A Work Project, presented as part of the requirements for the Award of a Master Degree in Finance from the NOVA – School of Business and Economics

PRIVATE EQUITY INVESTMENT COMMITTEE PAPER ON BIOTELEMETRY, INC. – INVESTMENT THESIS AND INDUSTRY OVERVIEW

JOHANNES SUPPANZ – 33877

A Project carried out in the Master in Finance Program, under the supervision of:

Luís Mota Duarte
Fábio Santos

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Abstract

This Work Project was prepared in a team of finance students and represents a simulated Private Equity Investment Committee Paper for a leverage buyout of the telemedicine company BioTelemetry, the US marked leader in the field of remote cardiac monitoring and a provider of glucose monitoring solutions as well as centralized research services for clinical trials. The leverage buyout consists of comprehensive market and company analysis including thorough valuation methods and the optimal financing structure, which led to promising value creation strategies and respective return scenarios. For a successful exit, several options were analyzed, and recommendations made.

Keywords: BioTelemetry, Private Equity, Remote Cardiac Monitoring, Telemedicine

Disclaimer

This Work Project was elaborated by students from the Master in Finance Program from Nova School of Business and Economics. As a group, we hereby certify that the submitted work is wholly our own work.

This Work Project's content is intended to be used for academic purposes only and we do not accept any responsibility or liability for investment, business, legal, or any other decisions taken based on this Work Project.

All data used was retrieved from publicly available sources, such as companies' annual reports, earnings call transcripts, and database websites, as well as from interviews and phone calls conducted with BioTelemetry's former employees and industry experts. All sources and aids used have been indicated as such. All texts either quoted directly or paraphrased have been indicated by in-text citations or their sources have been made available in footnotes.

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209).

Personal Reflection

Personal Reflection – Johannes Suppanz (33877)

1 Which hard/soft skills did you develop through the project?

Hard Skills

- Analytical skills to **face comprehensive issues**, such as markets, companies and business models, in a more structured and efficient manner.
- Financial Modeling of an integrated **Leverage Buyout Excel Model** connecting Balance Sheet, Income and Cash Flow Statement including the respective **forecast**.
- Improvement of ability to **produce compromized content** in a clear manner that is easy to understand for the reader.

Soft Skills

- Professional **communication** and effective **discussion** within a team to solve issues time efficient and to focus on the relevant topics.
- **Improvement of Time Management** to meet given deadlines with a steady level of time consumption per day.
- **How to get information from industry experts**, including the first approach of the expert via mail, LinkedIn or calls, interview preparation as well as the actual interview.

2 What would you change in your individual or team approach if you had to do a similar project?

Individual Approach

- Talk to even more industry experts right from the beginning, which helps to address certain issues I might not consider myself.

Team Approach

- Have **stricter internal deadlines** and discuss the produced content. This is especially true in the beginning of the project to better understand the industry and the company's business model.
- Spend more time besides the project to **foster the relationship between each member**.

3 What skills did the Masters' program gave you so you could be prepared for this kind of project?

General

- Dealing with **extreme workload** without losing the focus on the relevant things.
- By choosing the **corporate finance area of expertise** the focus of my master was on deal related topics which helped me to have more comprehensive view on private equity cases.

Private Equity Course

- **Understanding the private equity industry** especially how it operates, its value-creation strategies, terminology and the key aspects to consider when acquiring.
- How to model an **Leverage Buy Out** in Excel including the practical approach of a valuation using several valuation methods.
- Due to the **course assignment** I knew beforehand what an investment committee paper is and what I can expect during the Wok Project. It also made it possible for me to apply the assignments feedback.

Investment Thesis

Strong market revenue growth as well as highly leverageable internal capabilities make BioTelemetry an attractive target for an LBO

BioTelemetry, Inc. is the leading remote medical technology company focused on the delivery of health information to improve quality of life and reduce cost of care

Operating across three **highly attractive** and **growing markets**, the target company is well-positioned to sustain and grow its **technological leadership**, which is strongly secured through **intellectual property** covering its key devices, algorithms and reporting standards, particularly in its major business unit offering **Remote Cardiac Monitoring services**.

Strong historic financial performance: BioTel can also look at strong historic financial performance with **revenue growing for 29 consecutive quarters**. These robust financials, including its stable Operating Cash Flow and significantly growing Unlevered Free Cash Flow, make the target company highly leverageable.

Key Reasons for the Deal	Remote Cardiac Monitoring	Clinical Trial Services	Glucose Monitoring
Attractive and growing markets	• **Market Growth:** The market for Cardiac Monitoring is expected to grow at a **CAGR of 5.8%** until 2026. • **Market Drivers:** An increasing and aging population, an increasing healthcare spending as well as the shift from volume- to value-based reimbursement.	• **Market Growth:** The market for Clinical Trial Services is expected to grow at a **CAGR of 9.9%** until 2026. • **Market Drivers:** An increasing tendency towards the outsourcing of major parts of research activities by Pharmaceutical, Biotech and other companies.	• **Market Growth:** The market for Glucose Monitoring is expected to grow at a **CAGR of 6.2%** until 2026. • **Market Drivers:** An increasing and aging population, an increasing healthcare spending as well as an increasing prevalence of malnutrition and obesity.
Market leadership in Remote Cardiac Monitoring services **Combined with strong capabilities in all operating business units, this ensures vast potential for value creation**	• **Market Leadership:** BioTelemetry is the leading provider of remote cardiac monitoring devices and services in the most attractive market globally, the US. • **Technological Advantages:** Leadership in this fragmented market is based on the wide-ranging product and service offering as well as on BioTel's technological advantages, particularly with its patent-secured Extended Holter and MCOT. • **Geneva Software Platform:** New cloud-based platform for implantable cardiac device monitoring data completes BioTel's service offering, having an impact on patient care and workflow of physicians, and will further support market leadership.	• **Stable Revenue Stream:** BioTel's Research business is an attractive source of additional revenue in the enormous market for Clinical Trial Services. • **Therapeutic Expertise:** The experience in cardiovascular testing, technological capabilities and operational synergies with the Remote Cardiac Monitoring business provide highly demanded expertise to outsourcing research sponsors. • **Strong Value Proposition:** The recent addition of imaging capabilities to become an integrated cardiac and imaging testing platform will enable BioTel to deliver even greater value to the customers.	• **Diversification**: BioTel's Glucose Monitoring business, is an addition to the current product portfolio and the commitment to innovate connected health services. • **Technological Advantages:** BioTel's device provides clear technological edges to the existing competition with the first FDA-cleared, cellular-enabled glucose meter consolidating patient data in the cloud, making it easily accessible. • **Health Management Leader:** The glucose monitor features the ability to consolidate data from other connected health devices, uniquely positioning the company to move beyond diabetes to the management of chronic diseases.

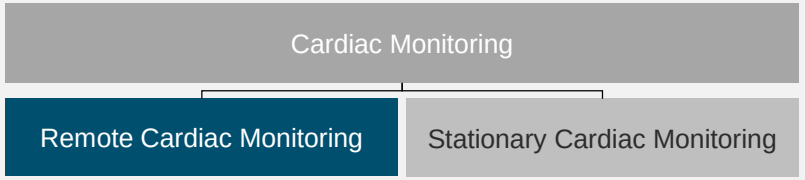
Industry Overview

Market Definition
Remote Cardiac Monitoring
Clinical Trial Services
Glucose Monitoring

BioTelemetry is currently active across the markets for Remote Cardiac Monitoring, Clinical Trial Services and Glucose Monitoring

Remote Cardiac Monitoring

Cardiac Monitoring is the **observation of the medical condition of the heart or specific heart-related parameters** of a patient, either inpatient (stationary) or outpatient (remote), over a specific time period.



This paper focuses on **Remote Cardiac Monitoring**. RCM allows patients with suspected cardiac arrhythmias or at risk of developing arrhythmias to use mobile medical devices, technology, and services to gather patient-generated health data, particularly electrocardiograms, and make it accessible to health professionals.

1

Clinical Trial Services

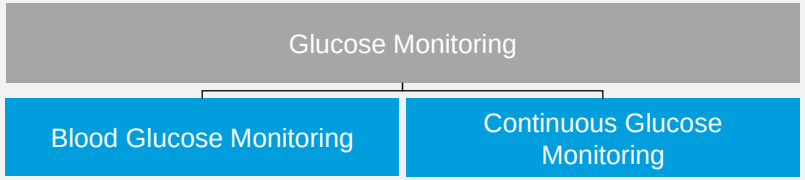
Due to increasing time pressure and costs, **companies in the medical space (e.g. Pharma, Biotech) are increasingly looking to outsource critical and cost-intensive functions**, including Research & Development.

This paper focuses on **research services during Clinical Trial**. Clinical Trial Services refer to all pre-approval research services on drugs or devices that are done in humans and outsourced to Contract Research Organizations. CROs are companies offering these research services on contract.

2

Glucose Monitoring

Glucose Monitoring is the **observation of the concentration of glucose in the blood**, which is typically performed by the patient individually. There are two main procedures, Blood Glucose Monitoring and Continuous Glucose Monitoring.



This paper focuses on **Blood Glucose Monitoring** with an excursion into **Continuous Glucose Monitoring**. BGM allows patients with diabetes or similar chronic diseases to use mobile medical devices, technology, and services to individually perform blood tests and monitor their blood glucose level.

3

Major Industry Trends

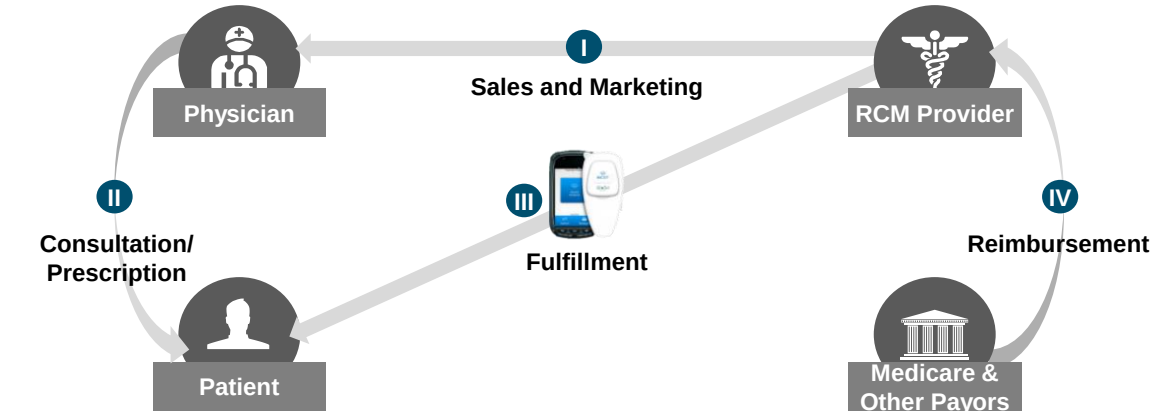
The global health economy is driven by large demographic, economical and technological trends:

- **Increasing and aging population:** Population is increasing and while people aged 65 or above accounted for less than 6.4% in 1993, the same group accounted for more than 8.8% in 2018[1]. This trend is expected to continue over the next 25 years[2].
- **Increasing global healthcare spending:** Along this demographic shift, global healthcare spending is expected to increase by 30% to $10tn from 2017 to 2022. By far the largest amount is spent in North America with an expected $4tn, whereas the largest growth is expected to come from Asia[3].
- **Shift from volume- to value-based reimbursement:** Healthcare systems worldwide will need to innovate and embrace clinical research, new technologies and risk models to potentially shape affordable, high-quality healthcare solutions for the future; this shift to value-based care appears to be most active in the United States[3].
- **Increasing investment in R&D:** Due to the rapidly increasing prevalence of chronic diseases, Pharmaceutical and Biotechnology companies will increase their spending in the R&D domain. In order to reduce costs and to ensure regulatory compliance, much of these growing investments are expected to be outsourced to clinical research providers.

Sources: [1]The World Bank; [2]United Nations; [3]Deloitte Study – Global Healthcare Outlook (2019); Expert Interviews

Remote Cardiac Monitoring provider promote their products to physicians, deliver the service and perform services to the patient and get reimbursed by insurances

Market Dynamics



Overview of Remote Cardiac Monitoring Devices[1]:

Holter 	• This device is typically the first step to continuously monitor the heart rhythm over shorter periods. • Application: **24-48 hours** (Traditional) or **2 weeks** (Extended). • Reimbursement: ~**$50**.
Event 	• In order to monitor and store data, it requires activation by the patient or by an abnormal heart rhythm. Hence, devices do not record continuously. • Application: Up to **30 days**. • Reimbursement: **~$250**.
MCOT 	• MCOT enables continuous transmission of data from the device to monitoring centers or physicians. • Application: Up to **30 days**. • Reimbursement: **~$800**.
ILR	• This is a small implantable device that gets placed under the skin in the upper chest area and continuously records heart rhythms. • Application: Up to **5 years**. • Reimbursement: **Case-to-case basis (carrier-priced)**.

Remote Cardiac Monitoring is the outpatient monitoring of patients who are suspected to suffer from cardiac arrhythmias. Monitoring devices differ in **application period**, **reimbursement rate** as well as **continuity of monitoring**. The market dynamics are described in the following:

I Sales and Marketing

- **Physicians are the primary (only) "distributor" of remote cardiac monitoring devices** to the end user (i.e. the patient, due to the required prescription).
- Sales to physicians are still **largely traditional and dependent on relationships, conferences, fairs and one-to-one sales**.
- Key requirements are that the medical devices and services are reimbursable and easy-to-use.

II Consultation and Prescription

- Patients consult their physician in **case of any symptomatic irregularities**, such as faint, heart flutter or for their regular health check.
- If the physician suspects heart-related issues, one of the devices presented will be prescribed to monitor the heart rhythm of the patient over time.

III Fulfillment

- After the doctor's prescription, the Remote Cardiac Monitoring provider **sends the product directly to the patient**. For the accurate installation of Traditional Holter devices, a physician might be required.

IV Reimbursement

- After fulfillment, public or private insurances perform payment based on **reimbursement rates for the specific product or service** that are set by the public Center for Medicare and Medicaid Services.

Other market players include[2]:

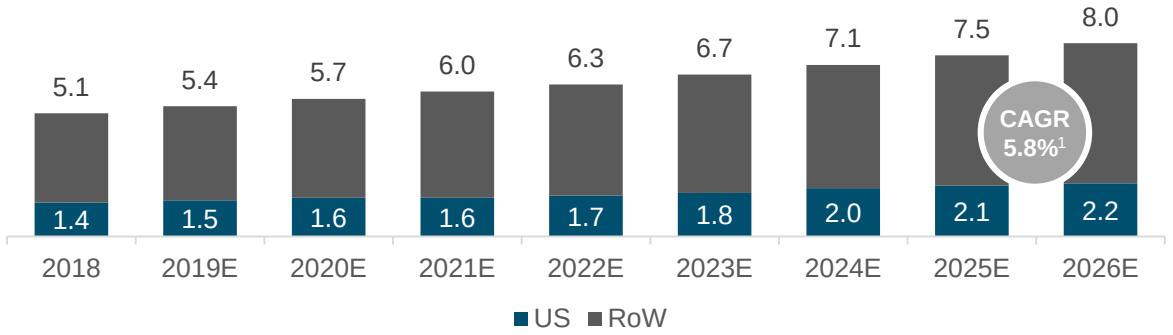
- **Suppliers** provide necessary components to manufacturers. The number of suppliers is limited and the process to qualify as a supplier is lengthy, which increases the supplier power.
- **Manufacturers** are subject to extensive FDA regulation. These entities are usually subject to high R&D expenses. Manufacturers are usually the same entity as RCM providers.
- **Regulatory bodies**, such as the FDA govern the manufacturing, labeling, promotion, distribution, advertising, and sale of medical devices.

Notes: [1]See Appendix 1-6; [2]See Appendix 7. Sources: BioTelemetry, Expert Interviews

Remote Cardiac Monitoring realized continuous growth in the past and is expected to reach an attractive value of $8bn by 2026, of which the US will account for 27%

BioTelemetry inc

Remote Cardiac Monitoring Market 2018-2026, In $bn



Cardiovascular diseases are one of the leading causes of mortality worldwide. In the US alone, more than 17.3mn annual deaths have been attributed to heart-related diseases, such as cardiomyopathy. Remote Cardiac Monitoring is focused on the diagnosis and monitoring of cardiac arrhythmias or heart rhythm disorders in view of the prevention and treatment of such diseases.

Market Growth

- Driven by the increase in the prevalence of heart diseases and the reliability of Remote Cardiac Monitoring in the detection of life-threatening arrhythmias, **the global market for Remote Cardiac Monitoring is currently valued at above $5bn and is expected to grow at a healthy CAGR of 5.8%** from 2018 to 2026.

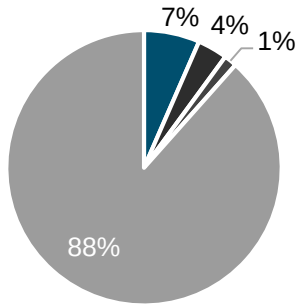
Market Drivers

- The growth can be attributed to major trends, such as an **increasing and aging population** as well as an **increasing healthcare spending**.
- In larger and advanced economies, the **shift from volume- to value-based reimbursement** is expected to further drive the growth of telemedicine solutions, as it will enable more efficient healthcare spending (e.g. through fewer in-person visits).
- In addition, **technological advancements and product innovation** are expected to increase awareness for heart-related diseases (e.g. Apple Heart Study) and to drive the development of more efficient monitoring devices.

Geo. Split

- The **US accounted for $1.4bn (~27% of global revenues) in 2018**, which makes it the largest geographical market for Remote Cardiac Monitoring followed by Europe. While the US is expected to retain its leadership position, the **highest growth is expected to come from the Asia-Pacific region** with strong growth in China in particular.

Competitive Landscape



The Remote Cardiac Monitoring market is highly fragmented with several large and many small companies, which fight for relevant market share in this attractive market. In addition to the high fragmentation, the Remote Cardiac Monitoring Market comprises players with different product and service offerings.

Market Players

- The **largest player offering devices and services is BioTel**. Only few companies can be classified as direct competition with similar propositions (See Appendix 8).
- The second largest player is **iRhythm**. Its revenue, however, is expected to decrease as its provisionary reimbursement codes will be transitioned to lower, permanent ones. As a result, future rates are expected to drop by up to 50%[2]. Other direct competitors include **SHL Telemedicine, BardyDx, Preventice, and CardioDiagnostics**.
- Besides the abovementioned direct competition, the market comprises many other companies, including **large healthcare conglomerates**, such as Abbott Laboratories, Boston Scientific Corporation, and Medtronic, **distributing the Remote Cardiac Monitoring only without the addition of any services**.
- Particularly large healthcare conglomerates pose strong competition due to their economies of scale, advanced distribution channel and lower entry barriers into related products and services.

M&A

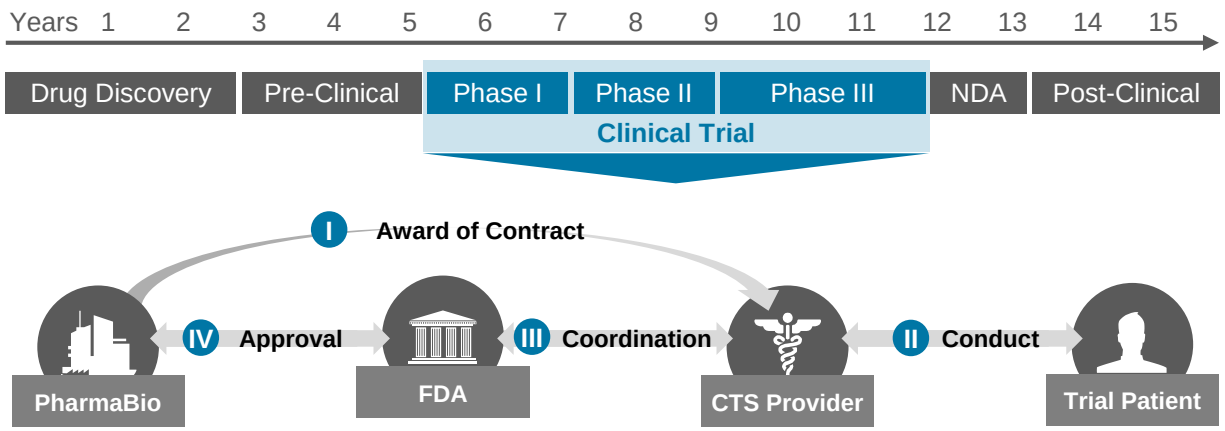
- **M&A activities are highly attractive**, **as they offer companies an opportunity to enter new markets fast without dealing with regulatory issues**, such as BioTel's acquisition of Geneva (2019), a cloud-based software firm, and LifeWatch (2017), a provider of technology for MCOT devices.

Notes: [1]CAGR for the period 2018-2026. Sources: [2]Kerrisdale Equity Report; Cardiac Arrhythmia Monitoring Devices Market from 2016-2026, WHO; BioTelemetry; Statista; Expert Interviews

If awarded with the research, Contract Research Organizations take over the conduct of clinical trials as well as the coordination with the regulatory bodies

BioTelemetry inc

Market Dynamics



Most Required Therapeutic Expertise in Clinical Trials:

Oncology	• Oncology deals with the prevention, diagnosis, and treatment of cancer. • Due to its importance and the vast revenue potential of cancer treatment drugs, **oncological products are at the top of the list in R&D**.
Cardio	• Cardiology deals with disorders of the heart and parts of the circulatory system. • Due to the **rise of cardiovascular diseases as well as the importance of the heart and circulatory system**, cardiological expertise is essential for clinical trials.
Neuro	• Neurology deals with disorders of the brain and nervous system. • Due to the rise of neurology to become the **third largest discipline for patient care**, many CROs offer extensive expertise or specialize in neurological methodologies.
Genetics	• Genetics with the study of genes, genetic variation, and heredity in organisms. • Due to the **increasing number of clinical trials in gene therapy**, partly driven by technological advancements, expertise in this therapeutic area is vital.

I Award of Contract

- After the initial phases of drug discovery and pre-clinical research are concluded, outsourcing **Pharma and Biotech companies tender required Clinical Trial Services and award the contract to the winning Contract Research Organization**.
- While the engagement and associated responsibilities between PharmaBio companies and CROs have historically been widely separated, it is expected that the trend towards a more hybrid approach continues, meaning that the **CROs are increasingly involved in the early phases of planning the clinical trial** (See Graph at the bottom).

II Conduct of Clinical Trial

- CROs plan, set-up and conduct the clinical trial; this includes the **recruitment or retention of patients, which is considered to be one of the major challenges** and a common reason for delayed starts of clinical trials.
- Depending on the drug or medical device to be developed, **the CRO applies methodologies from different therapeutic areas**; the most required therapeutic expertise are in oncology, cardiology, neurology and virology (See Overview to the left).

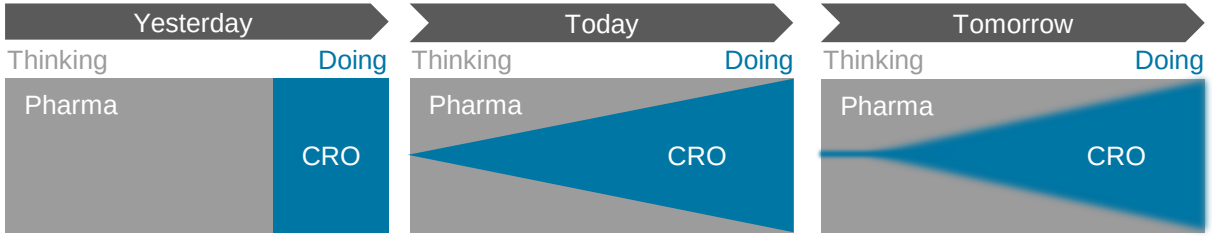
III Coordination with FDA

- Typically, the **CRO coordinates all regulatory issues with the FDA** that are required for the approval of the drug or medical device and that are associated with the contracted research they are conducting for Pharma and Biotech companies.

IV Approval of Drug or Medical Device

- If the research is successful, the **FDA grants approval to mass market the drug or device to the PharmaBio companies**.
- The CRO has no legal claim to the approval as it is only conducting contracted research for another party.

CRO Engagement Models, Now and Then:

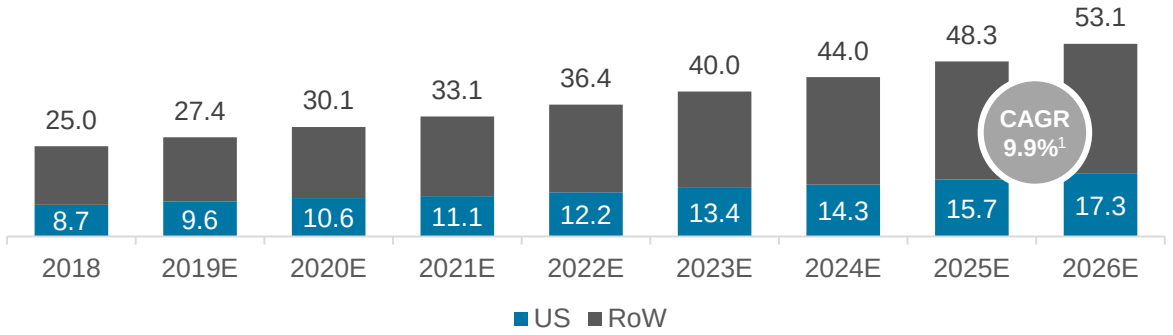


Sources: BioTelemetry, Expert Interviews

The Clinical Trial Services market is expected to reach more than $53bn by 2026, mainly driven by the increasing spending and outsourcing of R&D by Pharmaceutical and Biotech firms

BioTelemetry inc

Clinical Trial Services Market 2018-2026, In $bn



Pharmaceutical and Biotechnology companies, among others, increasingly outsource their research activities to specialized companies, so-called Contract Research Organizations. Clinical Trial Services, next to Pre-Clinical and Post-Clinical Services, account for the vast majority of these outsourcing activities.

Market Growth

- The **global market for Clinical Trial Services is valued at $25bn in 2018 and is expected to grow at an impressive CAGR of 9.9%** during the period from 2018 to 2026.
- This includes all research services conducted by Contract Research Organizations during one or all phases (I-IV) of clinical trials of new drugs and devices.

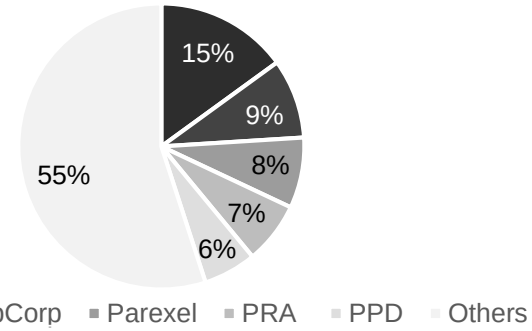
Market Drivers

- Future **revenue growth depends upon factors, such as growth in allocated R&D spending**, which is driven by the growing patient population and the demand for new, innovative and effective drugs and medical devices.
- In addition, Pharma and Biotech industries are increasingly recognizing the difficulties of the stringent approval processes by regulatory bodies (i.e. the FDA) and hence the **importance of scale and therapeutic expertise to accelerate the introduction of drugs and medical devices** in the market in a cost-effective manner, which will further propel the outsourcing of clinical trials to CROs[2].

Geo. Split

- The **US accounted for $8.7bn (~35% of global revenues) in 2018**, which makes it the largest geographical market for Clinical Trial Services followed by Europe.
- While the US is expected to retain its leadership position, the highest growth is expected to come from developing countries.

Competitive Landscape



The market for Clinical Trial Services is highly fragmented and competitive. Particularly due to the large amount of CROs, there is fierce competition for both customers and clinical trial patients. This competitiveness can cause periods of strong price competition to land the contract for specific clinical trials and hence increasing pressure on profitability.

Market Players

- Competing businesses include **traditional CROs, the in-house research and development departments of PharmaBio companies, universities, and teaching hospitals**. Among the traditional CROs, there are several hundred small, limited-service providers, several medium-sized firms and only a few full-service companies with global capabilities.
- The **largest five players, however, account for 45% of the global market**. These players include multinational CROs – IQVIA (formerly Quintiles), LabCorp, Parexel, PRA International and Pharmaceutical Product Development, in that order.

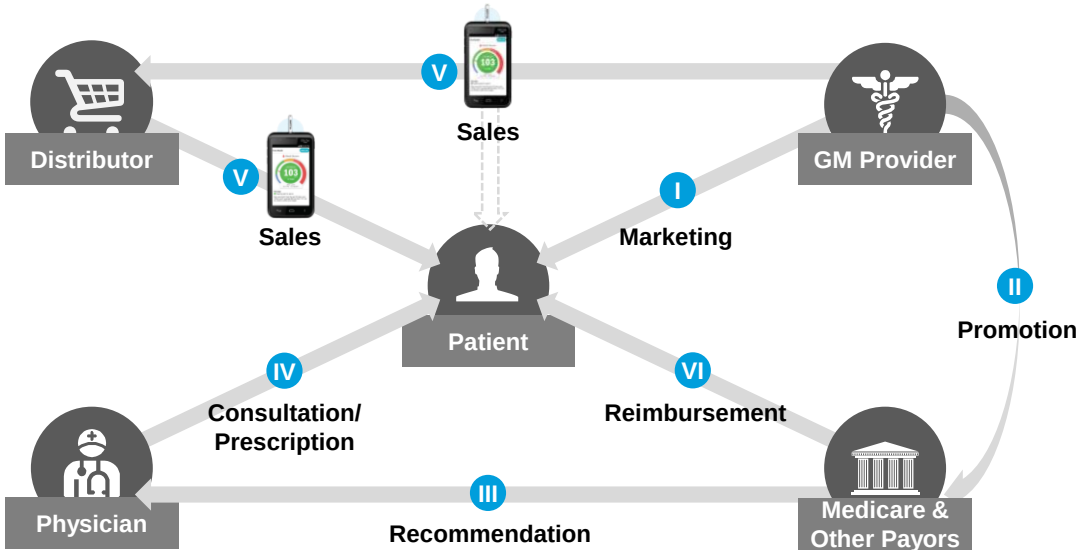
M&A

- Larger players have followed the trend of **M&A to enhance full-service capabilities and international reach**, while mid-sized and smaller CROs are more and more focusing on **niche sectors and a more personalized approach** to their sponsors.
- The largest consolidating transaction in the previous years was the **merger of IMS Health and Quintiles in 2016 to form IQVIA**, now the world's largest CRO, through a deal valued at more than $13bn.
- In addition, the market saw **many smaller deals intending to acquire expertise** in a specific area.

Sources: [1]CAGR for the period 2018-2026; [2]Statista;

The patient decides upon the glucose monitoring device, while one of the main criteria is its reimbursement by the insurance

Market Dynamics



Overview of Glucose Monitoring Devices:

BGM Device

- The traditional "finger prick" BGM system measures the glucose level at the time of the test.
- On average, patients perform two tests per day (equals two glucose values per day).
- Depending on the patients' needs, tests are performed up to seven times a day.
- Reimbursement: **~$20** for device **+ ~$24 per month** for test stripes[1].

CGM Device

- CGM devices do not require the patient to perform blood tests themselves.
- These devices perform a test every 5 minutes, which results in 288 tests a day. It is expected, that CGM will replace BGM in the long term.
- CGM devices are connected to a patch, which holds on the body for up to 14 days.
- Reimbursement: **~$70** for device **+ ~$70 per month** for patches.

Blood Glucose Monitoring allows patients with diabetes or similar chronic diseases to use mobile medical devices, technology and services to individually perform blood tests and monitor their blood glucose level. The market dynamics are described in the following:

I Marketing
- Provider of blood glucose monitors approach patients **via several online channels and adds** (e.g. Facebook, Google, and online forums) as well as **diabetes conferences and fairs**.
- Patients decide if reimbursement is granted and based on recommendation which devices to use. **Switching costs are not significant** and **patients might change device during diabetes life**.

II Promotion
- BGM provider must **promote their products to insurances to ensure that patients get reimbursed**. Only a **few patients will afford non-reimbursable devices**.
- Usually, insurances ask for more effective products, that result in **cost-savings for the insurance**.

III Recommendation
- Once the BGM devices are reimbursable, **insurances promote the product to the physicians**.

IV Consultation and Prescription
- If the physician diagnoses the patient with diabetes, he/she prescribes the device, that is reimbursable for the patient. Hence, he/she forwards the recommendation of the insurance.

V Sales
- In most cases, devices are sold via **third-party distributors instead of direct sales**. These distributors can be **online pharmacies or wholesalers, such as Walmart**.

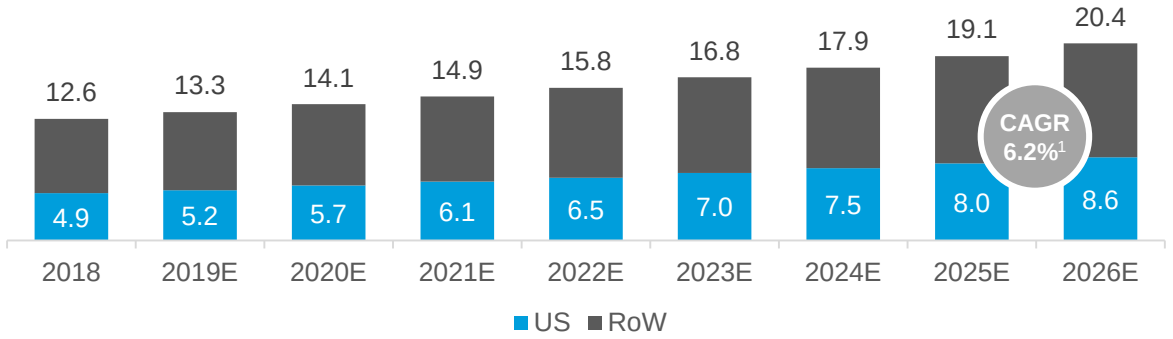
VI Reimbursement
- Based on previous negotiations between insurances and BGM providers, the patient gets reimbursed. **For reimbursement, a prescription is needed**.

Other market players include:
- **Suppliers** provide necessary components to manufacturers. The number of suppliers is limited and the process to qualify as a supplier is lengthy, which increases the supplier power.
- **Manufacturers** are subject to extensive FDA regulation. These entities are usually subject to high R&D expenses.
- **Regulatory bodies**, such as the FDA govern the manufacturing, labeling, promotion, distribution, advertising, and sale of medical devices.

Notes: [1]Assuming two test stripes per day. Sources: CMS, Expert Interviews

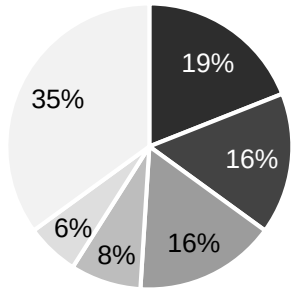
The Glucose Monitoring market is expected to further grow to more than $20bn by 2026, mainly driven by Continuous Glucose Monitoring solutions

Glucose Monitoring Market 2018-2026, In $bn



According to the WHO, diabetes was the 7th leading disease, causing death in 2016. Hence, remote glucose monitoring devices can be essential for patients' survival to balance their blood glucose levels.

Competitive Landscape



The market for Remote Glucose Monitoring is **highly fragmented, but largely dominated by multinational companies.** Overall, the five largest players, of which three are considered large healthcare conglomerates, accounted for ~65% of the global market volume in 2018. The rest of the market comprises numerous mid- to small-sized enterprises.

Market Growth

- The **global market for Glucose Monitoring is valued at $12.6bn in 2018 and is expected to grow at a healthy CAGR of 6.2%** to $20.4bn by 2026[2].
- Despite BGM being the larger market today, it is expected, that CGM will gain traction in the coming years by outgrowing the total market at a CAGR of 22.9%[3].

Market Drivers

- The growth in the market can be attributed to major trends, such as **an increasing and aging population**. In addition, the **increasing prevalence of obesity and sedentary** can be observed across the globe.
- Furthermore, **rapid technological advancements are expected to drive the awareness and availability** of glucose monitoring among people with diabetes.
- The development of CGM devices, which are more expensive than traditional BGM devices, will positively impact the market size as the simplicity of the device will prevent inaccurate use leading to higher trust by the patients.

Geo. Split

- The **US accounted for almost $5bn (~38% of global revenues) in 2018**, which makes it the largest geographical market for Glucose Monitoring followed by Europe.
- Untapped markets like the Middle East and Africa, however, show that the Glucose Monitoring market has vast opportunities in different regions.

Market Players

- The **global market leader is Medtronic with approximately $2.5bn** in revenues in 2018[4], **followed by Abbott Laboratories with almost $2.0bn and strong double-digit growth**[5]. Abbott's main product in its Diabetes Care division is the "Freestyle Libre", an innovative CGM device. **The third largest player with also almost $2.0bn in revenues is Roche**.
- Besides these large companies, the **market is very fragmented with several players with smaller market share**, such as BioTel. They **benefit from the growth of the market** and try to gain market share with **product innovations**.

M&A

- **M&A is highly attractive** for Remote Glucose Monitoring companies. On one hand, there are **many innovative companies, which are an attractive target** to acquire new technology. On the other hand, companies are spread around the globe, enabling buyers to **enter new geographic markets** without dealing with authorities to launch their product on another market or to vertically integrate cross-border distribution channel[6].
- Dexcom, for example, acquired Nintamed, a German distribution company which should help Dexcom to forward in its mission to improve access to its CGM technologies globally[7].

Notes: [1]CAGR for the period 2018-2026. Sources: [2]Statista; [3]Allied Market Research; [4]Medtronic Annual Report 2018; [5]Abbott Laboratories Annual Report 2018; [6]Mordor Intelligence; [7]Merger Market; Expert Interviews

Appendix

Traditional Holter devices have the shortest monitoring period and the lowest diagnosis yields among cardiac monitoring devices

BioTelemetry inc

Device	Key Information	Illustration

1. **Traditional Holter**
2. Extended Holter
3. Event Recorder
4. Mobile Cardiac Monitoring
5. Implantable Loop Recorder
6. Pacemaker

Description

- A Traditional Holter monitor is a small electrocardiogram, portable, and wearable device that keeps track of the patient's heart rhythm. It keeps the record of the heart rhythm typically over a 24-72-hour period, and the patient keeps a diary of activities and symptoms.
- It is a painless and noninvasive prescription. It is also considered as a low-cost, low-risk option.

Prescription

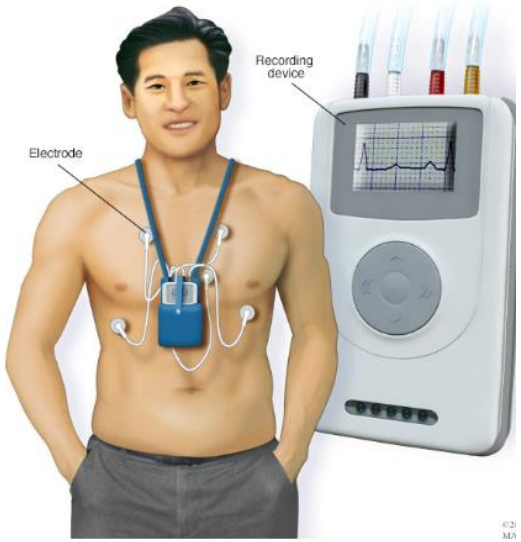
- A Traditional Holter monitor test is usually performed after a traditional test to check the patient's heart rhythm, especially if the electrocardiogram does not give the doctor enough information about the heart's condition.
- It is usually the first line of defense of extra-monitoring prescribed by doctors and physicians and it is classified as a short cardiac monitoring method. If the Traditional Holter monitoring does not capture the irregular heartbeat, physicians may prescribe additional and more time demanding monitoring services.

Cardiac Data Recording Process

- The Traditional Holter device monitors continuously the heart rhythm during the monitoring period. When prescribed, physicians should place electrodes that sense the heartbeat on the patient's chest. These electrodes are then connected to the device. Besides having the device recording the heartbeat, the patient is asked to keep a diary of all activities and symptoms while using the device. While monitoring the heart's rhythm, the patient may do its normal activities.
- Once the monitoring period is over, the patient should return the device to doctors/physicians along with the diary. While recording, cardiac data is stored in a flash memory card and then is transferred to the analysis conducted by the doctor/monitoring centers. Data is then compared and correlated to the patient's activities and symptoms during the monitoring period.

Diagnosis Yield[1]

- Yields are usually low, ranging from 5-18%. These are the lowest yields among Event and Mobile Cardiac Monitoring ones.
- The main reason for these yields is the short cardiac monitoring period, in which most symptoms may not reappear in the 24-72 hours during which the device is connected.



Traditional Holter monitoring device

Notes: [1]Diagnosis Yield: The proportion of patients in whom the medical technique yielded a definitive diagnosis out of the total number of patients that have received the diagnostic procedure. Sources: BioTelemetry Website & Documents; Mayo Clinic; Digirad Website

Extended Holter are prescribed in case the Traditional Holter results are not conclusive as these devices continuously record and store heartbeats

BioTelemetry inc

Device

1. Traditional Holter
2. **Extended Holter**
3. Event Recorder
4. Mobile Cardiac Monitoring
5. Implantable Loop Recorder
6. Pacemaker

Key Information

Description

- The Extended Holter is a device that continuously records and stores heartbeats for a period up to 14 days, without requiring battery changes.
- It has two key elements: the patch and the sensor. It is wires-free. The sensor collects and transmits cardiac data to monitoring centers. Besides having the recording cardiac data, the patient should also fill the diary with its symptoms.
- Given its recent development, it is still a more expensive solution than the Traditional Holter.

Prescription

- It is usually prescribed when Traditional Holter results are not conclusive. The Extended Holter device is a more accurate and effective method of detecting arrhythmias when compared to the Traditional Holter.
- It is classified as medium-short cardiac monitoring method. It also offers a less invasive and more convenient monitoring method than long-term devices, such as Implantable Loop Recorders.

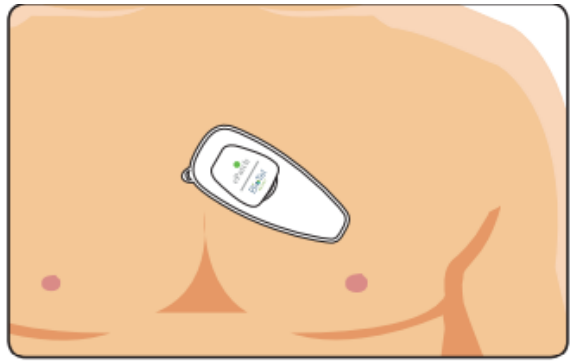
Cardiac Data Recording Process

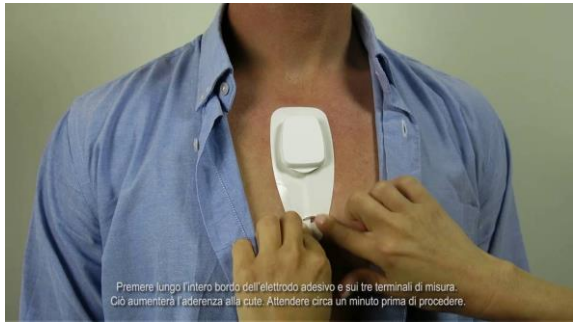
- This device can be setup up by doctors or by the patient himself. Patients should place the sensor into the patch and then place the patch in the patient's chest, as illustrated. If needed, the patch may be replaced during the monitoring period. There is no need for replacing the device's battery.
- Since its setup, the Extended Holter sensor continuously records and stores cardiac data. Whenever the patient feels a heart-related symptom, he/she should double-tap the middle of the sensor to record the symptom. He/she should also write that symptom in the diary.
- Cardiac data is transmitted via cellular coverage to the doctors or monitoring centers. This data is then analyzed, and cardiac reports are elaborated.

Diagnosis Yield

- Yields are greater when compared to Traditional Holter devices. In some studies, Extended Holter yields may reach up to 60%.
- The main reason for this improvement is the longer monitoring period, in which the probabilities of recording patients' abnormal symptoms are higher.

Illustration





Extended Holter monitoring device

Sources: BioTelemetry Website & Documents; Digirad

Event recorders are activated through patient's symptoms are offer a monitoring period up to 30 days

BioTelemetry inc

Device

1. Traditional Holter
2. Extended Holter
3. **Event Recorder**
4. Mobile Cardiac Monitoring
5. Implantable Loop Recorder
6. Pacemaker

Key Information

Description

- An Event Recorder is a portable device that offers an arrhythmia detection algorithm that detects and automatically transmits asymptomatic and symptomatic events, including: atrial fibrillation, tachycardia, bradycardia and pause. It records the same information as an EKG but for longer periods of time, which can range up to 30 days.
- Event devices do not record continuously. They record when the patient activates them or when an abnormal cardiac event activates the recorder. There are two main types of event monitors:
- **Symptom Event Recorder:** When activated, it only records the information from the heart's electrical signal for the next few minutes after being activated.
- **Memory Looping Recorder:** When activated, it records the information from a few minutes before the device was activated and also minutes after. So data from before, during and after the symptom is captured.

Prescription

- The Event recorder is used to record symptoms that are not always detectable when doing an EKG exam or when prescribing a Traditional Holter device. It is usually the next line of defense after prescribing the Traditional Holter. It is classified as a long cardiac monitoring method.

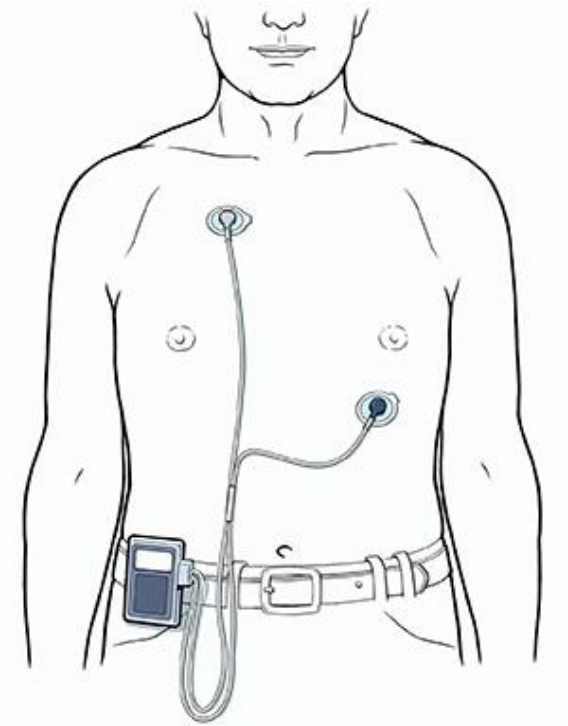
Cardiac Data Recording Process

- The device is composed by a small recorder that stores cardiac data and by electrodes connected to the patient's chest. These electrodes should be placed in specific locations of the patient's chest, as illustrated. Battery and electrodes may have to be changed during the monitoring period.
- The monitor is designed to detect and record specific heart symptoms. When the patient has a symptom, he/she can also activate the recording activity by pressing a button on the monitor.
- Event data is transmitted, either through the automatic transmission of event data with wireless event monitors or through the telephonic transmission of stored event data with traditional event devices. This data is then analyzed by cardiac technicians/doctors to identify possible arrhythmias.

Diagnosis Yield

- Yields vary significantly when using these devices. These yields range from 15-68% in different studies. Factors impacting these yields include the patient's ability to recognize and activate the monitors.

Illustration



Event Recorder monitoring device

Sources: BioTelemetry Website & Documents; American Heart Association

MCOT devices continuously record and automatically transmit cardiac data for a monitoring period up to 30 days

BioTelemetry inc

Device	Key Information	Illustration

1. Traditional Holter
2. Extended Holter
3. Event Recorder
4. **Mobile Cardiac Monitoring**
5. Implantable Loop Recorder
6. Pacemaker

Description

- A Mobile Cardiac Monitoring is a cardiac monitoring method that uses a small portable device to record a patient's cardiac activity. The cardiac monitoring period for MCOT can range up to 30 days
- These devices automatically send data to monitoring centers when a cardiac anomaly is detected. In contrast to the Traditional Holter and Event Recorders, MCOT provides real-time monitoring and analysis. This is a more expensive monitoring method when compared to Traditional Holter and Event devices.

Prescription

- MCOT devices may be prescribed when longer and continuous cardiac recording periods are needed. MCOT devices have proven beneficial mainly in patients with unexplained syncope, Cryptogenic Stroke and post ablation.

Cardiac Data Recording Process

- When a physician orders an MCOT device for a patient, they will also register the patient with their cardiac monitoring provider. The patient will either have the electrodes connected while they are in the office, or the MCOT device will be delivered to the patient's home and the patient will connect the electrodes themselves. In some devices, electrodes may be replaced by a patch similar to Extended Holter devices. Electrodes, patches, and monitor's battery may be replaced during the cardiac monitoring period.
- Once the patient is ready, the monitoring system's office will activate the MCOT device. A baseline test will be collected from the patient, and the information will be sent wirelessly across the mobile network. The data is transmitted to a 24-hour monitoring center via a mobile network and then interpreted by cardiac technicians.
- The MCOT devices employ two-way wireless communications, enabling continuous transmission of patient data to the monitoring centers and permitting physicians to remotely adjust monitoring parameters and request previous ECG data from the memory stored in the monitor.

Diagnosis Yield

- Data collected using MCOT devices usually provide more information than Traditional Holter and Event monitors. Diagnosis yields are also greater than all previous cardiac monitoring methods. In some MCOT devices, these rates can range up to 88%.

MCOT monitoring device

Sources: BioTelemetry Website & Documents; Digirad

ILR devices monitoring time can range up to 3 years and they transmit data to cardiac technicians through a home monitor device

BioTelemetry inc

Device	Key Information	Illustration

1. Traditional Holter
2. Extended Holter
3. Event Recorder
4. Mobile Cardiac Monitoring
5. **Implantable Loop Recorder**
6. Pacemaker

Description

- An Implantable Loop Recorder is a small implantable cardiac monitor (~size of an AA battery) that is capable of automatically detecting and recording a number of abnormal heart rhythms.
- The device is inserted under the skin to the left of the patient's breastbone and will continuously monitor the patient's heart rhythm for up to three years.

Prescription

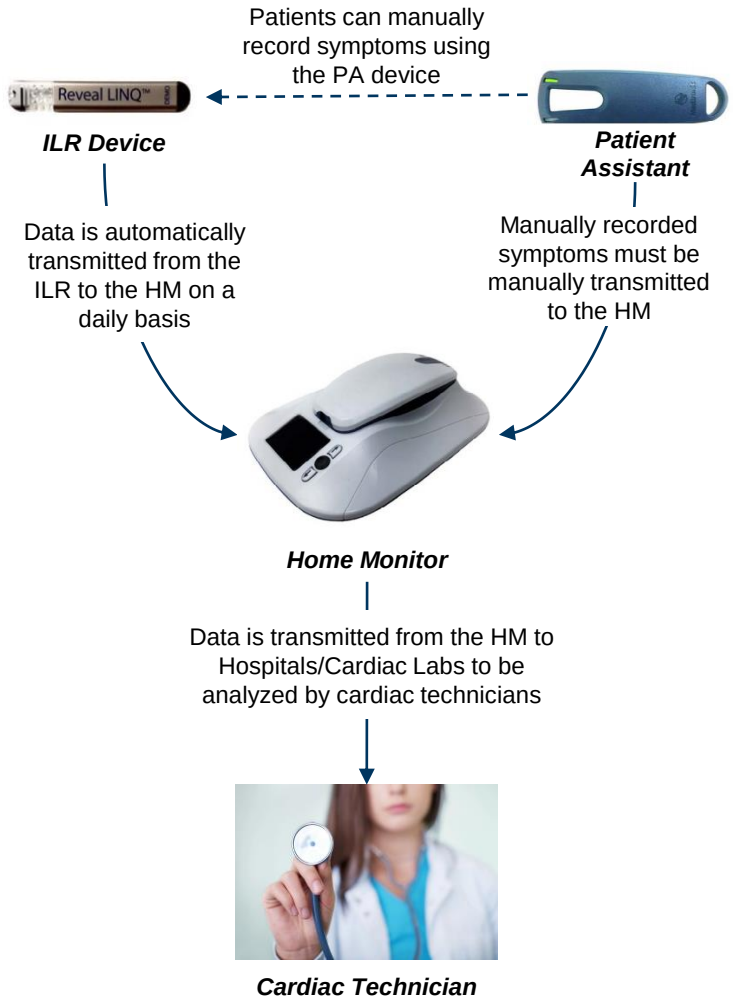
- An ILR can help answer questions about the patient's heart that other heart-monitoring devices do not provide. It allows for long-term heart rhythm monitoring.
- It can capture information that a standard electrocardiogram, Traditional Holter or Event monitor miss because some heart rhythm abnormalities occur infrequently. It allows physicians to reach a definite diagnosis.

Cardiac Data Recording Process

- Patients need to undergo a minor surgical procedure to place the ILR.
- **Patient Assistant:** Patients can still record symptoms manually using the Patient Assistant device. To make a symptomatic recording, the patient should hold the Patient Assistant over the ILR device and press the button. The ILR is able to record the heart rhythm for up to 6 minutes, 30 seconds before the button on the Patient Assistant is pressed and 1 minute after. This should give the patient plenty of time to use the Patient Assistant after the onset of symptoms. These recordings are stored within the ILR, which can store up to 4 symptom episodes before the memory is full. To reset the memory and allow to make more recordings, the data will need to be sent to the Heart Devices Team/Cardiac Technicians using the Home Monitor.
- **Home Monitor:** This is a bedside monitor that communicates with the patient's ILR device and sends information to the Heart Devices Team at a given hospital/data analysis center. All automatic recordings are sent daily, however, symptomatic recordings made using the Patient Assistant need to be sent by the patient. The monitor uses a cellular signal and is plugged into a power outlet.

Diagnosis Yield

- Yields are usually higher than Traditional Holter and Event recorders. According to studies, these can range up to 73%. The majority of diagnosis is reached in the first six months of the monitoring period.



Sources: Guy's and St Thomas' NHS Foundation Documents; National Heart, Lung, and Blood Institute; Mayo Clinic

Pacemakers are targeted to patients with already identified arrhythmias and they help to control abnormal heart rhythms through electric stimulus

BioTelemetry inc

Device	Key Information	Illustration

1. Traditional Holter
2. Extended Holter
3. Event Recorder
4. Mobile Cardiac Monitoring
5. Implantable Loop Recorder
6. **Pacemaker**

Description

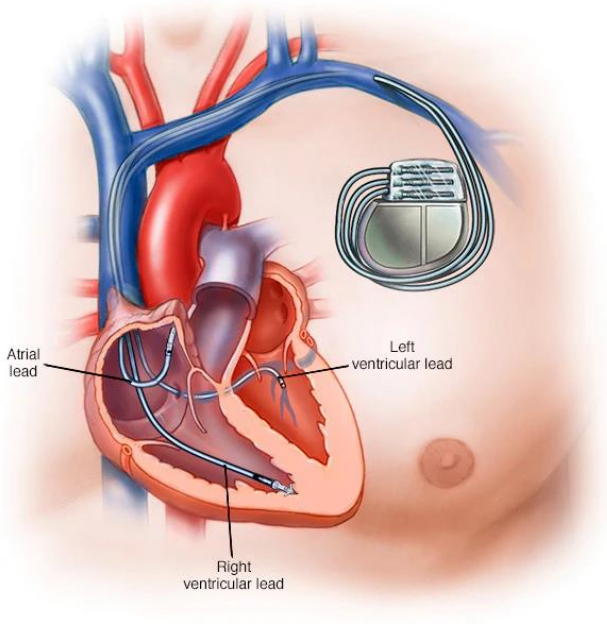
- A Pacemaker is a small device that is placed in the patient's chest or abdomen to help control abnormal heart rhythms.
- This device uses electrical pulses to prompt the heart to beat at a normal rate. If patient's heart rhythm is abnormal, the Pacemaker will direct the generator to send electrical pulses to the heart.

Prescription

- These devices are prescribed to patients with identified arrhythmias and are used to control and treat them.
- The most common reasons for prescriptions are patients who have bradycardia and heart block. Bradycardia is a heartbeat that is slower than normal. Heart block is a disorder that occurs if an electrical signal is slowed or disrupted as it moves through the heart.
- Besides monitoring and controlling the heartbeat, they can relieve some arrhythmias symptoms, such as fatigue and fainting.

How Pacemakers Work

- Placing a Pacemaker requires minor surgery. The surgery usually is done in a hospital or special heart treatment laboratory.
- The electrodes detect the patient heart's electrical activity and send data through the wires to the computer in the generator. If the heart rhythm is abnormal, the computer will direct the generator to send electrical pulses to the heart. The pulses travel through the wires to reach the heart.
- Doctors can program the Pacemaker's computer with an external device. He/she does not have to use needles or have direct contact with the Pacemaker. Pacemakers have one to three wires that are each placed in different chambers of the heart, as illustrated.

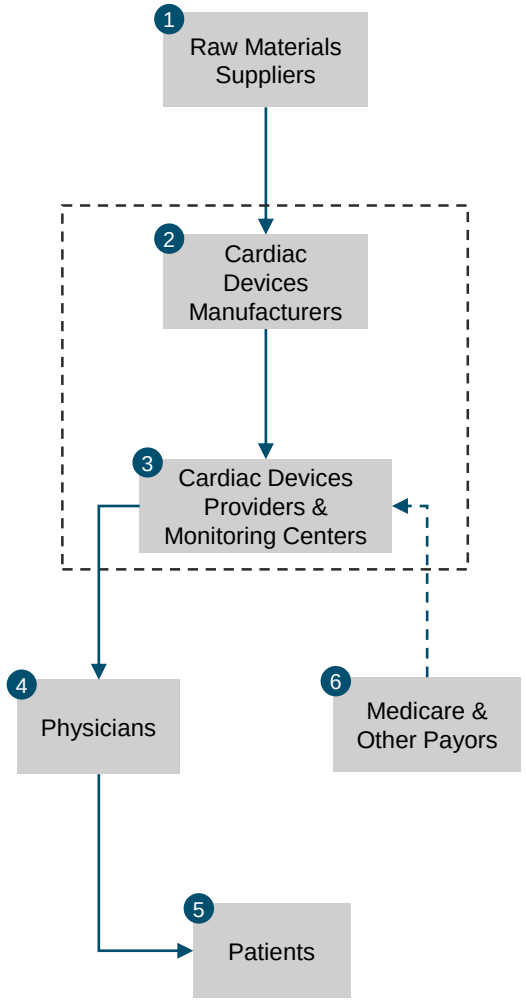


Pacemaker placement in the patient's heart

Sources: National Heart, Lung, and Blood Institute; Mayo Clinic

Many players intervene in the process of delivering cardiac monitoring services to patients

Market Dynamics



In some cases, players consolidate these two operations

Remote Cardiac Monitoring Market Dynamics Description

1 Raw Materials Suppliers

- Suppliers provide the necessary components to manufacturers to produce cardiac monitoring devices. The number of suppliers is limited and the process to qualify suppliers is lengthy, which increases the supplier power.
- Suppliers' components are subject to testing of performance before a purchasing agreement is signed. Suppliers also have to comply with FDA regulatory requirements and are subject to potential regulatory inspections and stoppages.

2 Cardiac Device Manufacturers

- Manufacturers buy raw materials and components from suppliers and then produce a diversified range of cardiac monitoring devices, including Traditional Holter, Event, and MCOT monitors.
- Given that these monitors are classified as medical devices, manufacturers are subject to extensive FDA regulation. FDA regulations govern the manufacturing, labeling, promotion, distribution, importing, exporting, shipping, advertising, promotion, and sale of these devices. In some cases, manufacturers are also the entities providing the monitoring and analysis services of the cardiac data collected with their devices.

3 Cardiac Device Providers & Monitoring Centers

- These entities make available cardiac monitoring devices to doctors and patients and monitor and analyze the cardiac data collected. When these entities do not produce their own devices, they buy them from cardiac devices manufacturers.
- When doctors/physicians prescribe a given cardiac monitoring treatment, cardiac devices providers lend the cardiac monitors to patients and then collect and analyze the cardiac data. This data is analyzed in monitoring centers, in some cases operating for 24 hours, by specialized cardiac technicians. They report urgent events and make available final analyzes to physicians.
- These entities get reimbursed by Insurance Plans and Government Healthcare Plans. Cardiac devices providers are not allowed under Federal and anti-kickback laws to pay or receive anything of value to induce prescription or referral of reimbursed products or services. They are also limited in terms of financial arrangements which they may have with healthcare professionals in a position to purchase, recommend or refer patients for their cardiac monitoring services or other products.

4 Physicians

- Physicians prescribe cardiac monitoring treatments to patients, which are rendered by the cardiac device providers and monitoring centers. During the cardiac monitoring period, physicians may be alerted by the monitoring centers about patients' urgent cardiac events.
- When the monitoring period is over, physicians receive the analysis report from the monitoring centers.

5 Patients

- Patients are the end-users of the cardiac monitoring devices. They receive them either during their medical appointment or at their home via post office delivery. When the cardiac monitoring period is over, patients have to return the monitoring devices back to physicians or via post office.

6 Medicare & Other Payors

- Medicare and other insurance plans reimburse cardiac device providers and monitoring centers for the cardiac monitoring services rendered. Reimbursement rates are set by Government entities and they vary accordingly to the monitoring device used and are adjusted geographically.

BioTelemetry faces direct competition from companies offering MCOT or Extended Holter in combination with monitoring services as well as large healthcare conglomerates

	Revenue LTM[1], In $mn	MCOT	Extended Holter	Holter	ILR	Post Event	Glucose Monitoring	Monitoring Service
BioTelemetry, Inc.	399	✓	✓	✓	✓		✓	✓
iRhythm	182		✓					✓
SHL Telemedicine, Ltd.	42	✓						✓
Bardy Diagnostics	27		✓					✓
Preventice Solutions	5	✓		✓		✓		✓
CardioDiagnostics, Inc.	4	✓						✓
Abbott Laboratories	30,935			✓	✓		✓	
Medtronic plc	30,666				✓		✓	
Ge Healthcare	19,784			✓				
Boston Scientific Corporation	10,077			✓		✓		
BIOTRONIK SE	700	✓			✓	✓		
InfoBionic, Inc.	8	✓						
Personal MedSystems	4			✓				
Qardio, Inc.	1	✓						
Schiller AG	-			✓				

Notes

- The patient monitoring market is highly fragmented with large and small competitors.
- BioTelemetry faces direct competition from companies that offer MCOT or Extended Holter, both in combination with a monitoring service.
- The direct competition comprises five companies, whereas iRhythm is the largest one in terms of revenue.
- Preventice Solutions offers a similar product portfolio to BioTelemetry.
- Besides the direct competition, large healthcare companies, such as Abbott and Medtronic compete on the Holter and Implant business.
- Large companies have a better sales channel and could, therefore, enter the MCOT and service market.
- Abbott decided not to offer a monitoring service for its continuous glucose monitoring device because they want patients to focus on their disease[1].
- Larger companies participate in the MCOT market by M&A activities. Boston Scientific Group holds a minority stake in Preventice Solutions since 2015.

Direct Competition

[1]As of 30th June 2019. Sources: [1]Expert Interviews

BioTelemetry currently holds 65 US patents and 134 international patents, mainly to protect its key MCOT intellectual property

Business Unit	Intellectual Property Protected	Product Type	Patents Number		Countries Covered	Average Expiration Year
			US	International		
BioTel Heart	MCOT OS	MCOT	16	32	Australia, Canada, China, Europe (European Patent Office[1]), Japan, US	2026
	CardioNet C5 (Monitor), MCOT C3, MCOT1 Lead Patch, MCOT3 Lead, and ECAT2	MCOT	20	38	Australia, Canada, China, Europe (European Patent Office[1]), Japan, US	2026
	Fusion	Event	6	13	Australia, Canada, Europe (European Patent Office[1]), US	2025
	CK100 CardioKey[2]	Holter	8	11	Canada, China, Europe (European Patent Office[1]), India, Hong Kong, Japan, Korea, US	2030
	ER920W	Event	5	13	Australia, Canada, Europe (European Patent Office[1]), US	2022
	ePatch and MCOT 1 Lead Patch	Extended Holter/MCOT	2	14	Australia, Canada, China, Europe (European Patent Office[1]), Hong Kong, Japan, US	2032
	Other (e.g. Data Control, Data Monitoring and Transmission, Access to monitoring, etc.)	Other	6	13	-	2021
	Total BioTel Heart Patents		**63**	**134**		**~2026**
BioTel Care	Handheld Blood Glucose Monitoring Device	BGM	2	-	US	2034
	Total BioTel Care Patents		**2**	**-**		**~2034**

Notes: [1]Countries covered under the European Patent Office include: Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Monaco, Netherlands, Norway, Poland, Portugal, Romania, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom; [2]CardioKey is BioTelemetry's next generation of Traditional Holter devices. Sources: BioTelemetry Website & Documents; United States Patents and Trademark Office

BioTelemetry has accelerated its growth through several strategic acquisitions across all three key business units

	Acquired Firm	Date	Deal Rationale & Description
Remote Cardiac Monitoring	**Geneva**	**March 2019**	• BioTelemetry acquired full control of Geneva, a firm that provides remote monitoring for implantable cardiac devices utilizing a proprietary cloud-based platform. • Geneva enables BioTelemetry to remotely monitor a physician's patients with implantable cardiac devices, such as Pacemakers, Defibrillators and Loop Recorders. • Geneva's platform provides physicians a single portal to order patient monitoring, review monitoring results and request routine device checks, helping drive significant in-office efficiencies and patient compliance. • The firm expects Geneva to contribute at least $10mn of revenue with a gross margin in excess of 60%. • This acquisition costed BioTelemetry $45.9mn in cash.
	ADEA Medical	**Q2 2019**	• BioTelemetry acquired the remaining outstanding equity (76.2%) of ADEA Medical. • ADEA Medical is a Sweden company that provides cardiac monitoring in northern Europe. • Total consideration paid at closing amounted to $0.2mn in cash and 50,000 shares of BioTelemetry's common stock valued at $2.1mn.
	LifeWatch	**July 2017**	• BioTelemetry acquired full control of LifeWatch at the end of 2017, a developer of MCOT devices. • BioTelemetry gained access to a range of MCOT devices that allowed the firm to strengthen its position as the leader in wireless medicine, creating the foremost connected health platform, significantly enhancing its ability to improve quality of life and reduce the cost of care. • Total consideration paid at closing amounted to 3,694,432 BioTelemetry's common shares with a fare value of $119.4mn and cash in the amount of $173.5mn.
	ePatch Division of DELTA	**April 2016**	• Asset Purchase Agreement in April 2016 for all products and total indications under development in the ePatch division. • BioTelemetry expected to generate future cost savings and to acquire control in products needed for the next generation of its MCOT devices. • Total consideration paid at closing amounted to $3.0mn in cash and 244,519 shares of BioTelemetry's common stock valued at $2.9mn.
Remote Clinical Trials	**VirtualScopics**	**March 2016**	• VirtualScopics is a leading provider of clinical trial imaging solutions. • BioTelemetry expected to expand its existing clinical research offerings and to gain further access to established customer relationships. • The total consideration paid at closing amounted to $15.0mn, net of cash acquired of $0.8mn.
Blood Glucose Monitoring	**ActiveCare**	**October 2018**	• BioTelemetry acquired assets primarily consisted of customer relationships. • Total consideration paid at closing amounted to 3.8mn in cash. The purchase price also includes a potential earn-out payment of $2.0mn, which is contingent on the achievement of certain revenue targets.
	Telcare	**December 2016**	• Telcare respective diabetes care management company (now it operates under the name of BioTel Care). • BioTelemetry also acquired the control of Telcare Medical Supply, a subsidiary of Telcare. • BioTelemetry expected to apply the firm's expertise in Remote Monitoring to the Diabetes market and to increase its presence in the Digital Population Health Management market. • Total consideration paid at closing amounted to $7.0mn in cash, with the potential for a performance-based earn-out of up to $5.0mn upon reaching certain revenue milestones.

Sources: BioTelemetry Annual Reports & Market News

BioTelemetry offers a wide range of monitoring devices, being MCOT the ones with highest diagnosis yield

Healthcare Product Portfolio

							
Device Type	Traditional Holter Monitoring	Traditional Holter Monitoring	Extended Holter Monitoring	Event Recorder	Mobile Cardiac Monitoring	Mobile Cardiac Monitoring	Implantable Loop Recorder
Product Name	DigiTrak XT Holter	DL800	ePatch	wEvent	MCOT 3L	MCOT Patch	ILR
Monitoring Period	24-48h	24-72h	3-14 days	Up to 30 days	Up to 30 days	Up to 30 days	3 years
Description	Lightweight compact device that utilizes digital “flash memory” technology and provides a continuous diagnostic 3-channel EKG. The stored data is mailed or sent electronically to BioTel Heart.	Continuous recording of ambulatory ECG data and the ability to detect and record Pacemaker pulses. The monitor has a built-in electronic diary for symptom correlation and a removable flash card for rapid data transfer and monitor turnaround.	Continuous recording and storing of heartbeats that are analyzed by certified cardiac technicians at BioTel Heart. The patient should write his/her symptoms and the feelings in the diary.	Non-looping, looping and auto-trigger monitors to accurately detect arrhythmia. It offers an accurate arrhythmia detection algorithm that detects and automatically transmits asymptomatic and symptomatic events.	Beat-by-beat analysis with automatic event detection and wireless transmission. It is a 3-channel real-time detection device that provides three distinct views of the heart for more specific and sensitive diagnostic value.	The MCOT system conducts a beat-by-beat analysis of the patient’s heart activity and automatically transmits certain abnormal beats to the certified cardiac technicians at BioTel Heart.	ILR monitors are implanted just under the skin of the chest for cardiac monitoring. **BioTelemetry does not manufacture or sell ILR products**. However, the firm provides monitoring services for these products.
Diagnosis Yield	5-18%	5-18%	60%	15-68%	88%	88%	9-73%

Sources: BioTelemetry Website & Documents

BioTelemetry's MCOT devices have a clear competitive advantage over other cardiac monitoring devices

Mobile Cardiac Outpatient Telemetry

- BioTelemetry's MCOT devices **have a competitive advantage over other cardiac monitoring devices**. These devices have the highest diagnostic yield among a wide range of cardiac monitors, the highest turnaround time, and the highest patient compliance.
- The algorithms used in these MCOT devices **maintain US Food and Drugs Administration clearance**, the authority which regulates these cardiac monitoring devices.
- According to BioTelemetry, its MCOT devices have proven to be **nearly 3x superior at detecting clinically significant arrhythmias when compared to other cardiac monitoring devices, such as LOOP event monitors**. BioTelemetry claims that its MCOT devices are the most accurate mobile arrhythmia detection devices available.
- MCOT devices also proved to have a **5x greater cumulative probability (after 20 cumulative days) of detecting post-stroke atrial fibrillation** after a stroke happened when compared to Implantable Loop Recording devices.
- These claims have been validated with over **40 scientific publications and abstracts that confirm these devices' utility**. The MCOT devices have a 13x return in cost savings when compared to Holter and Event technology.
- These scientific advantages **may lead physicians and cardiologists to further prescribe these devices, as these monitors have a higher diagnosis yield which can prevent future patients' strokes and other cardiac diseases**.

These advantages have led to a significant increase in patient volume and consequently to a double-digit growth in revenue in 2018.

Sources: BioTelemetry Website & Documents

CMS sets the reimbursement rates for Medicare, which are adjusted geographically

Medicare & CPT codes

- **Medicare Service:** Medicare is a federally-funded, national health insurance program administered by Centers for Medicare and Medicaid Services, providing coverage to Americans who are 65 years of age or older, certain younger people with disabilities, and individuals with end-stage renal disease. There are several payment systems within the Medicare program, including payment for inpatient hospital services, outpatient hospital services, ambulatory surgery centers, home health, physicians, and skilled nursing. The payment system that suits BioTelemetry is Physician Payment.

- **Physician Payment:** Physicians receive payment for each Current Procedural Terminology procedure code based on a fee schedule called the Medicare Physician Fee Schedule. The Physician Fee Schedule is based on a scale of national uniform values for all physician services, commonly referred to as the Resource-Based Relative Value Scale.

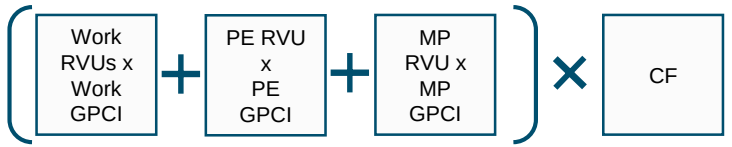
- **Current Procedural Terminology:** The CPT codes offer doctors and health care professionals a uniform language for coding medical services and procedures to streamline reporting, increase accuracy and efficiency. The CPT terminology is the most widely accepted medical nomenclature used across the country to report medical, surgical, radiology, laboratory, anesthesiology, genomic sequencing, evaluation and management (E/M) services under public and private health insurance programs.

Medicare Payment Process

1. Physician documentation in patient medical record
2. Transfer of information to billing/coding department
3. Selection of appropriate diagnosis and procedure codes
4. Submission of billing form to Medicare Administrative Contractor
5. Review of coding and physician documentation for medical necessity
6. Payment from MAC to hospital or physician (if deemed medically necessary)

Reimbursement Rates Computation

- The CMS is the entity responsible for setting the reimbursement rates on an annual basis. These rates are computed through the following formula:



1. Relative Value Units:
- **Work RVU:** Reflects the relative time and intensity associated with furnishing a Medicare PFS service.
- **Practice Expense RVU:** Reflects the costs of maintaining a practice (such as, renting office space, buying supplies and equipment, and staff costs).
- **Malpractice RVU:** Reflects costs of malpractice insurance.

2. Geographic Practice Cost Indices: Each of the three RVUs are adjusted to account for geographic variations in the costs of practicing medicine in different areas within the US. These adjustments are called GPCIs, and each kind of RVU component has a corresponding GPCI adjustment.

3. Conversion Factor: To determine the payment rate for a particular service, the sum of the geographically adjusted RVUs is multiplied by a CF in dollars. The statute specifies the formula by which the CF is updated on an annual basis.

Sources: Boston Scientific Billing and Coding Guide; CMS Documents

BioTelemetry operates mainly in San Francisco, which has one of the the highest reimbursement rates in the US

Medicare Reimbursement Rates for Remote Cardiac Monitoring Services

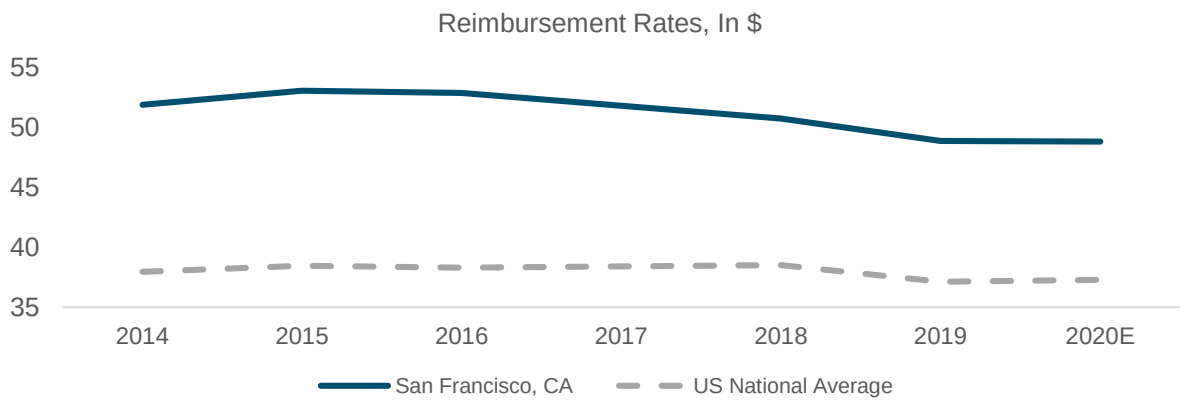
BioTelemetry monitors its Medicare Patients in the **CardioNet monitoring center in San Francisco, CA** with the exception of its Extended Holter services, for which the firm monitors the data in its **monitoring center in Malvern, PA**. Medicare reimbursement rates vary across states and in some cases within each state – BioTelemetry is reimbursed based on the location of its monitoring centers.

CPT code	Device Type	Service/code Description	Monitoring Center Location	Reimbursement Rates (in $) – Facility Rates[1]					
				2014	2015[2]	2016	2017	2018	2019
93226	Traditional Holter	External electrocardiographic recording up to 48 hours by continuous rhythm recording and storage; scanning analysis with report.	San Francisco, CA	51.86	53.03	52.84	51.78	50.71	48.86
0297T	Extended Holter	Scanning analysis with report – technical component.	Malvern, PA	316.19	317.77	319.36	333.7	335.37	336.21
93229	MCOT	External mobile cardiovascular telemetry with electrocardiographic recording, concurrent computerized real-time data analysis and greater than 24 hours of accessible ECG data storage (retrievable with query) with ECG triggered and patient selected events transmitted to a remote attended surveillance center for up to 30 days; technical support for connection and patient instructions for use, attended surveillance, analysis, and transmission of daily and emergent data reports as prescribed by a physician or other qualified health care professional.	San Francisco, CA	919.12	946.96	1016.78	987.14	983.04	950.69
93268	Event	External patient and, when performed, auto-activated electrocardiographic rhythm derived event recording with symptom-related memory loop with remote download capability up to 30 days, 24-hour attended monitoring; includes transmission, review, and interpretation by a physician or other qualified health care professional.	San Francisco, CA	275.53	280.84	280.66	273.97	272.11	266.20
93288	Pacemaker	Interrogation device evaluation (in person) with analysis, review, and report by a physician or other qualified health care professional, includes connection, recording, and disconnection per patient encounter; single, dual, or multiple lead Pacemaker system[3].	San Francisco, CA	21.34	22.11	21.53	22.57	22.57	30.24
93298	ILR	Interrogation device evaluation(s), (remote) up to 30 days; subcutaneous cardiac rhythm monitor system, including analysis of recorded heart rhythm data, analysis, review(s) and report(s) by a physician or other qualified health care professional.	San Francisco, CA	30.41	30.63	30.52	30.8	30.6	30.15

Notes: [1]Facility rates refer to the fee schedule amount when a physician provides this service in a facility setting, such as a hospital or Ambulatory Surgical Center. These rates are equal to the Non-Facility fees for the listed codes; [2]Rates for 2015 are the revised ones, updated in the second half of 2015. This update did not impact significantly the non-revised rates; [3]Rates for Pacemaker refer only to the Technical Component of the service, which excludes the service rendered by doctors (e.g. connection of the Pacemaker). Sources: CMS Physicians Fee Schedule; Kerrisdale Capital Equity Report

A significant reduction in Extended Holter reimbursement rates is expected by 2023

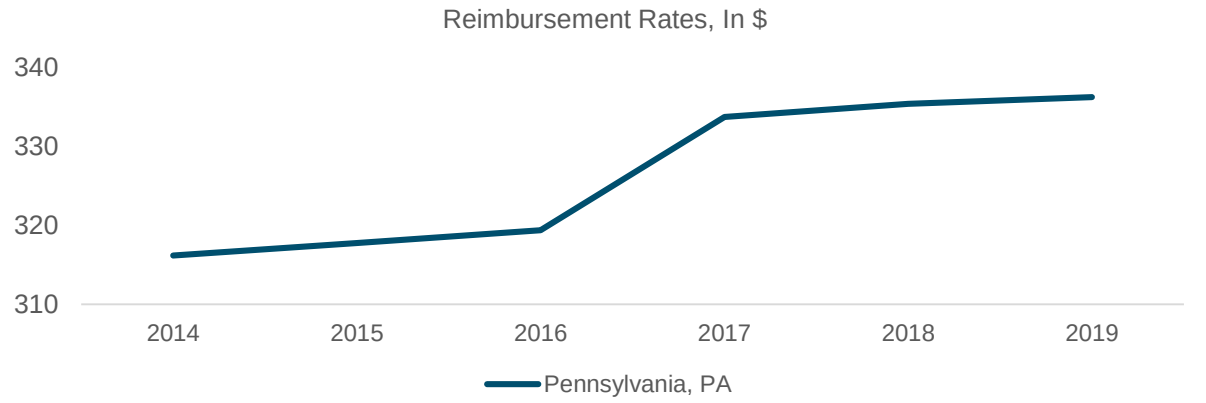
Traditional Holter Devices



Monitoring, Billing & Reimbursement Rates

- A Traditional Holter requires **about 20 minutes of technician time**[1].
- BioTel monitors and analyzes its Traditional Holter cardiac data in its monitoring center **in San Francisco, CA**. In 2019, the San Francisco, CA, Traditional Holter reimbursement rate was **~32% greater than the national average**.
- San Francisco Traditional Holter rate has been decreasing for 4 consecutive years, being **2019 the year with the greatest YoY decrease** (3.6% vs. 2.1%, 2.0%, and 0.4% in 2018, 2017, 2016, respectively).
- BioTel's Traditional Holter services are billed under the 93226 CPT code, which refers to the external electrocardiographic recording up to 72 hours by continuous rhythm recording and storage and scanning analysis with a report.
- **2020 proposed rate:** Despite the increase in the conversion factor and in the Holter national average reimbursement rate, **it is expected San Francisco's rate to decrease by 0.1%** in 2020 due to the decrease in the PE RVUs proposed by the CMS for this state.

Extended Holter Devices



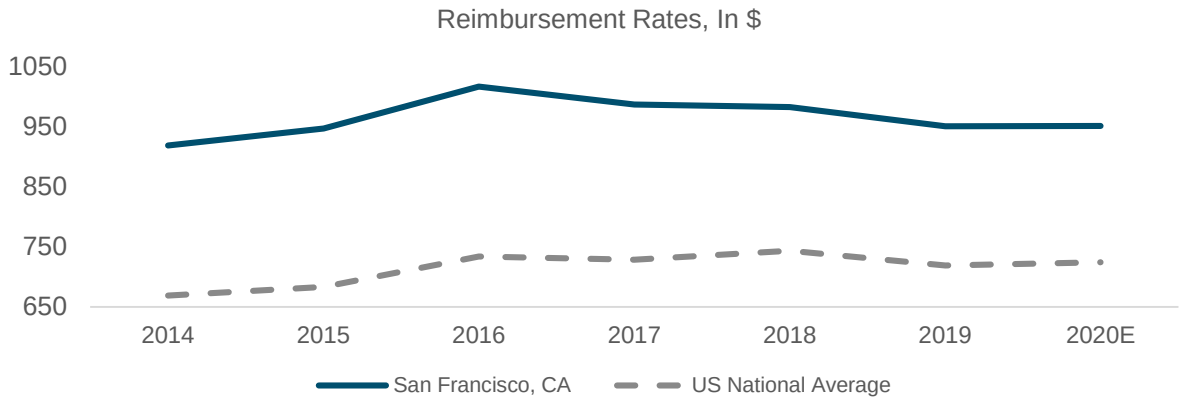
Monitoring, Billing & Reimbursement Rates

- An Extended Holter requires **about 40-60 minutes of analysis** performed by a cardiac technician[1].
- BioTel operates its Extended Holter services in its monitoring centers in **Malvern, PA**. Pennsylvania is also one of the states with the highest reimbursement rates for this kind of services. This rate was set by Novitas, the MAC responsible for PA state. **In 2019, the reimbursement rate was $336.21**[2].
- BioTel's Extended Holter services are billed under the 0297T CPT code, which refers to the scanning analysis with report of the cardiac data collected from patients. This is a **Category III code, which means it is temporary** – temporary codes are usually used in new methods/technologies yet to be proved worthwhile for patients.
- However, **the 0297T code is expected to be transitioned to Category I the latest by 2023**[1], which will mean a **significant reduction in reimbursement rates for Extended Holter services**. Category I reimbursement rates for the permanent code are expected to be similar to the Traditional Holter devices, which would mean a **reduction of ~86% when compared to 2019 rates**.
- Reimbursement rates for temporary codes are not defined by the CMS. Instead, the Medicare Administrative Contractor is the one responsible for setting these rates on a "contractor priced" method. **Currently, these rates vary significantly from state to state and from MAC to MAC**.
- Despite this significant reduction in reimbursement rates, **it is expected a not so significant impact on BioTelemetry revenue**, as Extended Holter accounts for a small share of total revenue.

Sources: [1]Kerrisdale Capital Equity Report; [2]Novitas Physicians Fee Schedule; CMS Physicians Fee Schedule

MCOTs have the highest reimbursement rate among all BioTelemetry's services

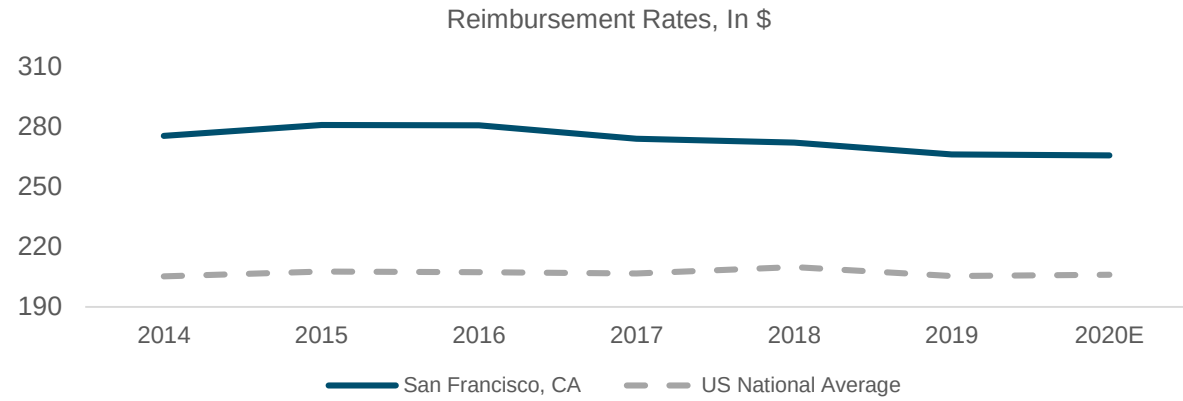
MCOT Devices



Monitoring, Billing & Reimbursement Rates

- BioTel's Mobile Cardiac Outpatient Telemetry services are billed under the 93229 CPT code, which refers to the recording, transmission, patient surveillance, review, and interpretation by a physician or other qualified health care professional of the cardiac data recorded for a period up to 30 days.
- BioTel monitors and analyzes its MCOT cardiac data in its **monitoring center in San Francisco, CA**. In 2019, the San Francisco reimbursement rate was **~32% greater than the national average reimbursement rate** for MCOT services.
- San Francisco MCOT rate has been decreasing for 3 consecutive years, **being 2019 the one with the highest YoY decrease** (3.3% vs. 0.4% and 2.9% in 2018 and 2017, respectively).
- In 2009, MCOT's CPT code was transitioned from Category III to Category I**, which led to a significant decrease in the reimbursement rate for that year**. Prior to 2009, BioTelemetry reimbursement rates for MCOT services were set by Highmark Medicare Services (now Novitas), the MAC responsible for the CA state. When CMS defined the new rate, the **national average reimbursement rate decreased ~33%**, from $1,123 to $754. After this, BioTelemetry decided to move its monitoring center to San Francisco, CA to take advantage of higher reimbursement rates[1].
- **2020 proposed rate: MCOT rate for San Francisco is expected to increase by 0.1% in 2020**. This growth could have been greater, but the CMS has proposed a decrease in the PE RVUs by 2% for this state.

Event Devices



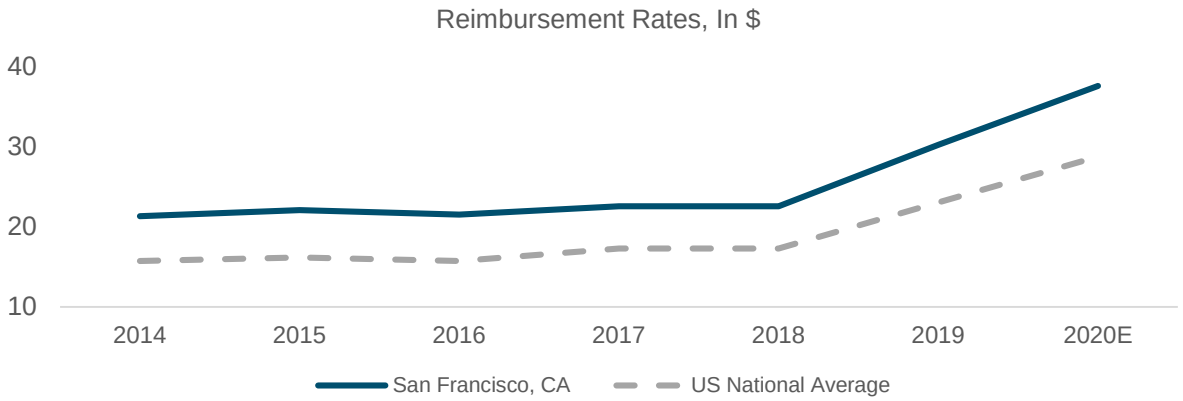
Monitoring, Billing & Reimbursement Rates

- BioTel's Event services are billed under the 93268 CPT code, which refers to the transmission, review, and interpretation by a physician or other qualified health care professional of the patient's cardiac data recorded for a period up to 30 days.
- BioTel monitors and analyzes Event cardiac data in its **monitoring center in San Francisco, CA**. In 2019, the San Francisco, CA, Event reimbursement rate was **~30% greater than the national average reimbursement rate**.
- San Francisco Event rate has been decreasing for four consecutive years, **being 2017 the year with the highest YoY decrease** (2.4% vs. 2.2%, 0.7% and 0.1% in 2019, 2018 and 2016, respectively).
- **2020 proposed rate:** Event rate for San Francisco is expected to decrease by 0.2% in 2020, mainly due to the decrease in the PE RVUs by 2% proposed by the CMS for the same year.

Sources: [1]Kerrisdale Capital Equity Report; CMS Physicians Fee Schedule

Pacemaker rates with 34% increase in 2019, ILR rates keep decreasing for two consecutive years

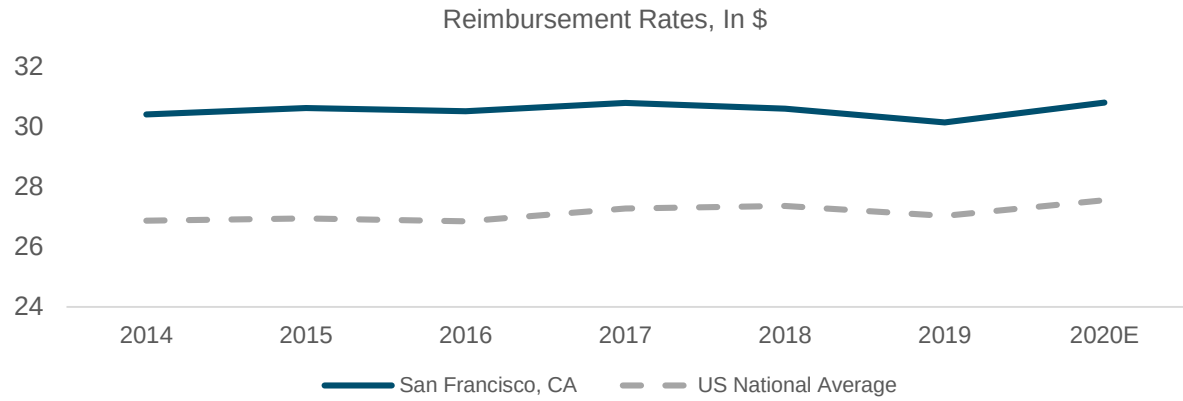
Pacemaker Monitoring



Monitoring, Billing & Reimbursement Rates

- BioTel's Pacemaker services are prescribed under the 93288 CPT code, which refers to the analysis, review and report by a physician or other qualified health care professional of the cardiac data collected.
- BioTel monitors and analyzes Pacemaker cardiac data in its **monitoring center in San Francisco, CA**. In 2019, the San Francisco, CA, Event reimbursement rate was ~31% greater than the national average reimbursement rate.
- San Francisco Pacemaker rate **increased by 34% from 2018 to 2019**, the highest growth in the past 5 years.
- **2020 proposed rate:** Rate for Pacemaker services in San Francisco is expected to increase in 2020 by ~24% when compared to 2019. Besides the increase in the conversion factor, this growth is also due to the increase in the proposed PE RVUs values for the state, which increased by ~22%.

ILR Monitoring



Monitoring, Billing & Reimbursement Rates

- BioTel's ILR services are prescribed under the 93298 CPT code, which refers to the analysis of recorded heart rhythm data, analysis, review(s) and report(s) by a physician or other qualified health care professional.
- BioTel monitors and analyzes ILR cardiac data in its **monitoring center in San Francisco, CA**. In 2019, the San Francisco, CA, Event reimbursement rate was **~11% greater than the national average reimbursement rate**.
- San Francisco ILR rate has been decreasing for 2 consecutive years, **being 2019 the one with the highest YoY decrease** (1.5% vs. 0.6% in 2018).
- **2020 proposed rate:** Rate for ILR services in San Francisco is expected to increase by 2.2% when compared to 2019. This growth is only due to the increase in the conversion factor.

Sources: CMS Physicians Fee Schedule

BioTelemetry's Blood Glucose Monitoring connects patients and care team in real time

BioTel Care Connected Blood Glucose Monitoring

BioTel Care is BioTelemetry's business dedicated to **patient remote monitoring and analysis of blood glucose for diabetes population and health management**. BioTel Care is the first FDA-cleared cellular-connected blood glucose meter.

- BioTel Care Connected Blood Glucose Monitoring is the **first cellular-enabled diabetes management solution that connects people with diabetes and their care team**. This remote monitoring sends messages and reminders along with personalized education, and it keeps the care team in the loop with timely updates.
- It is to be used by diabetes patients and it can be prescribed by physicians. It is available for **diabetes types 1 and 2**.
- It offers easy **monitoring of patients, reporting and info sharing** – beyond the office – to help patients stay on track and engaged in their well-being. With timely insights and two-way messaging, office visits can focus on important opportunities for proactive care.
- **How it Works:** BioTel Care monitoring is not Wi-Fi dependent and there is no need for users to have a cell phone, app, USB cords or additional hardware. Patients do not have to enter data. **The blood glucose monitor automatically transmits readings to BioTelemetry's secure cloud**. BioTel Care does it automatically anywhere there is cellular connectivity. There are no data transmission charges.
- Each time patients want to test their blood they should use an included test strip. Immediately after taking a blood glucose reading, patients receive a personalized message on the meter to support their health and reinforce their health professional's advice.
- In response to specific levels of blood glucose readings, triggered messages can be automatically generated.
- The information your meter provides enables your health professional to connect with you through the device, cell phone, or email. For people with diabetes, at the touch of a finger, there are multiple educational tools all designed to support patient health.
- This product is designed to provide a **price competitive alternative to health insurance coverage** that allows individuals to avoid the hassle of submitting claims.

The Blood Glucose Monitoring is available in **two subscription methodologies:**

- Annual Subscription (1 year) with Monthly Charge of $24.99 = **$299.88/year**
- Monthly Subscription: $99 month 1 for meter; $24.99 per month thereafter = **$373.89/year**

Sources: BioTelemetry Website & Documents