

Diversifying the Medical Practice Portfolio: The Next Healthcare Frontier

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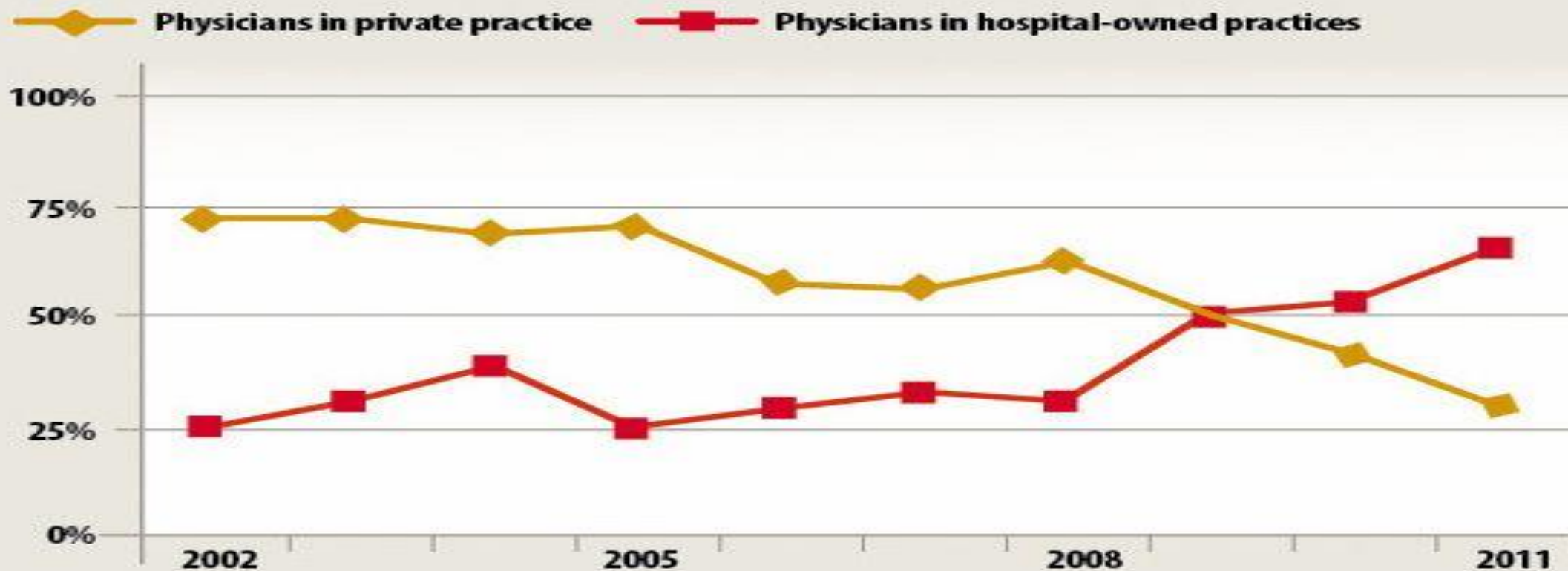
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Disclosures

- Founder and CEO, Comprehensive Spine and Sports
- Adjunct Clinical Associate Professor, Stanford University
- Board, American Society of Interventional Pain Physicians
- Board, American Academy of Regenerative Medicine
- Research, Semnur Pharmaceuticals
- Consultant, Zimmer Biomet
- Advisor, Iweus Capital Inc.
- Advisor, iHealthFrontier

Changing employment dynamics:

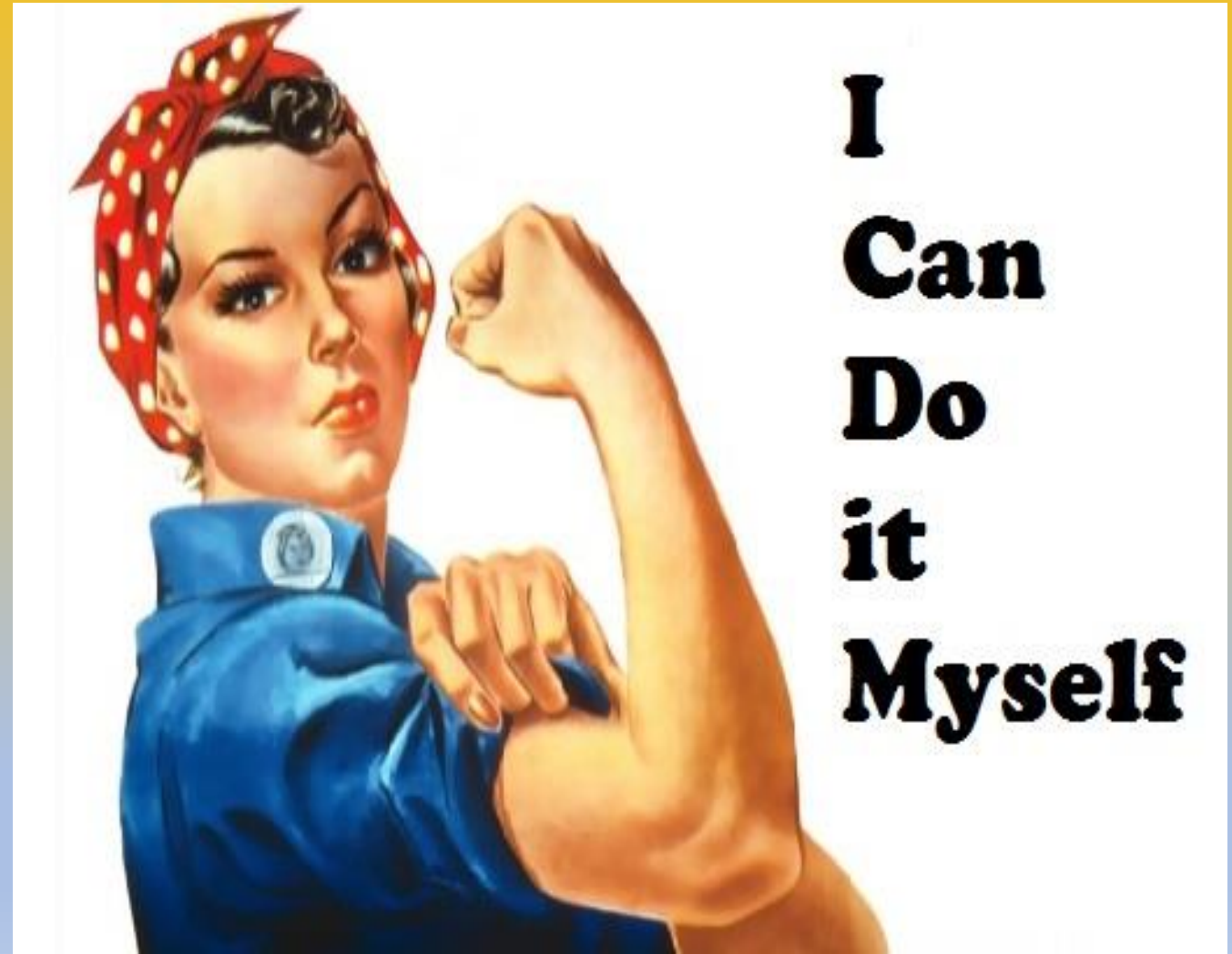
Private versus hospital-owned practices, 2002-2011



Source: Physician Compensation and Production Survey, Medical Group Management Association, 2011 Survey

Independent Practices are Struggling

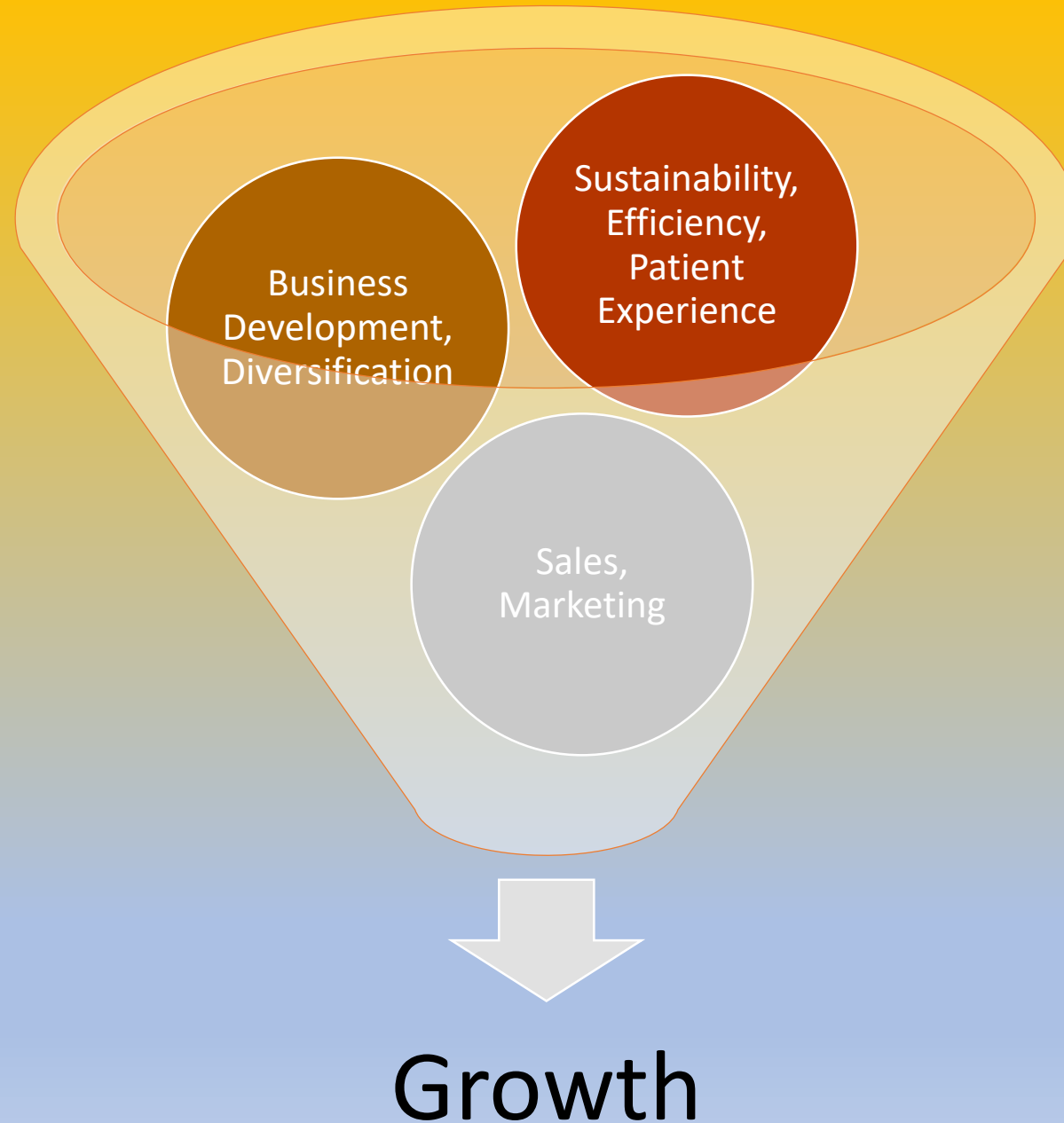
- Lowering Reimbursements
- Increasing competition
- Changing health care delivery landscape
- Difficult talent recruitment and retention
- High infrastructure costs
- Declining number and quality of consumers
- Shifting expectations



Objectives



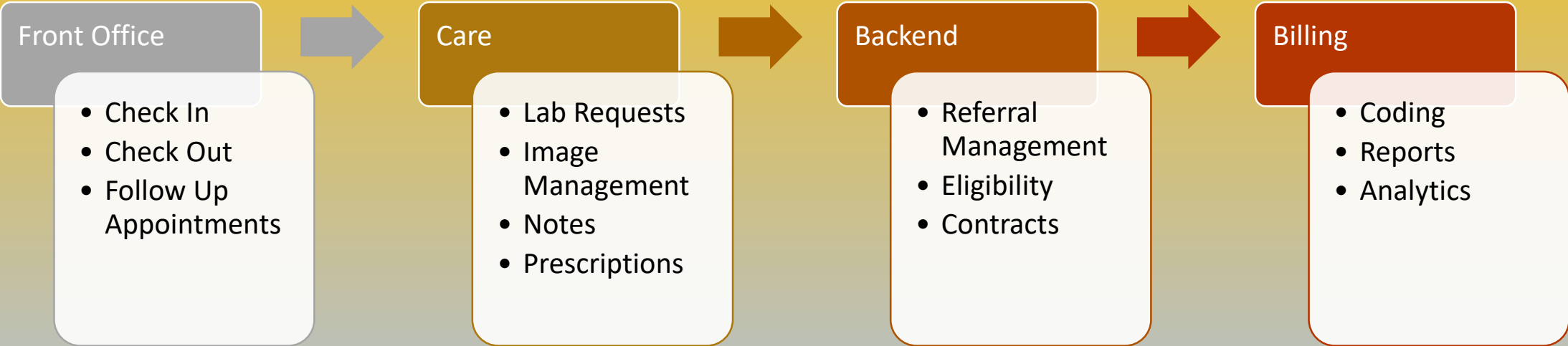
Solution



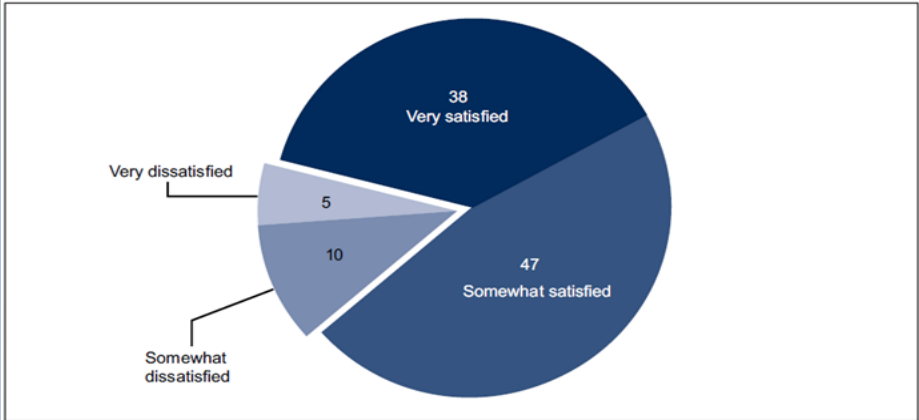
Operational Efficiency: EHR



Electronic Health Record (EHR) System



Embrace it



Operational efficiency: Providers and Staff

- Positive work environment
- Team work
- Take ownership and pride
- Accountability
- Incentivized goals
- Recognizing people's strengths and weakness and use them to your advantage



Consumerism: Things that matter

- Serving the need
- Access and Availability
- Overall experience
- Wait times
- Provider compassion and knowledge
- Environment, Appearance, Etiquette
- Comprehensive and Integrated
- Pricing of goods



EDITORIAL

Inevitable Evolution: How Technology has transformed Physician–Patient Partnership?

Annu Navani

The history of medicine is as old as civilization. The Hippocratic oath written in Greece in the fifth century BCE is still considered the basic foundation of medical ethics. Early medical traditions started in Babylon, China, Egypt, and India, whereas Italy led the way in systematic training of physicians through universities around the thirteenth century.¹ The Greeks introduced the concept of medical diagnosis, prognosis, and advanced medical ethics. As the understanding of anatomy improved, medicine progressed into real science with logic and reasoning. The germ theory of disease in the nineteenth century led to cures for many infectious diseases. Research boomed in the early twentieth century, leading to developments in biochemistry, genetics, lab technology, and radiation giving birth to modern medicine.

Similarly, the practice of Pain Medicine started as early as mankind. The word “pain” comes from the Latin word “poena” which means “punishment” whereas the word “patient” comes from the Latin word “patior” which means “to endure suffering or pain”. The treatment for pain flourished in many civilizations including Egypt, where Papyrus of Ebers contained a large variety of pharmacological information, as well as the Greek, Romans, East Indians, and early Native Americans that had a variety of pain theories and solutions for pain control.¹ The World War I (1914–1918) and World War II (1939–1946) provided the setting for rapid advancement in management of injuries and pain. John Bonica, an army surgeon during World War II, introduced the concept of multidisciplinary, multimodal management of chronic pain published in 1953 that led to solid foundation of the field that was later reinforced by advances in the field of pharmacology, psychology, rehabilitation, neurostimulation, and regenerative medicine, leading to pain management solutions that were once considered impossible.

More recently, with the advent of community education and awareness, the specialty of Pain Medicine has entered a new era of patient-centric care and consumerism. The delivery of health care is in many ways tied to consumer satisfaction as the patients search for “value” in health care

purchases trying their best to balance between quality and cost.^{2,3} The availability of electronic data makes it easier for prospective patients to research for possible diagnosis based on their symptoms and evaluate services using hospital rankings, physician grades, and other quality metrics.²



On the same note, the patients are willing to become more involved in their personal health care by being part of a community that is ready to share decision making with the physicians, learn more about self-management, make healthier choices and lifestyle changes, and become less reliant on drugs or surgery while placing more emphasis on prevention and wellness.

There are several tools to assist patients’ partner in their health care. Of the available approaches, wearable activity monitors, microelectronic medical devices, and electronic communication enable patients to become engaged partners.³ Electronic messaging can be an especially effective adjunct to face-to-face intervention in weight management and smoking cessation programs. On the same note, supporting a patient through a pain flare by coping strategy exercise can help prevent a fall, need for medication, or unnecessary hospital visit.

Patient portals are also popular among health care groups, insurance companies, and employers that allow patients to communicate with their physicians or other providers, access test results and other medical information, and arrange appointments. Many portals also notify users of breathing, flare up management, and exercise routines. When combined with other wellness services, such as health coaching, risk assessments, and biometric screens, portals are useful in both educating patients and motivating them to take better care of their health.

With the advent of e-mail, texting, patient portals, and activity/medical trackers, the connection between patients and their physicians has changed profoundly. Mobile apps, such as the one we use in our clinical practice called “Tame My Pain” senses the cause of pain flare and provides a set of flare-up management tools to help ease pain

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CSSCtr Patient Engagement App



Application: Tame My Pain



Functionality

- Long term self care
- Tracks patient outcomes via Artificial Intelligence
- Bridges patients to their providers
- Allows for proactive preventive care
- Invites new patients to the practice

Upcoming Changes

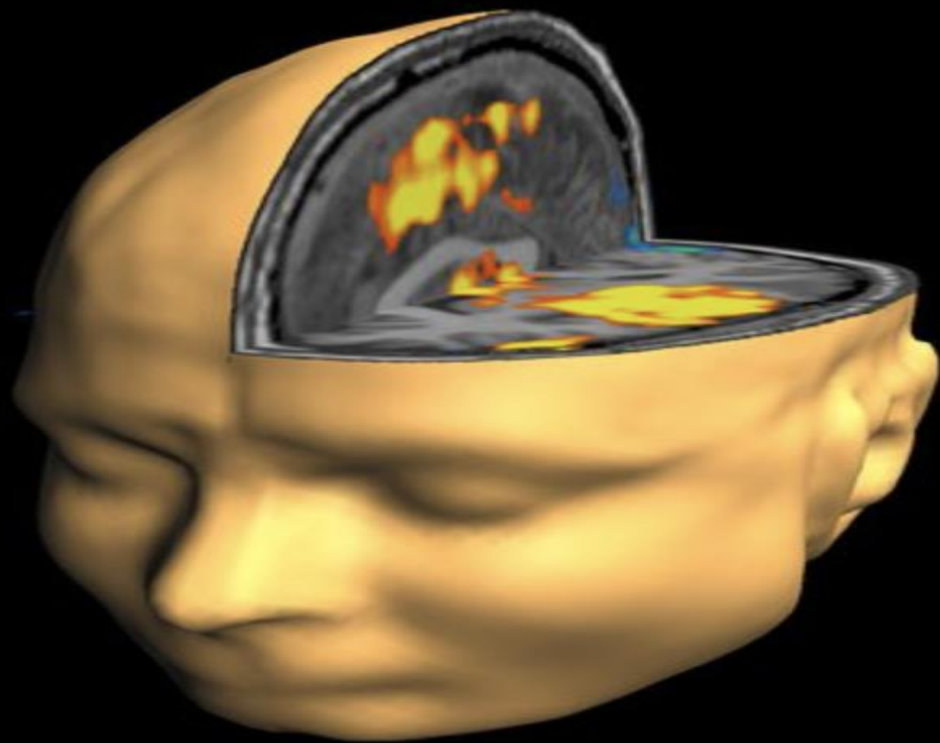
- Expand data points
- Virtual and Augmented Reality
- Expand Indications
- More Statistical Machine learning algorithms
- Freemium and Premium versions

Virtual vs. Augmented Reality

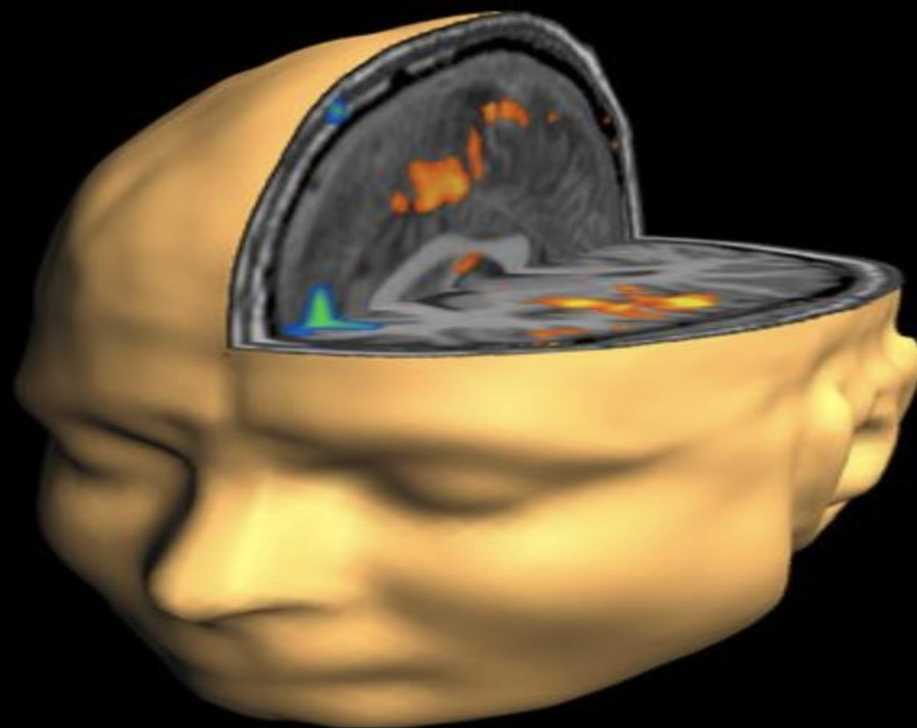




Pain Related Brain Activity is reduced during VR

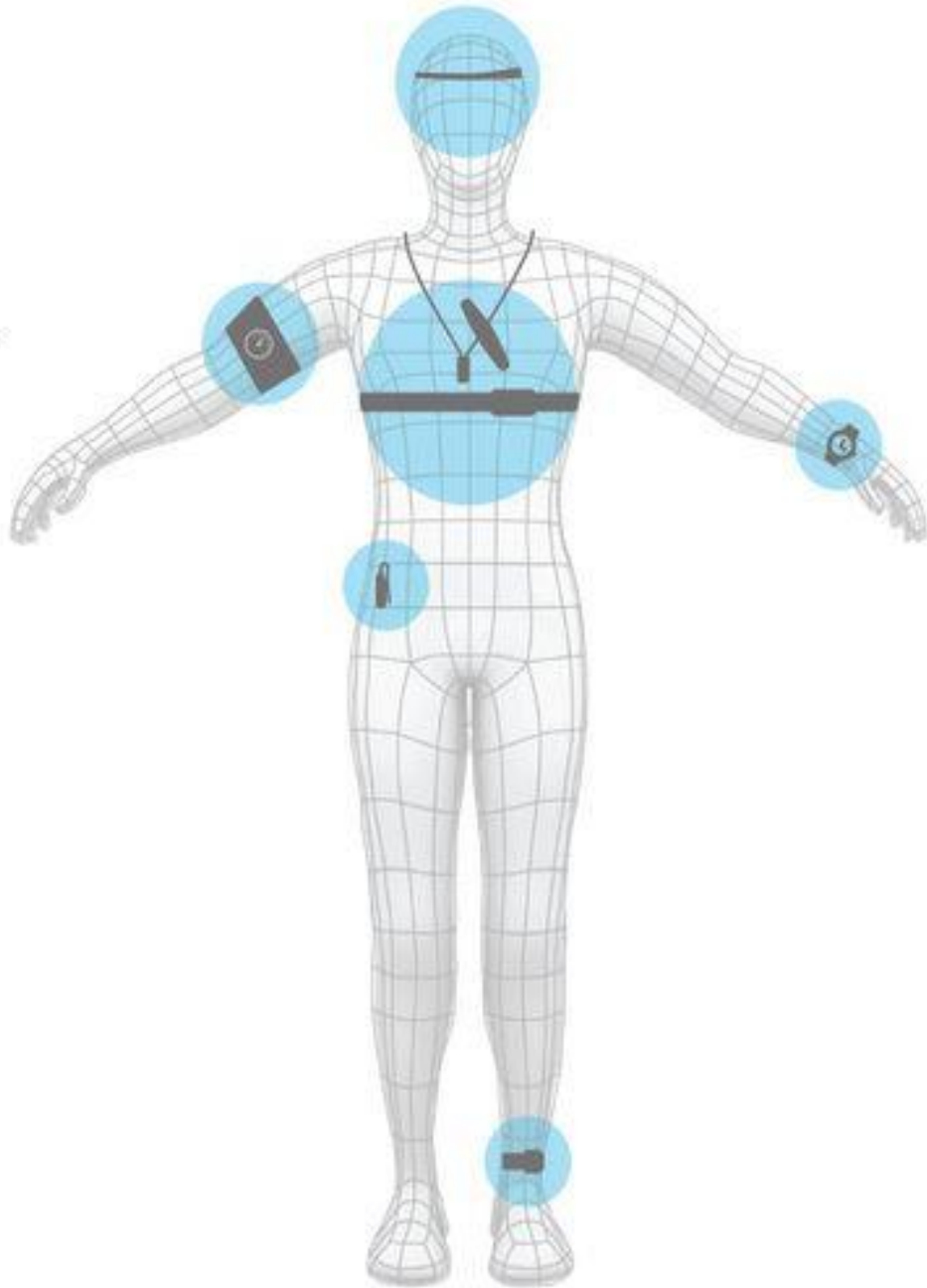


No VR



VR

- Posture**
Lumo
Zephyr
Jins Meme
- Muscle Activity**
Athos
- Blood Pressure**
iHealth
Withings
- Skin Conductance**
Basis
Body Media
Empatica
Neumitra
- Movement**
Fitbit
Nike Fuelband
Jawbone Up Band
Garmin
Samsung
MC10
Zephyr
Withings
Spire
iHealth
Jins Meme
Proteus
Neumitra
Body Media
Empatica
Owlet
- Oxygen Level**
iHealth
Withings
Owlet
- Hydration**
Corventis
MC10
- Temperature**
Tempdrop
MC10
Empatica
BodyMedia
Basis
Owlet



- Brain Activity**
NeuroSky
Melon (acquired by DAQRI)
Emotiv
- Glucose**
Google
Dexcom
Glycens Incorporated
- Eye Tracking**
Jins Meme
- Sleep**
FitBit
Rest Devices
Garmin
Nike
Amigo
BodyMedia
Withings
Samsung
Misfit
Jawbone
iHealth
Basis
Owlet
- Respiration**
Spire
Zephyr
Rest Devices
- Ingestion**
Proteus
- Heart Tracking**
Zephyr
Withings
Sprouting
Proteus
iHealth
Basis
Corventis
AliveCor
Samsung
Garmin
Empatica
Owlet



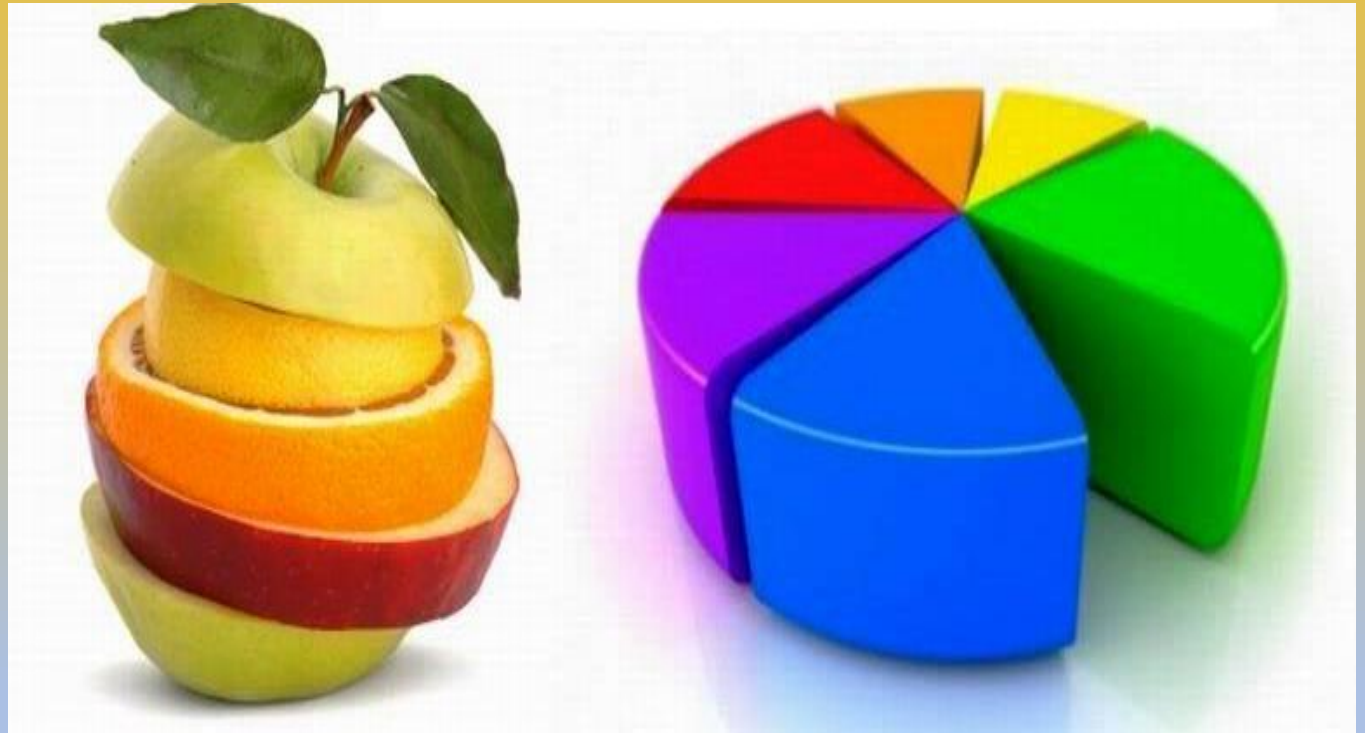
Business Development

- Existing and New market analysis
- Sales Strategy
- Demographic and Need analysis
- Competition and Consumer expectations
- Competitive Edge



Diversification

- Products and Services
- Locations
- Provider specialties
- Fee for service models
- Insurance types



CSSCtr Portfolio

- 5 locations
- 26 providers
- 1 ASC and 3 Procedure suites
- 20+ revenue generating service types
- Strong growth trajectory

- Interventional and Surgical Spine and Orthopedics
- Alternative and Integrated Medicine
- Regenerative Medicine
- Research and Development
- International Clinical training center

Integrated Health Care

CSSCtr Revenue Models

Services: Fee for service

Spine and Orthopedic interventional and surgical Procedures

Return to Work programs: Functional Restoration, Work Hardening

Medical legal Evaluations

Clinical Research Studies: Multiple, Funded

Ancillary Services: Acupuncture, Chiropractic, Psychology, Nutrition, DME, UDS

Ambulatory Surgery Center

Tele Health: Psych Services

Marketing and Sales

- Physician to physician referrals
- Online presence
 - Website
 - Facebook, Instagram
 - Twitter
 - LinkedIn
- SEO
- Keep track of referrals. What is working? What is not.
 - Invest accordingly.

Marketing and Sales: Reputation Building

- National and International Leaders in Interventional Spine, Sports and Regenerative Medicine
- Board members: American Academy of Regenerative Medicine, American Society of Interventional Pain Physicians among other leadership positions
- Publications: peer reviewed journals, book chapters and clinical guidelines and 1st ever clinical biologics book
- Training institute for spine and orthopedic biologics training
- Honorable awards for excellence from ASIPP, AARM, NYISP, AAPIO

First ever Clinical Guidelines Biologics 2019

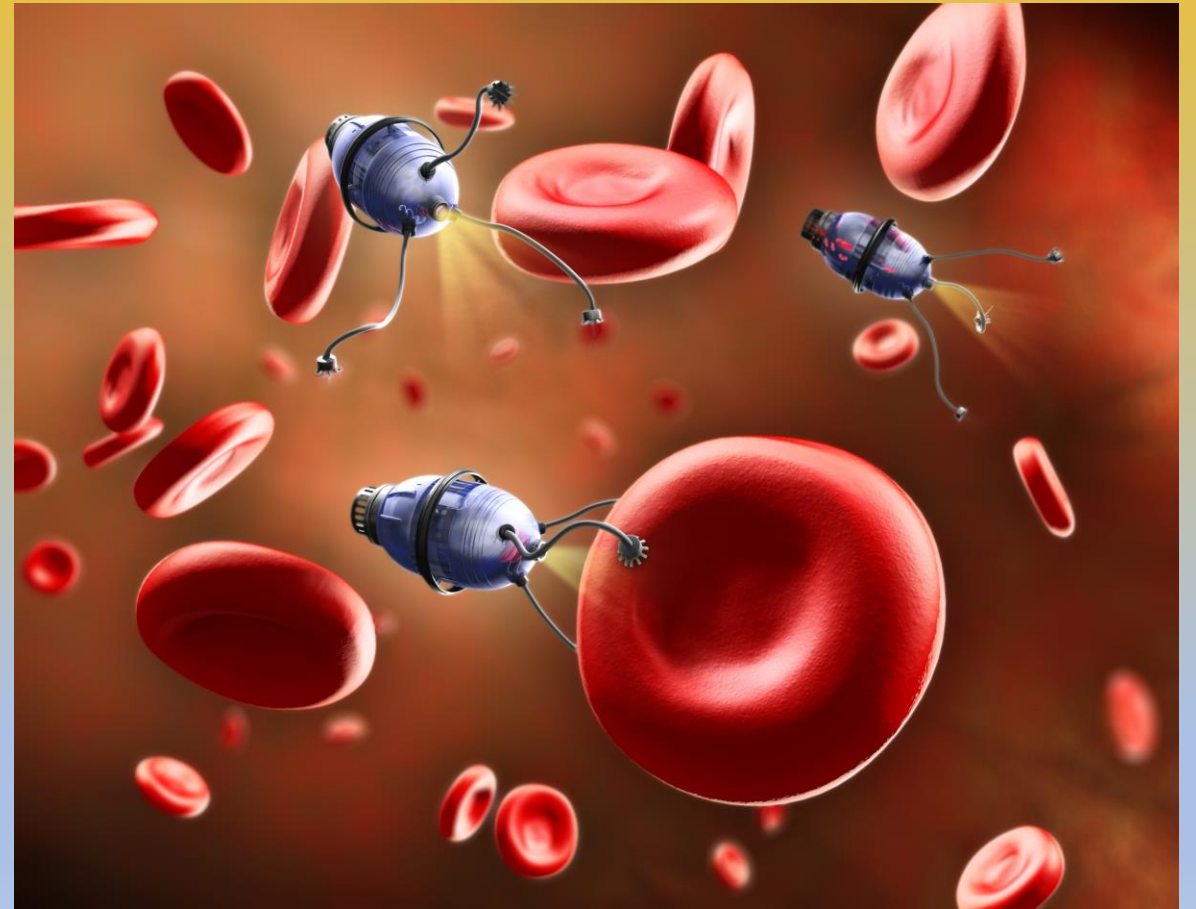
ASIPP Regenerative Medicine Guidelines

Responsible, Safe, and Effective use of Biologics in Lumbar Spine: American Society of Interventional Pain Physicians Guidelines.

Navani et al, Pain Physician 2019: In Press

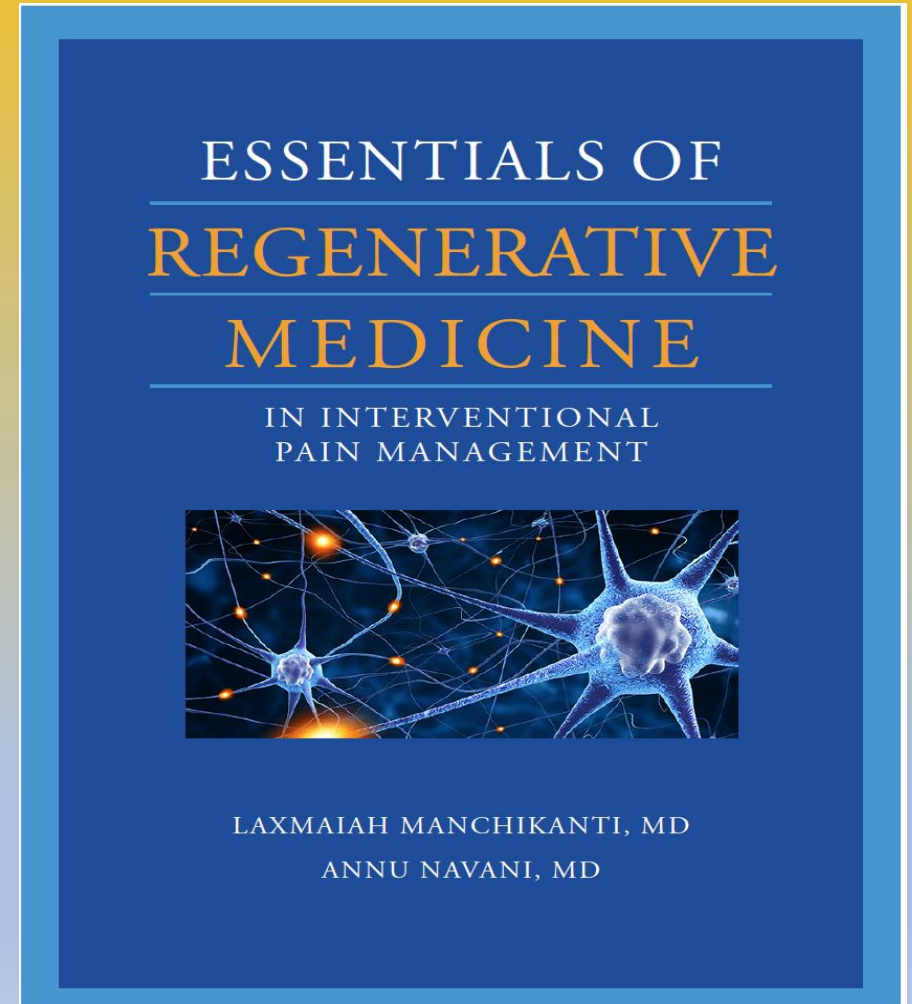
Future of Medicine

- Regenerative Medicine
- Biologic-Device combination products
- Gene therapy
- Nanotechnology
- Artificial Intelligence

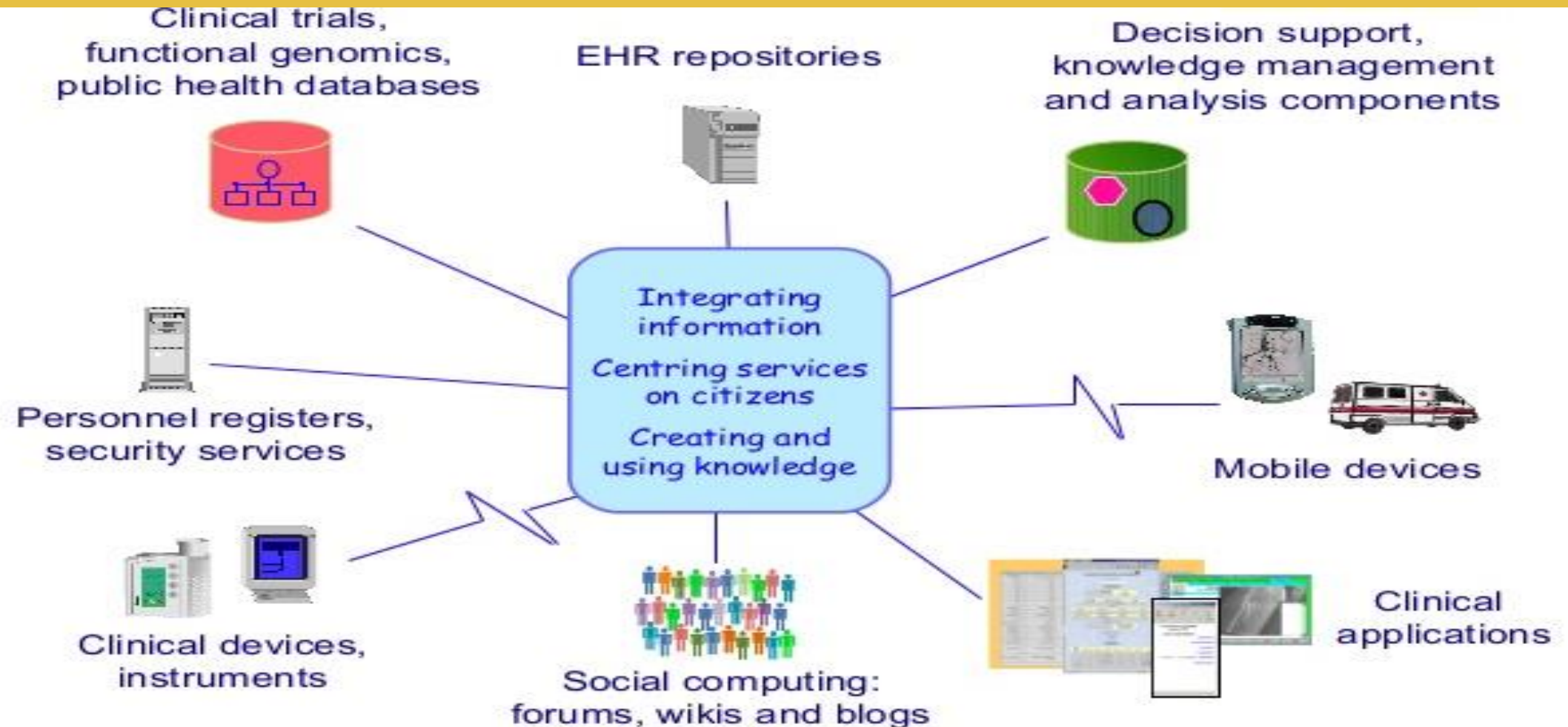


Leaders in Regenerative Medicine

Clinical application
of Regenerative
Medicine Spine
and MSK



Digital Healthcare



AI and More

Evolution of Healthcare Delivery

Predictive



Preventative



Proactive



Reactive

Be Prepared



ORIGINAL ARTICLE

Chronic Pain Challenge: A Statistical Machine-learning Method for Chronic Pain Assessment

¹Aman Navani, ²Gang Li

ABSTRACT

Aim: The objective of Chronic Pain Challenge project is designing and construction of a machine-learning system to calculate the dynamic changes to the chronic pain risk score of an individual based on various weighted health behaviors.

Materials and methods: The visual analog scale (VAS) and Oswestry Disability Index (ODI) ratings of 218 subjects were studied for dynamic changes based on three weighted health behaviors, physical exercise, nutrition, and depression in order to predict their individual and cumulative impact on severity of chronic pain. The predictive function was used to produce confidence and prediction intervals for the calculation of new VAS and ODI scores using supervised and unsupervised machine-learning algorithms and R programming language for statistical computation.

Results: This 9 months research study resulted in the development of innovative design and construction of a machine-learning program that accurately predicted the changes to standardized tests, such as VAS and ODI based on weighted values for depression score (DS), nutrition score (NS) and physical activity score (PAS). The testing of both extreme and moderate ranges of health behavior values in a variety of subjects and comparison against simple weightage confirmed the accuracy and validity of the program.

Conclusion: Chronic Pain Challenge program is a valid and accurate method in predicting chronic pain risk of an individual based on the engagement in various health behaviors. The Chronic Pain Challenge program can predict and prevent progression of chronic pain and disability by global education and empowerment, thereby disrupting the current health care model with the emerging and accelerating technology.

Clinical significance: The Chronic Pain Challenge program is an innovative statistical machine-learning program for chronic pain predictability based on individual's health behavior patterns.

Keywords: Algorithm, Chronic pain, Health behaviors, Health risk, Health statistics, Machine learning, Pain risk.

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Conflict of interest: None

INTRODUCTION

Chronic pain is a major social and economic burden around the world. Globally, 20% of adults suffer from pain and 10% are newly diagnosed with chronic pain each year.¹ Pain can be acute or chronic, continuous or intermittent, nociceptive or neuropathic, or any combination thereof. Although there are several risk factors for chronic pain, the main determinants are mental and physical stress at work,^{2,3} socioeconomic status,⁴ rurality,⁵ occupational status,⁶ race,^{7,8} and education.⁹ These risk factors are preventable to a large extent and if identified and corrected in a timely fashion can lead to prevention of chronic pain and disability.

Developments in the field of genetics, information technologies, and nanotechnology are enforcing a more individualized approach to health care. People are living longer due to scientific advances in understanding of the etiology of diseases, improvements in diagnostic techniques, and sophistication of treatment protocols. However, in order to build healthy communities, the key is to focus on prevention and early intervention before the onset of chronic illness. Chronic pain due to its profound impact on the social and economic structure of a community warrants attention as an immediate public health priority.

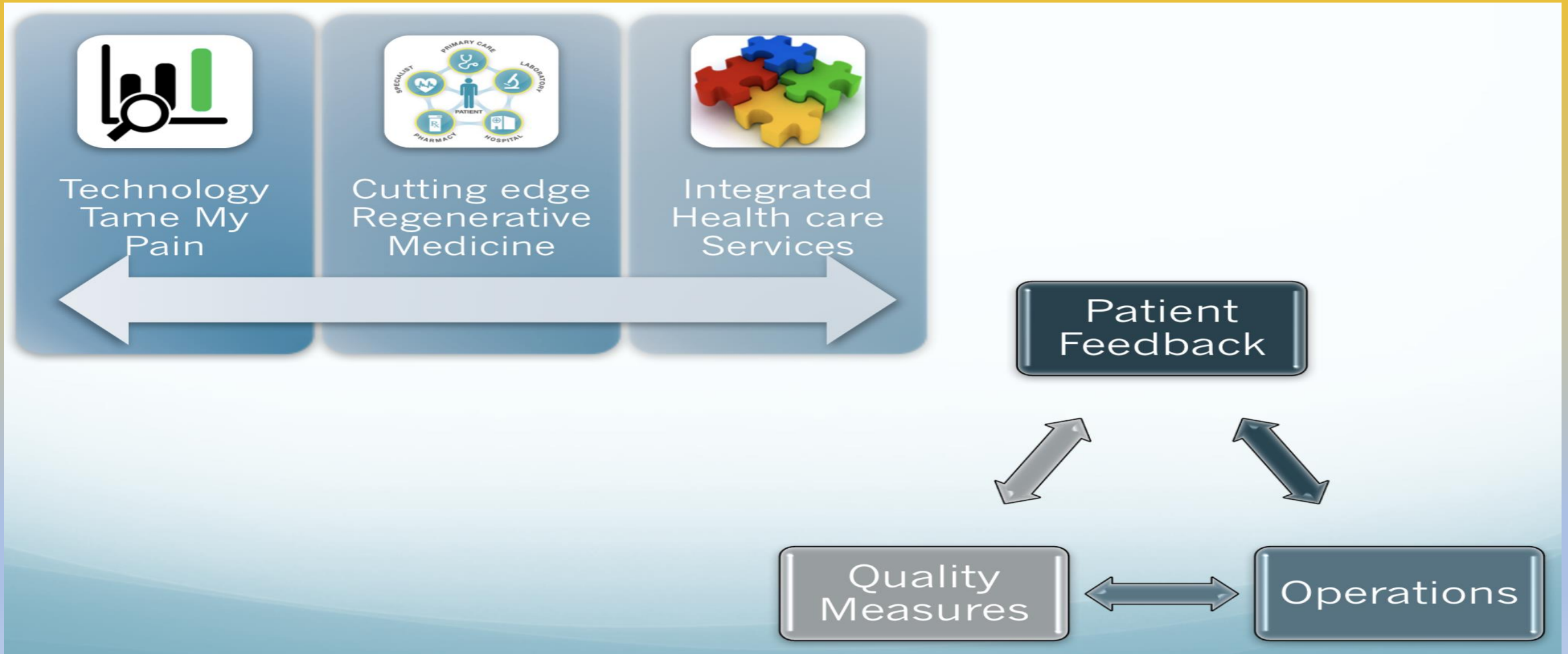
Prevention of chronic pain necessitates the use of a pain measurement tool that can accurately identify the effect of health and behavioral interventions in people. Applying this tool to accurately predict the risk of developing chronic pain lacking healthy behaviors or vice versa can serve as a powerful tool in prevention of or treatment at an early stage of chronic pain before its multidimensional impact sets in. There are some aspects of lifestyle education that are practiced by primary care physicians and health coaches, but there is no universal paradigm accepted for chronic pain prevention and management.

In USA, Center for Medicare and Medicaid services has developed a risk adjustment system and has assigned a risk score to a particular patient based on their age, gender, and presence or absence of chronic disease.¹⁰ This system assigns a single "Health Risk Score" to a patient

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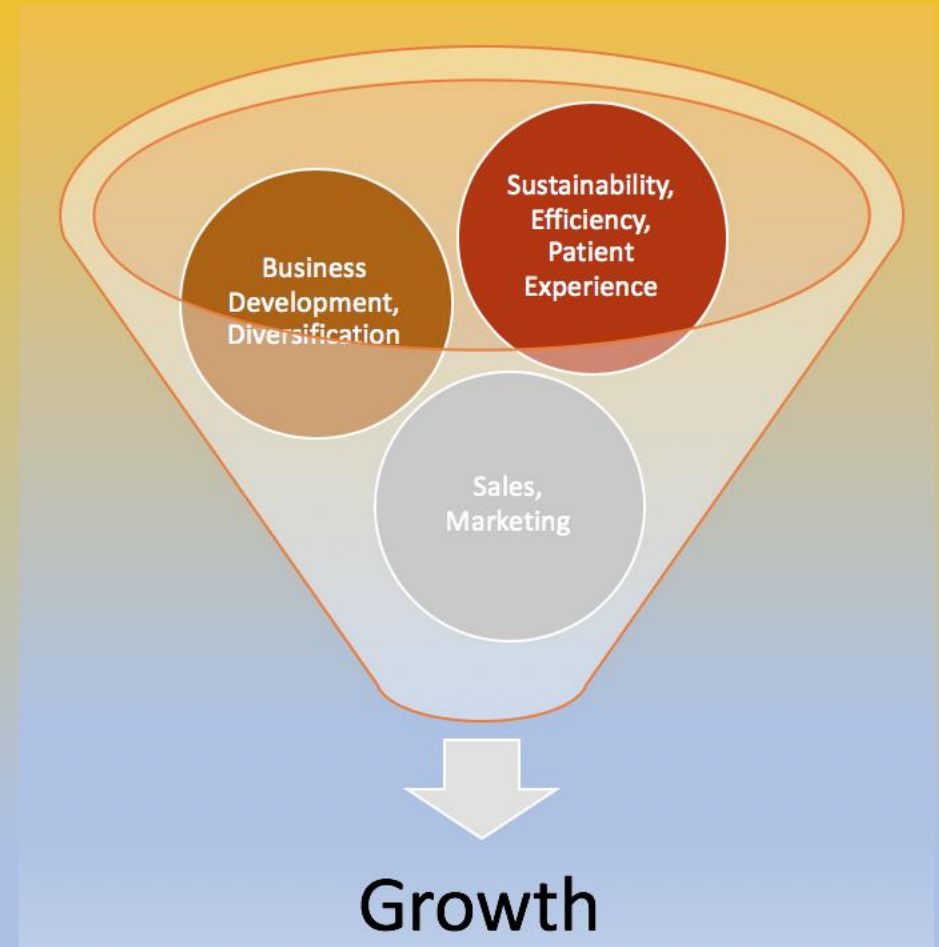


Key Concepts



Looking Forward

- Balance between income and costs
- Outstanding Clinical Outcomes
- High customer satisfaction
- Diversification
- Business Development
- Technology infusion
- Sales, Marketing





EVEN THE SKY IS NOT YOUR LIMIT.
BELIEVE

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