Appointment Scheduling: Evaluating the Robustness of Models

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Additional information available at: http://Leeds.colorado.edu/ApptSched
Agenda

1. Research objectives
2. Appointment Scheduling Challenges
3. Assumptions
4. Provider Survey
5. Insights and Impacts
6. Current issues and modeling implications
1. Research Objectives

How to deliver

- Cost-effective outpatient service delivery
- Quality care
- Discover realistic needs and practices
  - Patients
  - Providers
2. Appointment Scheduling Challenges
2. Challenges

- Supply < Demand
- Resource limitations: Funding, Facility, Staff
- High quality services and outcomes

- The Service Experience
  - Patients’ problems and needs are addressed
  - Providers’ schedule and workload
- Provide patient access when needed
- Minimize delays and wait time for providers and patients
- Eliminate provider idle time
- Maximize productivity
- Predictable
  - Eliminate uncertainty
  - Eliminate undesirable variance
Literature: Appointment Scheduling and Yield Maximization

- Klassen & Rohleder (1996)

- Cayirli & Veral (2003)

- LaGanga & Lawrence (2007)
  - Clinic overbooking to improve patient access and increase provider productivity. *Decision Sciences, 38*(2).
Literature: Access to Healthcare

- **Qu, Rardin, Williams, & Willis (2007)**

- **Robinson & Chen (2010)**
  - A Comparison of Traditional ad Open-Access Policies for Appointment Scheduling

- **Institute of Medicine (2001)**
  - *Crossing the quality chasm: A new health system for the 21st century.*

- **Murray & Berwick (2003)**

- **Green, Savin, & Murray (2007)**
3. Appointment Scheduling

Model Assumptions

- Service time
  - Fixed or Variable
  - Distribution

- Costs or penalties
  - Provider idle time
  - Provider overtime
  - Patient wait time

- Punctuality
4. Provider Interviews and Pilot Survey

Prior Interviews
- External: Sought us for more information on overbooking
- Internal (Mental Health Center of Denver): Expressed interest in scheduling issues or were referred by administrative managers

Practices
- Chiropractic
- Child Advocacy and Forensics
- Internal medicine, pediatrics, ob/gyn
- Mental health for adults, children, families

New Pilot Survey of Providers

- Source: Members of Medical & Behavioral Quality Improvement Committee

- Providers:
  - MDs in physical and behavioral healthcare
  - Psychologists

- Settings and Practice
  - Private Practice Psychiatry
  - Federally Qualified Health Centers
  - Outpatient Behavioral Health
    - Substance abuse and mental health
Clinic Size

- Average number of providers: 29.2
- Range: 1 – 44
- Average patients per day per provider: 12.5
- Range: 7 – 19
- Total Volume: Range = 7 - 836
How many days on average is the wait between when a patient calls for an appointment and when the appointment occurs?

- 1-3 days
- 7 days
- 2 weeks
- The "average wait" is not a manageable metric at our FQHC;
- The demand for care is easily 3 to 4 times the "supply";
- A 30 day wait or longer would be common for a new patient. However, the wait can vary depending upon whether patient is "new" vs. "established"; acute vs. preventive care; acuity of illness; type of patient: e.g., new prenatals can get in within a few days and, finally, who is requesting the appointment can make a difference.
When scheduling in your clinical practice, which factors are relatively most important?
The Other Important Factors

- Continuity is the most important determinant. If your PCP is in then you can have an appointment today. If you can wait, you will get the appointment when your PCP is in next.

- Availability of provider

- Under the Medical Home Model, we routinely measure patient satisfaction with provider

- Establishing continuity of care; i.e., ability to see the same PCP and on a time contingent basis instead of "event contingent" basis is probably the most important.

- We have an urgent need to significantly increase staffing in order to better meet the demand for "convenient care" and "urgent care";

- Uncertainty of future funding for operations is a big factor impeding growth.

- I try to keep my schedule as full as possible (private practice)
Operating Characteristics

- No Shows: 5% - 40%
- Walk-ins: 0% - 5%
- Same-day Appointments: 1% - 65%
- Average service time: 18 – 70 minutes
  - Average 34.4 minutes
- Variation in service time: 2 – 60 minutes
  - 24.25 minutes
  - Some variation is because of different types of appointments
- Time allocated for appointment: 20 – 70 minutes
  - Average: 38.75 minutes
  - Slightly longer than service time
How punctual are patients on average for their appointments?

- **Late by less than 10 minutes**
- **On Time**
- **Early by 10 or more minutes**
Operating Practices

- Squeeze in extra patients?
  - Yes: 100%

- Overbook?
  - Yes: 20%

- How? (FQHCs responded)
  - We use team nurse co-visits and the provider is booked onto their team with the nurse, who does the initial work up and then the assessment and plan is done with the PCP and the Nurse together.
  - Scheduling software allows user to double and triple book.
What problems are most important or troublesome to your clinic operations?

- Matching supply to high demand times such as school physical season and flu season. These are often accompanied by times of provider vacations even though we limit provider vacations during the high demand periods.

- No shows. Lack of available reporting mechanism to track average appt time, no show, same day availability

- High demand vs. "supply" on the part of people who call in and want to be seen.

- Equally high demand in excess of supply on the part of other outside agencies who want to get their patients access to primary care (e.g., mental health provider agencies, UC and other hospitals, EDs)
What problems are most important or troublesome to your clinic operations?

- High level of medical complexity in a relatively young population (average number of active medical problems per patient is 5; approximately 40% have mental health conditions)
- Being forced to ration medical care access
- Insufficient clinical staffing
- Insufficient access to specialty care for uninsured
- Homelessness is growing rapidly; cost of providing meds to homeless is doubling this year over last to more than $100,000
What problems are most important or troublesome to your clinic operations?

- I used to have a 10% or more no-show rate, but since I started using an online scheduling system that automatically sends a reminder to patients I get very few no-shows.

- Probably the biggest problem right now is that I often will let a session go longer than scheduled and since I frequently have sessions back to back for a few hours at a time I'm off schedule for the rest of the day.

- Many part time trainees who are not scheduled into OP..and have other roles...also we focus on groups when patients are needing individual Tx.................I think we will do better with multi-family groups in time......also, medically ill childrens' families prefer to get MH services at their POC and not have to come to a clinic for MH services....we could have providers at the medical sub-specialties
Other comments or questions, or further explanations of information above?

- It is way more complicated than just a "scheduling problem".

- Medically, there is a need to constantly balance the demand for patient volume against the demand for ethical practice of medicine (i.e., being accountable for "quality" in terms of continuity of care, accountability for practicing to evidence based standards of care and accountability for medical outcomes - especially when specialty care is not an option for most patients.

- We are integrating care of medical and mental health at our organization; we believe that this is favorably impacting quality but this does not increase medical capacity.

- When we make room for a client established under a MH facility, we're forced to invoke procedures and protocols that erect barriers to access for someone else.
Other comments or questions, or further explanations of information above?

- **>> NOTE:** This survey forces numerical responses to #2, 3, 5 & 6 that, to the reviewer, grossly oversimplify the issues and don't serve to enlighten a better understanding of all the factors that impact medical care capacity; e.g., "no shows" are 20%; however, due to overbooking, the "unfilled slot rate" is actually 4.7%.

- The "average time per visit" varies depending on type of patient, complexity, need for translation, etc.; it’s a metric that can be calculated but, in reality, it is not practical to directly manage this metric (e.g.; start a timer in the exam room).
Insights and Impacts

- Focus on the right factors for healthcare access and capacity management?

- Quality of Care
  - What is good treatment?
  - Is access enough?
  - Role of outcomes
  - Patient satisfaction

- Integrated care
  - Where and how to deliver
Current Issues and Modeling Implications

- Telemedicine and its impact on no-shows
- “Just-in-time scheduling”
  - A center started “recycling” no-shows to offer same-day access
  - 25% increased appointment yield reported
  - Assessment of policy robustness
    - Impact of increased variation
    - Range of appropriate no-show rates
    - Comparison of alternative policies
    - Application of simulation modeling
    - Gradient search models with tuned utility function
    - Opportunity for “The Science of Better” and Analytics!
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Questions? Comments?

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And http://www.outcomesmhcd.com/Pubs.htm