The Economic and Functional Impacts of ISMETT

Battelle Technology Partnership Practice
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Battelle Memorial Institute

- World’s largest independent non-profit research institute
- Works on science, technology and innovation as drivers of economic growth
- HQ in Columbus, Ohio USA
The Battelle Technology Partnership Practice

• Battelle’s economic development strategy and economic research group

• Major practice in impact analysis, including life science economic impact for:
  - Academic medical centers
  - Universities
  - Governments
  - Associations and foundations
ISMETT

Introduction to the Istituto Mediterraneo per i Trapianti e Terapie ad Alta Specializzazione
Background

• Established 1997 in Palermo
• Public/Private Partnership
  ▪ Region of Sicily
  ▪ Cervello and Civico Hospitals
  ▪ UMPC
• Organ transplantation and highly specialized therapies
• Recognized today as among Europe’s signature transplantation centers
ISMETT Mission

• Advanced specialty clinical care
• Education and training of health care workforce
• Biomedical R&D

In doing so, keep Sicilians in Sicily for care, bring patients to Sicily, raise the standard of care, provide the latest in technologies and specialized techniques, educate and train health care personnel, advance research and encourage the advancement of a biomedical economic cluster in Sicily.
Structure of ISMETT Impacts

- **Labor**
  - Expenditure Impacts (Backward Effect)
    - Spending in Sicily
  - Functional Impacts (Forward Effect)

- **Supplies**
  - Non-clinical (Travel and Associated Expenditures) Retained in Sicily

- **Utilities**
  - Clinical Care of Patients
  - Practice Innovations
  - Information/Knowledge Diffusion
  - Basic Science Research
  - Translational Science R&D
  - Clinical Research
  - Innovation
  - Commercialization

- **Building**
  - Physician Education
  - Allied Health Education
  - Bioscience Research Education

- **Multiplier Effect (Spending Recirculation in Sicily)**
  - Total Sicilian Economic Impact (Backward Linkage)
Battelle’s analysis

• Quantitative analysis of expenditure impacts
  ▪ Economic Output
  ▪ Employment
  ▪ Government Revenue

• Quantitative/qualitative assessment of functional impacts
  ▪ Clinical Care and Patients Retained in Sicily
  ▪ Research and Development
  ▪ Biomedical Education and Workforce Development
  ▪ A New Management Model
Quantitative Impact (Expenditure Impact Analysis)
Methodology

- Linear Cash Flow Analysis
- Well-proven technique for academic health center impact measurement
- Able to incorporate detailed expenditure data from ISMETT administration and data from survey of ISMETT personnel
- Measures direct and indirect (multiplier effect) impacts
- Models impact on output (business volume), jobs, and government revenues
Impact on Sicily

For 2013 = €132.5 million and 1,793 total jobs

<table>
<thead>
<tr>
<th>IMPACT</th>
<th>ECONOMIC OUTPUT (BUSINESS VOLUME)</th>
<th>EMPLOYMENT</th>
</tr>
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<tbody>
<tr>
<td>DIRECT IMPACT</td>
<td>€ 67,936,382</td>
<td>862</td>
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<td>INDIRECT (MULTIPLIER) IMPACT</td>
<td>€ 64,539,563</td>
<td>931</td>
</tr>
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<td>TOTAL IMPACT</td>
<td>€ 132,475,945</td>
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## IMPACT

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<td>DIRECT EXPENDITURE IMPACT</td>
<td>€ 67,936,382</td>
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<tr>
<td>Direct Expenditures of ISMETT for Goods and Services</td>
<td>€ 49,600,000</td>
</tr>
<tr>
<td>Direct Expenditures of ISMETT Physicians, Nurses and Other Personnel</td>
<td>€ 13,141,628</td>
</tr>
<tr>
<td>Direct Expenditures by Visitors to Patients (from outside of Sicily)</td>
<td>€ 3,231,365</td>
</tr>
<tr>
<td>Direct Expenditures by Visitors (from outside of Sicily, not including hospital expenditures)</td>
<td>€ 449,918</td>
</tr>
<tr>
<td>Direct Expenditures by Visitors to Personnel and ISMETT</td>
<td>€ 1,513,473</td>
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Functional Impacts
CLINICAL CARE
## Clinical Care

<table>
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<tr>
<th>TYPE OF SERVICE</th>
<th>2013 NUMBER OF PATIENTS FROM SICILY</th>
<th>2013 NUMBER OF PATIENTS FROM ITALY (RESIDING OUTSIDE OF SICILY)</th>
<th>2013 NUMBER OF PATIENTS FROM OUTSIDE OF ITALY</th>
<th>2013 TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall patient visits (consults, check-ups, etc.)</td>
<td>29,154</td>
<td>807</td>
<td>62</td>
<td>30,023</td>
</tr>
<tr>
<td>Surgeries (total)</td>
<td>1,455</td>
<td>45</td>
<td>23</td>
<td>1,523</td>
</tr>
<tr>
<td>Organ transplants</td>
<td>110</td>
<td>11</td>
<td>6</td>
<td>127</td>
</tr>
</tbody>
</table>
Estimate of Health Care Expenditures Retained in Sicily

ASSUMPTIONS:

- **Two-thirds of Inpatient stays.** ISMETT was established to provide specialized services generally unavailable (or available at a lower standard of care) in Sicily prior to the establishment of ISMETT, but some cases could still have been treated with in Sicily.

- **One-third of Day Hospital visits.** The specialized nature care means that even for Day Hospital care many patients (1/3rd) would have had to receive their care outside of Sicily.

- **Two outpatient visits per inpatient case.**

On this basis using 2013 data = two-thirds of 2,587 inpatient stays (1,725 stays), + one-third of 2,306 day hospital visits (769 visits) + 3,450 outpatient visits (2 x 1,725).
Estimate of Health Care Expenditures Retained in Sicily

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<tr>
<th>H) ISMETT Production Revenue Retained in Sicily for Sicilians who May Otherwise Have Left Sicily for Care = (B<em>E)+(C</em>F)+(D*G)</th>
<th>I) Total Direct Economic Impact of ISMETT (From Battelle Economic Impact Model: See Table 1)</th>
<th>J) Percent of Total Direct ISMETT Economic Impact Allocable to Retained Sicilian Patients = (H/A)*100</th>
<th>K) Total Direct ISMETT Economic Impact Allocable to Retained Sicilian Patients = I*J</th>
<th>L) Output Multiplier (Indirect Impact Multiplier from Battelle Economic Impact Model: See Table 1)</th>
<th>Estimated total Economic Impact of Patient Care Expenditures Retained in Sicily = K*L</th>
</tr>
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<td>€ 54,900,749</td>
<td>€ 67,936,382</td>
<td>63.28%</td>
<td>€ 42,987,244</td>
<td>1.95</td>
<td>€ 83,825,125</td>
</tr>
</tbody>
</table>
Net Benefit to Sicily of Retained Patients

- Previous slide only patient care cost
- Also have to account for cost of travel support avoided
- Calculated travel savings = €44.3 million
  Retained healthcare expenditure impact of €83.8 million
  + Travel cost savings of €44.3 million
  = €128.1 million in retained funds for Sicily
- Have to subtract cost of care of €54.9 million
- CONCLUSION: Net financial benefit for Sicily of retaining this volume of patients = €128.1 - €54.9 = €73.2 million
Functional Impacts
UPMC RELATIONSHIP
Partnership with UPMC provides access to major global academic medical center and its research and training enterprise

- $780.4 million research budget
- $476 million from National Institutes of Health
- >5,000 faculty
- Only 3% of U.S. hospital systems ranked as “Best Hospitals” in one specialty. UPMC achieves this ranking in 14 specialties
- Full depth and expertise of clinical staff in UPMC and the University of Pittsburgh available on open access, daily basis for all ISMETT personnel
- Research resources and infrastructure of UPMC/Pitt available to ISMETT
- Experienced surgical team. Over 17,000 organ transplants performed by UPMC.
Partnership with UPMC provides access to major global academic medical center and its research and training enterprise

- ISMETT physicians and clinical staff able to train, consult and work alongside UPMC teams
- Knowledge transfer and training has resulted in ISMETT achieving transplant outcomes comparable to best transplant centers globally
  - ISMETT results for 1 year’s survival after liver transplant at >85%, 5 years survival >75% and 10 years >60%.
- ISMETT first hospital in Southern Italy to receive world-class credential of JCI accreditation.
Functional Impacts
RESEARCH
Regenerative Medicine Research

• Regenerative medicine and the development of the Regenerative Medicine and Cell Therapy Unit (Cell Factory)

• Pioneering work in:
  ▪ Injected fetal hepatocytes to sustain patients awaiting liver transplantation
  ▪ Transplantation of fetal stem cells
  ▪ Transplantation of pancreatic islets to support diabetes patients
  ▪ Infusion of stem cells to regenerate damaged cardiac muscle

• Collaboration with McGowan Institute in Pittsburgh
Other Research Areas

• Advancement of surgical procedures and protocols
• Use of reduced size, living donor, marginal organs and split livers for transplants – expanding organ availability
• Development of immunosuppression therapies
• Adoptive cell immunotherapy for treatment of post-transplant viral infections
• Artificial organs as a bridge to transplantation or as destination therapy for patients with end-stage heart and lung failure.
Advancing Health Care Management

• Advanced IT systems for hospital and health system management
• Electronic medical records introduced in 1999
• High speed access to complete patient records when organ becomes available
• Ongoing monitoring/at-home monitoring of patients’ data and vital signs
• Paperless radiology department for diagnostics and interventional radiology
• Real-time telepathology and other consultations between Palermo and Pittsburgh
• Ultimately serves to increase quality of care, access to care, patient safety and operational cost effectiveness.
Building reputation and research networks

- ISMETT authors produced 83 peer reviewed journal articles between 2001-2012
- European connectivity: Co-authorship with researchers in Germany, Switzerland, France, Spain and the United Kingdom
- USA connectivity: Co-authorship with researchers at the University of Pittsburgh, University of North Carolina, University of Miami, Temple University, Thomas Jefferson University.
Functional Impacts
EDUCATION
International training and knowledge transfer

- ISMETT engaged in training for physicians, nurses, other clinical and administrative personnel
- Specialized training through UPMC and the University of Pittsburgh
- Renato Fiandaca Simulation Center – advanced simulators or hand-on training. Collaboration with WISER at UPMC
- CME, educational events, theoretical and on-the-job practical training.
Functional Impacts
BIOMEDICAL CLUSTER DEVELOPMENT IN SICILY
Building a Biomedical R&D Cluster in Sicily

- ISMETT has raised the profile of Italy, Sicily and Palermo in life sciences
- Seeking to build upon this momentum with Ri.MED Foundation
  - Partners: National Government, Region of Sicily, Italian National Research Council, UPMC.
- Build upon growing international reputation by expanding biomedical research and translational clinical science infrastructure in Palermo (Carini)
- Development of Ri.MED Biomedical Research and Biotechnology Center (BRBC)
BRBC

Primary research focus areas:
• Structural biology
• Computational biology
• Computational drug discovery
• Vaccine development
• Device development
• Tissue engineering and regenerative medicine
• Molecular imaging
• Neuroscience

25,000 square meters of laboratory facilities.
Core labs, vivarium and transgenic rodent facility
Business incubator and innovation commercialization program
300 bed academic medical center/research hospital
A 600 person biomedical science community
Key Success Factors Necessary for Further Advancing Palermo as a Biomedical R&D and Commercialization Hub

- Engaged academic research institutions with actively committed leadership
- Discretionary national government support or other R&D funding support
- A focus on existing and emerging core competencies
- Available capital for all stages of venture development and growth
- Talent and workforce development
- Access to specialized facilities and equipment
- Intensive networking across sectors and with industry
- Stable and supportive business, tax, and regulatory policies
- Patience and a long-term perspective
The Singapore Example

• Similar size to Sicily with 5.2 million people
• Implemented 10-year strategy for biomedical cluster growth
• Developed research institutes (A*STAR) and encouraged industry collaboration
• Biopolis Research Park development
• Investing 2.5% of GDP in R&D, en-route to goal of 3.5%
• Pharma sector grown 274% since 2000
• Now one of the highest concentrations of researchers in the world
• Biomedical manufacturing now employing >13,000 and biomed R&D a further 4,300
“Pharmaceuticals are knowledge products. Drugs are physically small but their effects are targeted and potent, and they command high value. That is how Singapore must be. Ours is a small island with no natural resources. We must therefore invest in knowledge and R&D, recruit and groom talent, and focus our efforts to excel in niche areas. Then we can transcend the limitations of physical size and punch above our weight class among the global competition”.

Prime Minister of Singapore, 2009
The Arizona Example

- Population 6.5 million
- Long-term commitment to strategic bioscience development roadmap produced in 2001
- First win with attraction of International Genomics Consortium tissue research and banking facility
- Then the Translational Genomics Research Institute (Tgen)
- Further investment in research universities.
- Between 2002 and 2012 added almost 4,200 direct bioscience jobs. 185 new business starts.
Life Science is Where the Action is in New Research

Number of New Research Journals by Category 2000-2013

- **MEDICINE/HEALTH**: 2267
- **COMPUTING, IT AND COMMUNICATIONS TECH**: 929
- **AGRICULTURE**: 636
- **ENVIRONMENT & NATURAL RESOURCES**: 578
- **PHYSICAL SCIENCES**: 434
- **BRAIN SCIENCE/PSYCHOLOGY**: 426
- **BASIC LIFE SCIENCES**: 366
- **PHARMACEUTICAL SCIENCES**: 320
- **ENGINEERING**: 233
- **SOCIAL SCIENCES**: 142
- **HUMANITIES**: 17

Life Sciences: 73%
Other: 27%
Sicily Can Do It….

- Similar sized places have done so, adopting a decade+ strategic commitment
- Sicily has a base of biomedical excellence and expanding R&D through ISMETT
- Potential to further build momentum via Ri.MED
- Need strategic attention paid to key factors highlighted
- Potential for high wage jobs and export income
- An attainable goal is for Sicily to become the central location for biomedical sciences cluster development in the Mediterranean Basin
CONCLUSIONS
• ISMETT has successfully met the objective of filling major gaps in Sicilian clinical care

• The management experiment with UPMC has been a notable success, and ISMETT stands among a premiere group of transplantation and specialty care centers in terms of outcomes and reputation.

• ISMETT has also become an important economic engine for Sicily
  ▪ Annual economic impact of over €132 million
  ▪ 1,793 jobs
  ▪ €73.2 million net benefit through retained Sicilian patients
  ▪ €3.1 million in tax revenues within Sicily and €19.6 million within Italy overall.

• ISMETT’s growing research presence, together with planned Ri.MED development, provides a strong opportunity for Sicily to advance as a hub for biomedical sector development in the Mediterranean Basin.
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