Physician Perceptions of Consumer Health Technology

By: Maddy Myers
Mentor: Dr. Cinnamon Bloss
UC San Diego School of Medicine
Department of Biomedical Informatics
Research Funded By NIH Grant: T15LM011271
About Me:

- 5th Year Public Health and Biology Major
- Gain research experience in a collaborative lab
- Interests:
  - U.S. Healthcare System
  - Big Data in the Clinical Setting
  - Physician Wellness

Research Funded by Grant T15LM011271
Outline

01 Define consumer health technology

Research Funded by Grant T15LM011271
Outline

01 Define consumer health technology

02 Discuss the process of a systematic review

Research Funded by Grant T15LM011271
Outline

01 Define consumer health technology

02 Discuss the process of a systematic review

03 Investigate key findings from empirical studies

Research Funded by Grant T15LM011271
Consumer Health Technology

• Genetic testing
• Microbiome testing
• Blood and other biomarker tests
• Environmental testing
• Wearables
Why Care About Consumer Health Technology?

• Products are popular + promote health
• Disruptive technology
  • Innovations that create a new market and value network + eventually disrupts an existing market and value network
  • Estimated to be a $536.6 billion market by 2025
• Ethical, legal, social, + privacy implications
• Massive amount of data being generated
• Data permeates into the clinical setting
• Potential for clinical utility
  • Relevant and useful intervention

Research Funded by Grant T15LM011271
Research Question

What is the impact of DTC products, testing, and screening and the large amounts of data they generate on physicians?

More specifically, how is it impacting the patient-physician relationship?
Outline

Discuss the process of a systematic review
Systematic Review

Research Funded by Grant T15LM011271
Systematic Review

Synthesize current info into a convenient evidence based summary

Research Funded by Grant T15LM011271
Systematic Review

Synthesize current info into a convenient evidence based summary

Efficient mode to communicate info to busy physicians + researchers

Research Funded by Grant T15LM011271
Systematic Review

Synthesize current info into a convenient evidence based summary

Efficient mode to communicate info to busy physicians + researchers

Part of evidence based healthcare

Research Funded by Grant T15LM011271
Systematic Review

Synthesize current info into a convenient evidence based summary

Efficient mode to communicate info to busy physicians + researchers

Part of evidence based healthcare

Starting point for development of best practice guidelines

Research Funded by Grant T15LM011271
Deploy Searches on Electronic Databases: CINAHL, Cochrane, Embase, PsycINFO, PubMed, Sociological Abstracts, Web of Science

Develop research question and search strategies utilizing structured vocabulary + free text keywords

Search engine filtering

Upload to citation manager + remove duplicates

Titles + abstracts screened for eligibility $N = ?$

Full text records screened for eligibility $N = ?$

Studies assessing physician perceptions of consumer health technology $N = ?$

Excluded if:
- Not human subjects
- Not published in past 10 years
- Not in English

Excluded if:
- Not consumer health tech
- Not empirical

Excluded if:
- Not consumer health tech
- Not peer reviewed

Research Funded by Grant T15LM011271
Develop research question and search strategies utilizing structured vocabulary + free text keywords

Deploy Searches on Electronic Databases: CINAHL, Cochrane, Embase, PsycINFO, PubMed, Sociological Abstracts, Web of Science

Excluded if:
- Not consumer health tech
- Not empirical

Excluded if:
- Not consumer health tech
- Not peer reviewed

Excluded if:
- Not human subjects
- Not published in past 10 years
- Not in English

Studies assessing physician perceptions of consumer health technology

N = ?

Research Funded by Grant T15LM011271
Deploy Searches on Electronic Databases: CINAHL, Cochrane, Embase, PsycINFO, PubMed, Sociological Abstracts, Web of Science

Develop research question and search strategies utilizing structured vocabulary + free text keywords

Search engine filtering

Upload to citation manager + remove duplicates

Excluded if:
- Not consumer health tech
- Not empirical

Titles + abstracts screened for eligibility

N = ?

Excluded if:
- Not consumer health tech
- Not peer reviewed

Full text records screened for eligibility

N = ?

Excluded if:
- Not human subjects
- Not published in past 10 years
- Not in English

Studies assessing physician perceptions of consumer health technology

N = ?
Deploy Searches on Electronic Databases: CINAHL, Cochrane, Embase, PsycINFO, PubMed, Sociological Abstracts, Web of Science

Develop research question and search strategies utilizing structured vocabulary + free text keywords

Search engine filtering

Upload to citation manager + remove duplicates

Titles + abstracts screened for eligibility N = ?

Excluded if:
- Not consumer health tech
- Not empirical

Full text records screened for eligibility N = ?

Excluded if:
- Not consumer health tech
- Not peer reviewed

Studies assessing physician perceptions of consumer health technology N = ?

Excluded if:
- Not human subjects
- Not published in past 10 years
- Not in English

Research Funded by Grant T15LM011271
Outline

01 Define consumer health technology

02 Discuss the process of a systematic review

03 Investigate key findings from empirical studies

Research Funded by Grant T15LM011271
2012 Survey Study: Physician Awareness + Preparedness of DTC Genetic Testing

2012 Survey Study: Physician Awareness + Preparedness of DTC Genetic Testing

Convenience sample of internists and family medicine physicians (N = 382)

Research Funded by Grant T15LM011271
2012 Survey Study: Physician Awareness + Preparedness of DTC Genetic Testing

Convenience sample of internists and family medicine physicians (N = 382)

N = 148 (38.7%) aware of DTC genetic testing
2012 Survey Study: Physician Awareness + Preparedness of DTC Genetic Testing

Convenience sample of internists and family medicine physicians (N = 382)

N = 148 (38.7%) aware of DTC genetic testing

N = 59 (15%) felt prepared to answer questions about DTC genetic testing

Research Funded by Grant T15LM011271
2012 Survey Study: Physician Awareness + Preparedness of DTC Genetic Testing

Convenience sample of internists and family medicine physicians (N = 382)

N = 148 (38.7%) aware of DTC genetic testing

N = 59 (15%) felt prepared to answer questions about DTC genetic testing

41 + = 2x more likely to be aware of DTC testing > 40 -

Research Funded by Grant T15LM011271
2012 Survey Study: Incorporating DTC Info into Patient Care

Bernhardt et al. Incorporating direct-to-consumer genetic information into patient care: attitudes and experiences of primary care physicians
2012 Survey Study: Incorporating DTC Info into Patient Care

502 family medicine and internal medicine physicians

Research Funded by Grant T15LM011271
Bernhardt et al. Incorporating direct-to-consumer genetic information into patient care: attitudes and experiences of primary care physicians
2012 Survey Study: Incorporating DTC Info into Patient Care

- 502 family medicine and internal medicine physicians
- 58% reported feeling confident in interpreting genetic test results

Research Funded by Grant T15LM011271
Bernhardt et al. Incorporating direct-to-consumer genetic information into patient care: attitudes and experiences of primary care physicians
2012 Survey Study: Incorporating DTC Info into Patient Care

- 502 family medicine and internal medicine physicians
- 58% reported feeling confident in interpreting genetic test results
- 56% had a genetics course in medical school

Research Funded by Grant T15LM011271
Bernhardt et al. Incorporating direct-to-consumer genetic information into patient care: attitudes and experiences of primary care physicians
2012 Survey Study: Incorporating DTC Info into Patient Care

502 family medicine and internal medicine physicians

58% reported feeling confident in interpreting genetic test results

22% felt their training in genetics was sufficient

56% had a genetics course in medical school

Research Funded by Grant T15LM011271
Bernhardt et al. Incorporating direct-to-consumer genetic information into patient care: attitudes and experiences of primary care physicians
2012 Survey Study: Incorporating DTC Info into Patient Care

- 502 family medicine and internal medicine physicians
- 58% reported feeling confident in interpreting genetic test results
- 56% had a genetics course in medical school
- 22% felt their training in genetics was sufficient
- 20% had no genetics education

Research Funded by Grant T15LM011271
Bernhardt et al. Incorporating direct-to-consumer genetic information into patient care: attitudes and experiences of primary care physicians
2012 Survey Study: Incorporating DTC Info into Patient Care

<table>
<thead>
<tr>
<th>502 family medicine and internal medicine physicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>58% reported feeling confident in interpreting genetic test results</td>
</tr>
<tr>
<td>56% had a genetics course in medical school</td>
</tr>
<tr>
<td>22% felt their training in genetics was sufficient</td>
</tr>
<tr>
<td>20% had no genetics education</td>
</tr>
<tr>
<td>40% believed genetic results = have clinical utility</td>
</tr>
</tbody>
</table>

Research Funded by Grant T15LM011271

Bernhardt et al. Incorporating direct-to-consumer genetic information into patient care: attitudes and experiences of primary care physicians
Conclusions

Physician awareness and preparedness is low

If (and it did) DTC genetic testing becomes more widely used:

- Increased transparency around test technology
- Increased test efficacy
- Education!

Research Funded by Grant T15LM011271
2019 Interview Study: Physicians’ Perspectives on Unsolicited Genomic Results (UGRs)

Adult and pediatric primary care + subspecialty physicians Semi structured interviews

Semi structured interviews Across

Across four sites

Research Funded by Grant T15LM011271
2019 Interview Study: Non-Geneticist Physician Responses Regarding Unsolicited Genetic Results

Positive
- targeted screening
- earlier intervention
- care with appropriate specialists

Negative
- limited supporting data
- unnecessary intervention
- insurance cost increase
- lack of evidence based infrastructure
- informed consent?
- clinical disutility
- hindered workflow
- test regret, fear, anxiety
- un-reimbursed time
- creating disease
- lack of clinical decision support
- ill informed referrals
- false reassurance

Research Funded by Grant T15LM011271
Perceived Barriers of CGHD + DTC Tests

Efficacy
- "Light touch" from the FDA
- Varying degrees of lab quality
- Lack of Regulation
- 40% of genetic variants from DTC tests = not confirmed with Sanger Sequencing
- Unsolicited results = challenge to authority
- Paternalism
- "I do not know" = not acceptable
- + result, but no clinical solution or false + result

Clinical Utility
- Emotional burden on patient, frustration for physician
- Genotypic, but no phenotypic expression
- Unnecessary testing + treatment
- Financial costs - estimated $750 billion/year healthcare spending = wasteful
- Iatrogenic injury

Culture of Medicine Clash
- Perfectionist + fear based system (grades + torts)
- Paternalism
- Uncongruent data formats

Referrals
- Referrals to specialists to offload
- Best referral = geneticists + genetic counselors
- Referrals to specialists to offload
- Lack of knowledge surrounding which specialists to send patients to
- Shortage = PCPs feel obligated to fill void
- Avg. PCP = 3,000 patients + avg. visit = 15.7 min

Visit Implementation
- Lack of best practice guidelines
- Incongruent data formats
- Time

Knowledge
- Genetics = always changing
- Most practicing physicians = received one semester of genetics
- M1 + tech now not around then
- Survey reported approx. 10% of physician respondents felt they knew all they needed to about genetics for their jobs
- Many genetic variants once thought to be pathogenic might confer little/no risk
- PDFs, free text, graphics = cannot be put into EMR

Research Funded by Grant T15LM011271
Perceived Barriers of CGHD + DTC Tests

Efficacy

Clinical Utility

Culture of Medicine Clash

Unsolicited results = challenge to authority

Paternalism

"I do not know" = not acceptable

Varying degrees of lab quality

40% of genetic variants from DTC tests = not confirmed with Sanger Sequencing

"Light touch" from the FDA

Lack of Regulation

Genotypic, but no phenotypic expression

Financial costs - estimated $750 billion/year healthcare spending = wasteful

Unnecessary testing + treatment

Emotional burden on patient, frustration for physician + result, but no clinical solution or false + result

Referrals

PDFs, free text, graphics = cannot be put into EMR

Shortage = PCPs feel obligated to fill void

Avg. PCP = 3,000 patients + avg. visit = 15.7 min

Time

Perfectionist + fear based system (grades + to rts)

Lack of best practice guidelines

Incongruent data formats

Implementation

Best referral = geneticists + genetic counselors

Lack of knowledge surrounding which specialists to send patients to

Referrals to specialists to offload

Survey reported approx. 10% of physician respondents felt they knew all they needed to about genetics for their jobs

Genetics = always changing

Most practicing physicians = received one semester of genetics M1 + tech now not around then

Knowledge

many genetic variants once thought to be pathogenic might confer little/no risk

Iatrogenic injury

Tandy-Connor et al. False-positive results released by direct-to-consumer genetic tests highlight the importance of clinical confirmation testing for appropriate patient care. Genetics in Medicine.
Perceived Barriers of CGHD + DTC Tests

- Efficacy
  - Clinical Utility
  - Culture of Medicine Clash
  - Ununsolicited results = challenge to authority
  - Paternalism
  - "I do not know" = not acceptable
  - Varying degrees of lab quality
  - Lack of Regulation
  - 40% of genetic variants from DTC tests = not confirmed with Sanger Sequencing
  - "Light touch" from the FDA
  - Genotypic, but no phenotypic expression
  - Financial costs - estimated $750 billion/year healthcare spending = wasteful
  - Unnecessary testing + treatment
  - Emotional burden on patient, frustration for physician
  - + result, but no clinical solution or false + result

- Clinical Utility

- Unnecessary testing + treatment

- Financial costs - estimated $750 billion/year healthcare spending = wasteful

- Emotional burden on patient, frustration for physician

- + result, but no clinical solution or false + result

- Genotypic, but no phenotypic expression

- Unnecessary testing + treatment

- Financial costs - estimated $750 billion/year healthcare spending = wasteful

- Emotional burden on patient, frustration for physician

- + result, but no clinical solution or false + result

- Genotypic, but no phenotypic expression
Perceived Barriers of CGHD + DTC Tests

- Efficacy
- Clinical Utility
- Culture of Medicine Clash

- Unsolicited results = challenge to authority
- Paternalism
  - "I do not know" = not acceptable
  - 40% of genetic variants from DTC tests = not confirmed with Sanger Sequencing "Light touch" from the FDA
  - Genotypic, but no phenotypic expression
  - Financial costs - estimated $750 billion/year healthcare spending = wasteful
  - Emotional burden on patient, frustration for physician + result, but no clinical solution or false + result

- Referrals
  - PDFs, free text, graphics = cannot be put into EMR
  - Shortage = PCPs feel obligated to fill void
    - Avg. PCP = 3,000 patients + avg. visit = 15.7 min
  - Time
    - Perfectionist + fear based system (grades + torts)
    - Lack of best practice guidelines
    - Incongruent data formats

- Implementation
  - Best referral = geneticists + genetic counselors
  - Lack of knowledge surrounding which specialists to send patients to
  - Referrals to specialists to offload

- Survey reported approx. 10% of physician respondents felt they knew all they needed to about genetics for their jobs

- Genetics = always changing
- Most practicing physicians = received one semester of genetics M1 + tech now not around then

- Knowledge many genetic variants once thought to be pathogenic might confer little/no risk

- Iatrogenic injury
Most practicing physicians = received one semester of genetics
M1 + tech now not around then

Survey reported approx. 10% of physician respondents felt they
knew all they needed to about genetics for their jobs

Genetics = always changing

many genetic variants
once thought to be
pathogenic might
confer little/no risk

Knowledge

Function: Perceived Barriers of CGHD + DTC Tests

- Efficacy
- Clinical Utility
- Culture of Medicine Clash
  - Unsolicited results = challenge to authority
  - Paternalism
    - "I do not know" = not acceptable
- Varying degrees of lab quality
- Lack of Regulation
  - 40% of genetic variants from DTC tests = not confirmed with Sanger Sequencing
- "Light touch" from the FDA
- Genotypic, but no phenotypic expression
- Financial costs - estimated $750 billion/year healthcare spending = wasteful
- Unnecessary testing + treatment
- Emotional burden on patient, frustration for physician + result, but no clinical solution or false + result
- Referrals
  - PDFs, free text, graphics = cannot be put into EMR
- Shortage = PCPs feel obligated to fill void
  - Avg. PCP = 3,000 patients + avg. visit = 15.7 min
- Time
- Lack of best practice guidelines
- Incongruent data formats
- Best referral = geneticists + genetic counselors
- Lack of knowledge surrounding which specialists to send patients to
- Referrals to specialists to offload
- Survey reported approx. 10% of physician respondents felt they knew all they needed to about genetics for their jobs

Tai-Seale et al. Time Allocation in Primary Care Office Visits.
Perceived Barriers of CGHD + DTC Tests

- Efficacy
- Clinical Utility
- Culture of Medicine Clash
- Unsolicited results = challenge to authority
- Paternalism
- "I do not know" = not acceptable
- Varying degrees of lab quality
- Lack of Regulation
- 40% of genetic variants from DTC tests = not confirmed with Sanger Sequencing "Light touch" from the FDA
- Genotypic, but no phenotypic expression
- Financial costs - estimated $750 billion/year healthcare spending = wasteful
- Unnecessary testing + treatment
- Emotional burden on patient, frustration for physician + result, but no clinical solution or false + result
- Referrals
- PDFs, free text, graphics = cannot be put into EMR
- Shortage = PCPs feel obligated to fill void
- Avg. PCP = 3,000 patients + avg. visit = 15.7 min
- Time
- Perfectionist + fear based system (grades + to rts)
- Lack of best practice guidelines
- Incongruent data formats
- Visit
- Implementation
- Best referral = geneticists + genetic counselors
- Lack of knowledge surrounding which specialists to send patients to
- Referrals to specialists to offload
- Survey reported approx. 10% of physician respondents felt they knew all they needed to about genetics for their jobs
- Genetics = always changing
- Most practicing physicians = received one semester of genetics M1 + tech now not around then
- Knowledge
- Many genetic variants once thought to be pathogenic might confer little/no risk
- Iatrogenic injury
2019 Interview and Pilot Trial Study: Consumer Generated Health Data

Part 1 = semi-structured interviews of patients, caregivers, and doctors who were experienced in consumer-generated photography

Part 2 = pilot clinical trial with 30 parents of children undergoing laparoscopic appendectomy surgery

• Parents sent surgical site pictures to physician for 10 days post op

Patient and Physician Perceptions of App Based Photo Data

Patient
- Recognition of Autonomy
- Sense Making
- Empowerment
- Personal Responsibility
- Preventative Behaviors
- Health Promotion

Physician
- Reduced Consultations
- Aid in Diagnosis
- Assure Healing
- Above and Beyond

Improved Relationship
Assure Healing
What sets this study apart...

- Physician is involved throughout
- Data has clinical utility
- Physician has the knowledge to interpret the data
- Time saving and improves workflow

Research Funded by Grant T15LM011271
Moving forward...

• Strike a balance between:
  • Technological innovation + regulation
  • Individual + professional autonomy
  • User friendliness and clinical utility

• Develop a pathway for clinical integration

Resistance is futile. Accept, integrate, and improve.
Skills Learned

• Systematic review best practices
  • Database selection
  • Free text vs. structured vocabulary
  • Boolean logic
  • PRISMA checklist

• Citation management

• Work individually and in a collaborative environment

• Troubleshooting
Acknowledgements

• Bloss Lab Members
  • Mentor Dr. Cinnamon Bloss
  • Dr. Cynthia Schairer
  • Cynthia Triplett
  • Julie Cakici
  • Caryn Rubanovich
  • Carolina Mayes
  • Colin Burke
  • Sneha Lakshmanan
  • Kevin Ngo
  • Justin Castro

• DBMI Faculty and Staff

Research Funded by Grant T15LM011271
THANK YOU!
Questions?