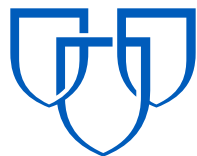


MAYO
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以患者为中心的医疗 之医学信息学解决方案

An informatics solution for patient- centered care

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- 1月30日，亚马逊、伯克希尔哈撒韦及摩根大通宣称将成立一家独立的医保公司，为其雇员及家人提供价格合理、透明、高品质医疗保健服务。联合健康集团(UnitedHealth)、信诺集团(Cigna)和医疗保险商Anthem股价下跌4-7%。CVS和沃博联(Walgreens)以及快捷药方(Express Scripts)股价跌幅都在4-5%之间。药品分销商康德乐健康(Cardinal Health)、美源伯根(AmerisourceBergen)和麦克森(McKesson)下跌1-3%

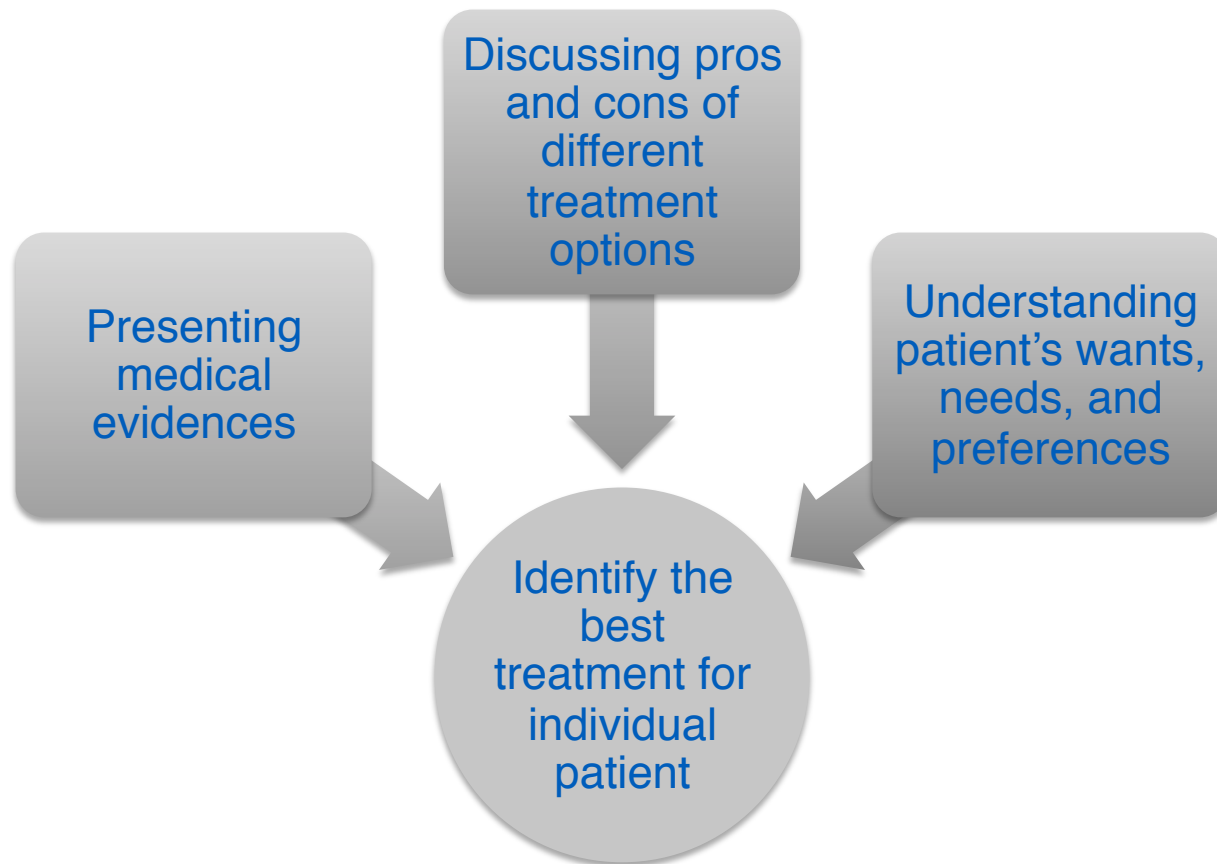
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以患者为中心的医疗 (patient-centered care)

“a partnership among practitioners, patients, and their families (when appropriate) to ensure that decisions respect patient’s wants, needs, and preferences and that patients have the education and support they need to make decisions and participate in their own care”

-- the Institute of Medicine

It is not only a way of creating a more appealing patient experience, but also a fundamental practice for providing high-quality care. Research has shown that patient-centered care improves patients’ satisfaction, promotes adherence, leads to better health outcomes, brings higher retention rate and more job satisfaction to clinicians, and eventually reduces healthcare costs and improves health care quality.



- Not just giving the patients what they ask
- Not conflicting with evidence-based medicine



- What lipid-lowering medication to use to prevent coronary heart disease?



- Which genetic test to use for cancer screening?



- lumpectomy (breast-conserving surgery) followed by radiation therapy or mastectomy (breast-removal surgery) for an early-stage breast cancer patient?

Challenge to understanding patient's wants, needs and preferences

- Clinical encounters – fragmented, time-limited
- Low health literacy and long assumed authority of clinicians
- Patients often cannot verbalize explicitly the abstract concepts such as values and preferences

Interview, Focus Group and Survey

Doc: Are you sexually active?

Me: I play Pokémon GO



Interview, Focus Group and Survey

- Researchers and clinicians often have difficulty choosing the most relevant and appropriate survey questions
- Patients are reluctant to participate in formal studies, particularly for rare diseases, conditions with stigma and illicit drug use cases
- Patients lack of motivation to participate, because their perceived costs of responding outweigh the perceived benefits, according to social exchange theory.
- Train and supervise interviewers
- In reality, the constraints of cost and time often compromises survey quality

Category selection buttons: Blood Sugar, Daily Routine, Daily Sugar Testing, Low Blood Sugar, Weight Change, Side Effects, Costs

Weight Change

- Metformin**: None
- Insulin**: 4 to 6 lbs. gain
- Glitazones**: More than 2 to 6 lbs. gain
- Exenatide**: 3 to 6 lbs. loss
- Sulfonylureas**: 2 to 3 lbs. gain

Low Blood Sugar (Hypoglycemia)

- Metformin**: Severe = No Risk, Minor = 0 - 1%
- Insulin**: Severe = 1 - 2%, Minor = 30 - 60%
- Glitazones**: Severe = No Risk, Minor = 1 - 2%
- Exenatide**: Severe = No Risk, Minor = 0 - 1%
- Sulfonylureas**: Severe = Less than 1%, Minor = 25%

Blood Sugar (A1c Reduction)

- Metformin**: 1 - 2%
- Insulin**: Unlimited %
- Glitazones**: 1%
- Exenatide**: ½ - 1%
- Sulfonylureas**: 1 - 2%

Costs

- Metformin** (Generic available): \$0.10 per day / \$10 / 3 months
- Insulin** (No generic available - price varies by dose):
 - Lantus: Vial, per 100 units: \$10; Pen, per 100 units: \$43
 - NPH: Vial, per 100 units: \$6; Pen, per 100 units: \$30
 - Short acting analog insulin: Vial, per 100 units: \$10; Pen, per 100 units: \$43
- Pioglitazone** (No generic available): \$10.00 per day / \$900 / 3 months
- Liraglutide/Exenatide** (No generic available): \$11.00 per day / \$1000 / 3 months
- Sulfonylureas** (Generic available): \$0.10 per day / \$10 / 3 months
- Gliptins** (No generic available): \$7.00 per day / \$630 / 3 months

Daily Routine

- Metformin**: [Icon]
- Insulin**: [Icon] OR [Icon]
- Glitazones**: [Icon]
- Exenatide** (KEEP COLD): Take in the hour before meals.
- Sulfonylureas**: Take 30 min. before meal.

Daily Sugar Testing (Monitoring)

- Metformin**: Monitor 2-3 times weekly, less often once stable.
- Insulin**: Monitor once or twice daily, less often once stable.
- Glitazones**: Monitor 3-5 times weekly, less often once stable.
- Exenatide**: Monitor twice daily after meals when used with Sulfonylureas, as needed when used with Metformin.
- Sulfonylureas**: Monitor 2-5 times weekly, less often once stable.

Side Effects

- Metformin**: In the first few weeks after starting Metformin, patients may have some nausea, indigestion or diarrhea.
- Insulin**: There are no other side effects associated with Insulin.
- Glitazones**: Over time, 10 in 100 people may have fluid retention (edema) while taking Glitazones. For some, it may be as little as ankle swelling. For others, fluid may build up in the lungs making it difficult to breathe. This may resolve after you stop taking the drug.
- Exenatide**: After starting Exenatide, some patients may have nausea or diarrhea. In some cases, the nausea may be severe enough that a patient has to stop taking the drug.
- Sulfonylureas**: Some patients get nausea, rash and/or diarrhea when they first start taking Sulfonylureas. This type of reaction may force them to stop taking the drug.

Figure 2. The latest decision aid for diabetes medication choice, developed at Mayo Clinic.

Video

- <https://www.youtube.com/watch?v=SYTPqceFgSw>

Patient-generated health data

- Patient discussion forum
- Ask a doctor website (including patient portal)
- Other Internet platforms

流感下的北京中年

CT和化验的结果显示为“未知病毒”感染：

1) CT：肺部大面积感染。对比36小时前的X光片，病毒扩散迅猛。

2) 咽拭子：甲流、乙流都是阴性。表明没有感染甲流或者乙流。

学医的人一眼就知道这意味着什么。到半个月后，才知道“未知病毒”的残酷。

病人及家属对医学
科普，教育的需求

岳母在医院急电：“。。。医生准备上人工肺。我也没啥主意了，你们啥意见？”

预计顶72小时的插管治疗方案，只坚持了不到17小时。昨晚受到重大冲击，根本没来得及看人工肺的信息。我问：“大夫有说治愈概率，以及愈后预期恢复情况吗？”岳母说：“没有啊。就说10分钟以后听我们回话。”

夫人作为女儿肯定是要上的，我原则上也不反对。但有两个后果要考虑：

- 1) 家庭抗冲击能力。如果钱花光，女儿、夫人、岳母和我自己以后就扛不住任何的冲击，再有人生病，ICU的门都进不去。
- 2) 愈后情况。如果救回来要卧床吸氧，对岳父的生命意味着什么、对岳母的生活意味着什么、对我们和孩子意味着什么？

夫人麻烦了丁医院的朋友，再让他去问呼吸科大夫。回话说：“当时建议转到戊医院，就是为了上人工肺，条件许可情况下最好接受治疗。”

我紧急电话一位医疗创业的前同事，虽然久未联系，他作为创始人也非常忙，听了诉求，立马帮我。首先给出的建议就是：“信息不足的情况下，听医生的。”咨询后，他又发了一个截图给我：人工肺，医学上叫ECMO，叶克膜，呼吸科ICU终端救命神器。

总共约25分钟，期间岳母又催了一次，说是情况已经很危急了。我尽量安抚，说：“我们尽量再等等。”既然都建议上，经济条件也能接受，我们决定上人工肺进行治疗。

我从不怀疑戊医院大夫、特别是ICU大夫的仁心仁术；医院在核心地段建，肯定不是为了钱增加病人开销。但给我的信息太少、决策时间太紧，作为家属确实是难以接受。。。我们当时考虑的一个重要因素：岳父自己是怎么想的？如果有人要给你“刮骨疗毒”，刮骨很疼，疗毒的治愈率很低，你让他刮吗？

病人及家属对医学
证据、治疗方案相
关信息的需求

Research Goal:

Applying machine learning, text mining and natural language processing approaches to mine patient-generated health data, in order to understand patients' wants, needs and preferences.

Characterizing public opinions towards diseases by mining news media data. Huang M, ElTayeb O, Yao L*. (submitted)

Detecting drinking-related contents on social media by classifying heterogeneous data types. ElTayeb O, Eaglin T, Abdullah M, Burlinson D, Dou W, Yao L*. The 30th International Conference on Industrial, Engineering, Other Applications of Applied Intelligent Systems (Special Track: Intelligent Systems in Healthcare and mHealth for Health Outcomes), Arras, France (2017)

Identifying serendipitous drug usages in patient forum data – a feasibility study. Ru B, Warner-Hillard C, Ge Y, Yao L*, The 10th International Conference on Health Informatics (HEALTHINF), Porto, Portugal (2017) (Acceptance rate: 21%)

A content analysis of patient-reported medication outcomes on social media. Ru B, Harris K, Yao L*. The Data Mining in Biomedical Informatics and Healthcare (DMBIH) workshop, IEEE International Conference on Data Mining (ICDM), Atlantic City, NJ (2015) (Best Paper Award)



If you will it, it is no dream; and if
you do not will it, a dream it is and a
dream it will stay

— *Theodor Herzl* —

AZ QUOTES

Questions?

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