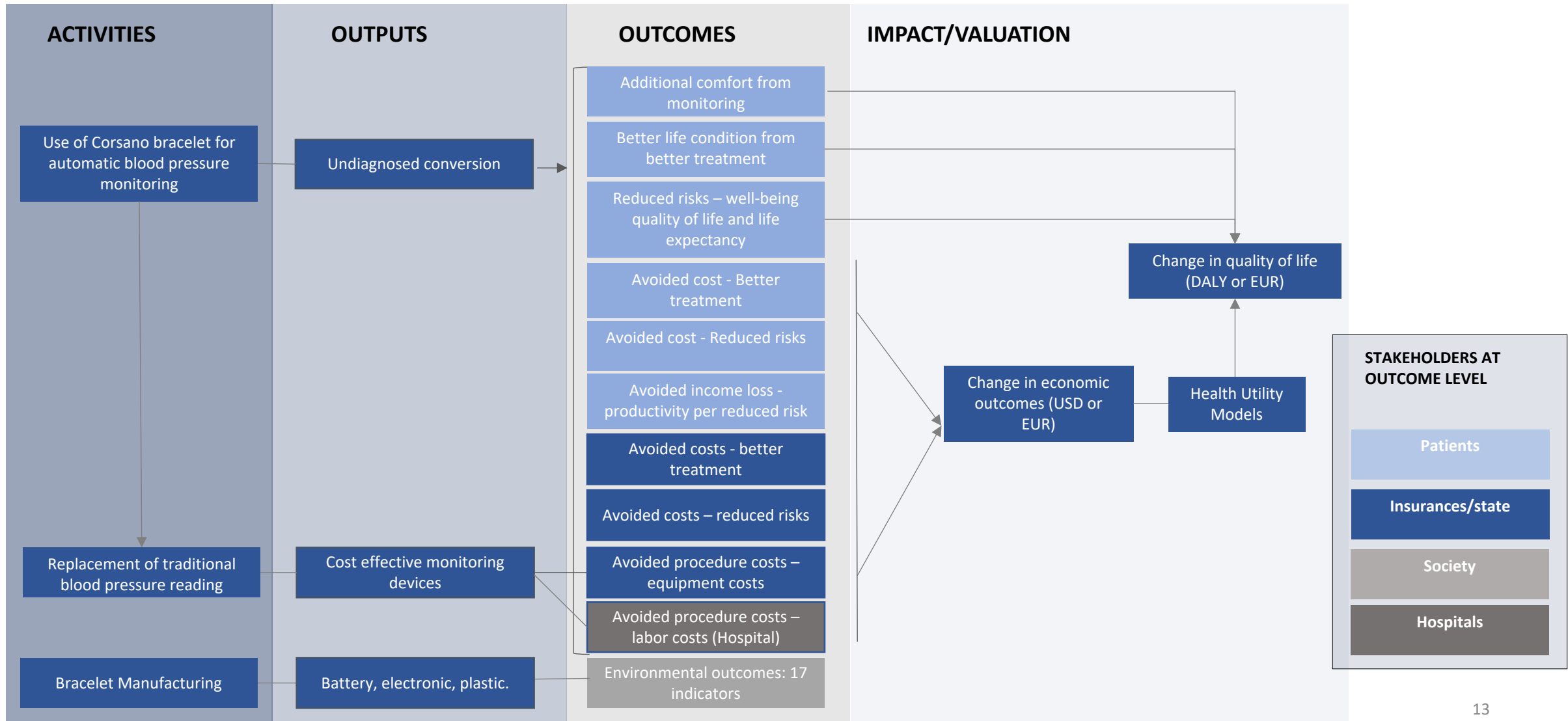
The next question is who is addressed by those monitorings: The scenario assumes that cardio watch monitoring has the potential to monitor 78 patients. Among these, there is a percentage of potential patients who will benefit the most from the monitoring — those who are undiagnosed. The % prevalence of undiagnosed patients in each country is consider as the proportion of patients that can be potentially monitored at hospitals with the cardio watch.

e.g. US scenario



Impact framework

This **impact map or impact framework** describes the expected outcomes for each stakeholder that results from assessed activities, for the two scenarios assessed.



Outcome definition - Patients



Additional comfort from monitoring: this outcome measures the direct well-being the patient will experience due to running a test with a comfortable device. We assume that a CardioWatch versus ABPM monitoring is responsible for increasing the quality of life by 1% (assumption).

Better life condition from better treatment: this outcome measures the direct health benefits the patient gains due to an adjustment or a better treatment thanks to the monitoring. We assumed a relatively low additivity of this outcome, given that the monitoring system is not the only driver for this outcome to happen. We considered a [study](#) showing a loss of approx. 15.6 days per year of productivity due to the condition, with an average quality of life loss during that period of 10% (assumption).

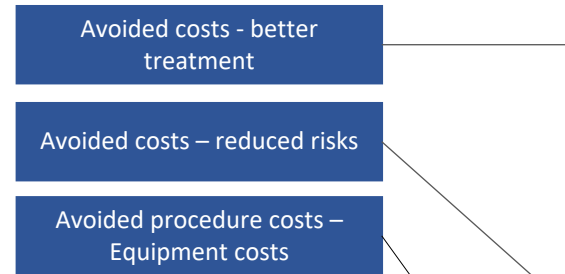
Reduced risks - well-being quality of life and life expectancy (stroke, ischemic heart disease, heart failure) from better diagnostic: this outcome measures the well-being increase by reducing risks of complications due to high blood pressure. We use statistics at the country/region level from the Global Burden of Disease 2019, providing us with an average DALY/capita linked to those complications.

Avoided cost from better treatment: this outcome measures the potential change in cost for patients (personal finances) thanks to better treatment. We assume that this change is beneficial (reduced cost) for patients already under treatment, but detrimental for those who begin medication and control (increased cost). The estimate is based on secondary data regarding the additional cost per individual due to hypertension-associated productivity loss or medical expenses and the proportion paid by patients 11.7% of the healthcare costs per HBP patient

Avoided cost from reduced risks: this outcome measures the cost saving per patient due to avoiding the risks of heart failure, and stroke, associated with hypertension. The estimate is based on secondary data regarding the additional cost per individual a year due to a stroke and considering the fraction of the expenditures paid by patients (11.7% - assumption).

Avoided income loss from reduced risks: this outcome measures the avoided income loss due to the time out of work due to a stroke. The estimation considers 59 working days lost based on the [American Journal of Managed Care \(2019\)](#) and the estimation of income is based on the US and the EU GDP per capita.

Outcome definition – Insurance/state system



Avoided costs - better treatment: this outcome measures the change in the cost of insurance companies/state due to adjusted treatments in patients. The estimation is based on the annual healthcare cost per hypertension patient in the United States and Europe considering the fraction paid by insurance (88% estimation based on Center for Disease and Control Prevention 2019).

Avoided costs - reduced risks: this outcome measures the change in the cost of insurance companies/state due to the avoided risks of stroke due to earlier diagnostics. The estimation is based on the annual cost per stroke in the United States and Europe.

Avoided procedure costs - equipment cost: this outcome measures the cost change due to the difference costs between an alternative monitoring system and the Corsano bracelet watch. The estimation is based on the primary information provided and it is expressed in cost per watch. This cost doesn't include additional costs like monitoring the data processing.

Outcome definition – Hospitals (only for Hospital monitoring scenario)

Avoided procedure costs –
Labor



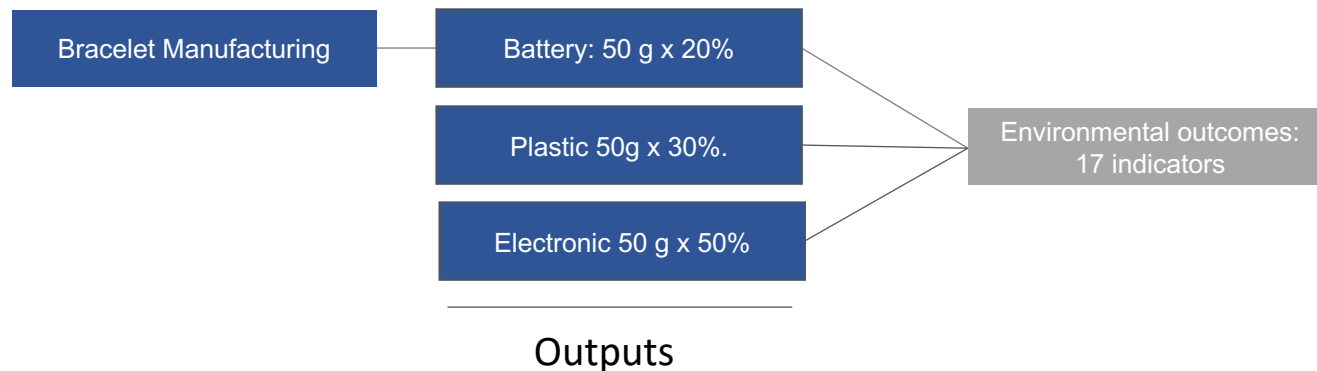
Avoided procedure costs – Labor: this outcome takes into account the time and cost savings in hospitals and health professionals from reducing the number of patients and emergencies due to avoided risks and improved treatments in hospitals. The estimation considers data on the average remuneration of the hospital nurses based on OCDE stats.

Outcome definition – Natural capital

We used Life Cycle Assessment (ISO 14040-44), considering Valuing Impact valuation factors (cost to society, built from public sources), to develop a screening assessment of the environmental impact of the production of the watch.

We considered that each watch is 50 g and that it is composed of:

- Electronic (50%)
- Plastic (30%)
- Batteries (20%)



- Climate change
- Water depletion
- Marine ecotoxicity
- Freshwater ecotoxicity
- Marine eutrophication
- Freshwater eutrophication
- Ionizing radiation
- Particulate matter form.
- Photochem. oxidant form.
- Ozone depletion
- Human toxicity
- Land use
- Terrestrial ecotoxicity
- Terrestrial acidification
- Metal depletion
- Fossil depletion
- Marine plastics

We considered the impact methodology of ReCiPe across 17 impact indicators, including climate change, water depletion and pollution, land use, air pollution, and resources depletion.

Data and assumptions: Comparison of US and Europe

This table shows the main data and assumptions used in the assessment, indicating the relevance of the results:

Data/assumption	Type of data and source	United states	Europe	Relevance in the results
Prevalence of hypertension patients (%)	Secondary data. Source: Global report on hypertension 2023	20% undiagnosed, 48% treated and controlled, 22% treated not controlled, 10% diagnosed not treated.	34% undiagnosed, 27% treated not controlled, 26% treated and controlled, 13% diagnosed not treated	High (in hospital monitoring scenario)
Health Utility of Income	Secondary data. Source: Valuing impact	0.07 USD/USD	0.11 USD/USD	Medium
Health Utility of taxes	Secondary data. Source: Valuing Impact	1.07 USD/USD	1.16 USD/USD	Medium
Reducing risks of stroke, heart failure, ischemic (DALY/Capita)	Secondary data. Source: IHME GBD 2019 Risk factors database	59% disability weight	59% disability weight	Medium
Incidence of a stroke hypertensive patients	Secondary data. Source: European Journal of medical research	18% for undiagnosed	18% for undiagnosed	High
Comfort increase (DALY/monitoring)	Assumption	1%*1 day/365=2.74E-5 DALY /monitoring. We assume the same for both regions		Low
Productivity loss due to hypertension care and per stroke (number of days per year)	Estimated based on secondary data. Source: Productivity Loss Associated with Hypertension in the United States	<ul style="list-style-type: none"> 1.3 days/year due to hypertension in Treated and controlled patients 15.6 days for stroke 		Medium
Fraction of health care cost paid by patients and insurance (%)	Estimation based on secondary data. Source: Centers for Disease Control and Prevention	<ul style="list-style-type: none"> 12% paid by patients 88% paid by insurance/state 		High
Hospital Labor costs (USD)	Estimated based on secondary data of Annual remuneration of hospital nurses. Source: OCDE stats). Only for hospital monitoring scenario.	81,630 USD	143,519 USD (includes Norway, Denmark and Sweden which have higher costs)	High
Treatment cost of stroke per patient (USD)	Estimation based on secondary data. Source: Journal of Medicine and Life 2021	59,900 USD	47,333 USD	High
Equipment costs (USD)	Primary data	The cardio watch cost USD 420, ABPM USD 1,200 and Traditional BP cost USD 63. We assume the same costs for both regions.		Low
Healthcare cost per HBP patient (USD)	Estimated based on secondary data of (i) Annual healthcare cost of hypertension by patient and (ii) number of hypertensive patients treated in US/Europe Sources: <ul style="list-style-type: none"> For US: Center for Disease and Control Prevention 2019 and For Europe: Oxford Population Health 2021 and # hypertensive patients treated in EU 	2,203 USD	1,695 USD	Medium

Assumptions: Additivity factors

Additivity factors reflect the additional benefit of monitoring with Corsano watch, compared to current other monitoring system:

	Better treatment	Reduced risks
Type of patients	Additivity from better treatment (titration): refers to additional improvement on the life condition of patients due to a better treatment triggered by a better diagnostic	Additivity of the watch for reducing risks: reflects the additional reduction on risk of stroke and other, per type of patient due to an early diagnosis
Undiagnosed conversion	<ul style="list-style-type: none">• 20% better life condition from better treatment (titration).• For the Hospital monitoring scenario, we assume #3 diagnostics are needed to achieve a better treatment.	<ul style="list-style-type: none">• 15% of the watch for reducing risks

Results: ABPM Monitoring Scenario

Impact on insurance/state and hospitals (financial value) - ABPM monitoring scenario

	Sum of Economic/ Financial value (USD)
Europe	29,528
Hospital	2,163
Avoided procedure costs - Labour	2,163
Insurance companies/state	27,365
Avoided costs - Better treatment	-2,646
Avoided costs - Reduced risks	29,927
Avoided procedure costs - Equipment cost	84
United States	21,063
Hospital	724
Avoided procedure costs - Labour	724
Insurance companies/state	20,339
Avoided costs - Better treatment	-2,023
Avoided costs - Reduced risks	22,278
Avoided procedure costs - Equipment cost	84

- The insurance/state and hospitals will experience savings overall of USD 29,500 in the EU and USD 21,060 in the US per watch a year.
- The most relevant savings are due to the avoided costs related to stroke treatment. The assumption is that 88% of these costs are assumed by insurance, and this saving could be overestimated.
- The potential ROI for insurance is high considering the avoided cost of stroke treatment in both regions. **The estimated ROI for insurance in the EU is 1:140 a year or USD 280 for the lifetime of the watch in the EU and 1: 100 or USD 200 for the lifetime in the US** (USD 210 equivalent cost/year of the watch).
- Hospitals would save costs due to saving time. Overall, the avoided costs are USD 2,163 in the EU and 724 per watch a year in the US (EU hospital costs includes Denmark, Norway and Sweden which increase the average costs).
- Additional value not accounted for is the ability to serve more patients over time due to the simplicity and minimal labor requirements of the monitoring.

Impact on patients – Economic value – ABPM scenario

Sum of Economic/Financial value (USD)		Undiagnosed conversion
Europe		6,928
Patient		6,928
Additional comfort from running the test		
Avoided cost - Better treatment		-552
Avoided cost - reduced risks		3,965
Avoided income loss – productivity reduced risk		3,515
Better life condition for better treatment		
Reduced risks - wellbeing quality of life (stroke, ischaemic heart disease , heart failure)		
Reduced risks - wellbeing life expectancy (stroke, ischaemic heart disease , heart failure)		
United States		6,335
Patient		6,335
Additional comfort from running the test		0
Avoided cost - Better treatment		-268
Avoided cost - reduced risks		2,952
Avoided income loss – productivity reduced risk		3,651
Better life condition for better treatment		0
Reduced risks - wellbeing quality of life (stroke, ischaemic heart disease , heart failure)		0
Reduced risks - wellbeing life expectancy (stroke, ischaemic heart disease , heart failure)		0

- The table shows the economic value for undiagnosed patients in the US and Europe. Overall, the net benefits vary from USD 6,900 (EU) to USD 6,300 (US) USD/watch a year.
- The main benefits for patients result from the avoided costs of expenses for reducing the risk of a stroke and the avoided income loss due to a decrease in productivity. The economic value from avoided income loss represents 70% of the economic value per undiagnosed patient in both countries.
- The avoided cost of better treatment is negative because these patients will start treatments after early diagnoses, increasing expenses and reducing the positive benefits of reducing the risk of stroke due to an early diagnosis.

Impact on patients – Well-being – ABPM scenario

Sum of Societal value (USD)	
	Undiagnosed conversion
Europe	54,876
Patient	54,876
Additional comfort from running the test	39
Avoided cost - Better treatment	-59
Avoided cost - reduced risks	426
Avoided income loss – productivity reduced risk	378
Better life condition for better treatment	408
Reduced risks - wellbeing quality of life (stroke, ischaemic heart disease , heart failure)	22,742
Reduced risks - wellbeing life expectancy (stroke, ischaemic heart disease , heart failure)	30,942
United States	32,313
Patient	32,313
Additional comfort from running the test	23
Avoided cost - Better treatment	-20
Avoided cost - reduced risks	219
Avoided income loss – productivity reduced risk	271
Better life condition for better treatment	240
Reduced risks - wellbeing quality of life (stroke, ischaemic heart disease , heart failure)	13,378
Reduced risks - wellbeing life expectancy (stroke, ischaemic heart disease , heart failure)	18,201

- The table shows the social value for undiagnosed patients in the US and Europe due to monitoring at the hospital.
- Overall, the **social value created for patients is \$54,900 in the EU and 32,300 in the US per watch a year.**
- The most relevant benefits come from the improvement in quality of life and life expectancy gained from reducing risks of stroke.

Impact on patients – QALY – ABPM scenario

Sum of QALY		Undiagnosed conversion
Europe		1.00E+00
Patient		1.00E+00
	Additional comfort from running the test	7.27E-04
	Better life condition for better treatment	7.56E-03
	Reduced risks - wellbeing quality of life (stroke, ischaemic heart disease , heart failure)	4.21E-01
	Reduced risks - wellbeing life expectancy (stroke, ischaemic heart disease , heart failure)	5.73E-01
United States		5.89E-01
Patient		5.89E-01
	Additional comfort from running the test	4.27E-04
	Better life condition for better treatment	4.44E-03
	Reduced risks - wellbeing quality of life (stroke, ischaemic heart disease , heart failure)	2.48E-01
	Reduced risks - wellbeing life expectancy (stroke, ischaemic heart disease , heart failure)	3.37E-01

- The table shows the change in the health condition of patients, expressed in physical units or QALY value.
- The health benefits are driven by well-being from quality of life and life expectancy gained by reducing the risk of stroke due to an early diagnosis.

Impact on society due to environmental changes

- The **environmental impact** generated by the production of the watch a year is **relatively low: 89 USD per watch per year, or 178 USD per watch (over its lifetime, assumed to be 2 years)**.
- Currently, it excludes any charging station or charger, as well as the use of electricity to power it.
- The natural capital impact is driven by climate change, toxicity impacts, use of non-renewable resources, and particular matter emissions.

(*) Limitation: This estimation excludes the environmental impact of traditional monitoring systems. The net impact is expected to be positive, indicating that Corsano monitoring has a lower environmental impact than traditional ABPM monitoring.

	Sum of Societal value (USD)
Production impact - Battery	-46
Production impact - Electronic	-34
Production impact - Plastic	-9
Grand Total	-89

Summary – ABPM scenario

- **Overall, as a result of the health benefit, patients are expected to have a well-being benefit of 55,000 USD in the EU and 32,300 USD in the US.**
- **Patients are expected to have an economic benefit of 6,300– 6,900 USD per year in the EU and the US respectively.** Economic benefits are mainly driven by: (i) a reduction of productivity loss from sick leaves and (ii) a reduction in healthcare costs from avoided strokes.
- **Insurance/state (including hospitals) are expected to save, on average, 29,500 USD in the EU and 21,060 USD in the US per patient a year.** The most relevant savings are due to the avoided costs related to stroke treatment, representing more than 90% of total savings.
- **The return on investment for insurance/state is 1: 282 in the EU and 1: 200 in the US for the lifetime of a cardio watch (2 years).**
- **For hospitals, the potential reduction of costs due to saving nurses time is about 47 USD per hour which leads to an overall saving of 2,160 USD in the EU and 700 USD in the US.** The differences between countries are explained by the higher costs in the EU driven by countries like Denmark, Norway, and Sweden.
- **Overall, the estimated SROI in the EU is approx. 1: 424 in the EU and 261 in the US per year or 1: 848 (EU) and 1: 522 (US) for 2 years cardio watch lifetime,** which represents the ratio between the total societal value (patients and insurance/state) and cost of the watch.

Limitations

- Additivity factors to explain the impact of cardio watch to reduce risks or improve comfort are based on assumptions and are the same for both scenarios (ABPM and 24-hour long-year monitoring). More accurate data is needed to present the results externally.
- The environmental impact of manufacturing the watch considers only the additional impact and it is not compared with the impact of manufacturing another monitoring. Additionally, the assessment does not account for the extra costs associated with data processing.
- Secondary data related to healthcare costs and the proportion of costs taken by insurance and patients present wide variability across studies and methodologies. Accurate and comparable data to adjust healthcare costs is needed to improve results.

Data improvement recommendations

Some parameters could be adjusted with access to better data, mainly:

- Additivity factor of the benefits from being monitored with a Cardio Watch, instead of existing monitoring systems. We recommend to adjust this % by consulting health professionals.
- Healthcare costs like labor costs for hospitals, the cost of stroke per patient, and the cost per hypertensive patient present wide variability across methodologies and studies. We recommend adjusting these values using comparable data between countries.
- The allocation of healthcare costs across patients and insurance companies. For the US and EU, we have considered that 11.7% is allocated to patients and 88% per insurance/state – based on US data. However, this can vary widely depending on the patient group and across regions.
- Data to assess the environmental impact of conventional monitoring systems can be adjusted.