



Predicting and Improving Dental Productivity



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HRSA 2006 National Primary Oral Health Conference
December 12, 2006

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Today's Objectives

- Identify the factors that were used in the model to predict dental provider productivity using a linear regression model
- Recognize how to select a candidate that has a higher probability of being a productive asset
- Recognize how open access scheduling and other innovations can affect the dynamics of access to dental services





CHC Mission Statement

Since 1972

Community Health Center is a private, non-profit agency providing primary health care and social services.

Its' **quality** health care services are available to all, and particularly to those who cannot gain **access** to such services elsewhere. The Community Health Center takes **leadership** in promoting interagency **cooperation**. It is based on consumer control and is committed to ensuring **human rights** and **respecting human dignity**; as such, it strives to be a voice and vehicle for **social change**.



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Services We Provide

- **Medical**

- Pediatrics
- Internal medicine
- Family practice
- Family planning
- Breast and Cervical Cancer Early Detection Program
- Asthma management program
- Prenatal program
- Maternal-Infant program

- **Dental**

- Preventative
- Restorative
- Emergency
- Mobile dentistry in schools
- Endodontics
- Oral Surgery
- Prosthetics

- **Behavioral Health**

- Children
- Adults
- Families

- **School Based Health Centers**

- Medical
- Behavioral Health
- Dental **HIV/AIDS**
- AIDS/HIV Services
- Medical, behavioral, social

- **Domestic Violence Services**

- Domestic Violence Services
- Battered Women's Shelter

- **Community Contributions**

- Vinnie's Jump & Jive
- HomeRoom after school program
- Family Wellness Center



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CHC Dental Clinic Background

- 8 Towns: expanding to 3 additional towns in 2007
- Mobile sites
 - New London: 13 schools
 - New Britain: 10 schools and NBHS
 - Meriden: 12 schools, OB clinic, Head Start
 - Middletown
 - Stamford: Head Start and WIC
 - Norwalk: 2 Head Start Centers
- 13 FTE dentists
- 9 FTE hygienists
- 31 chairs

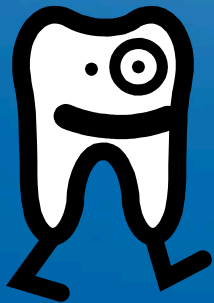


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Dentistry At CHC

- Quantity: 52,000 dental visits annually at CHC
- Quality: All CHC dentists have completed general practice residencies, practice full scope dentistry, and participate in ongoing peer review and performance improvement activities
- Comprehensive: We believe that extracting a tooth represents a failure of prevention. CHC staff make all efforts to save a tooth, including endodontics on-site.



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What is the scope?

- Basic restorative for all ages
- Oral surgery
- Endodontics
 - Including molar endodontic treatment
 - PT endodontist on staff
 - GP utilize rotary instrumentation
- Prosthetics
 - Crown and Bridge
 - Full and partial dentures
- Pediatric dentistry
 - FT pediatric dentist on staff





Challenges In Dentistry

- Dentistry is a specialized, high risk service, expensive to deliver.
- Infection control procedures alone are very costly
- Lab fees regularly run hundreds of dollars per prosthesis
- Pediatric dentistry sometimes requires Operating Room intervention, with general anesthesia...scarce service and long waiting times
- Specialty care, such as endodontics; very difficult to access...
- Patients need a dental home—with continuity, coordination, and access—just like they need a medical home.



CHC Responses To The Problem

Macro level look

- Expanded dental capacity: CHC expansion efforts
- Maximize existing clinical space usage
- Addition of specialists
- Development of **mobile dentistry capacity** and role of care coordinator across locales
- Partnership with UCONN School of Dental Medicine, CT Health Foundation, and others
- Daily Productivity, capacity and utilization monitoring
- Implementation of Advanced Access Scheduling Public-Private Partnerships
- Priority focus on children's dental health





What we tried to accomplish with this model besides the objectives

Micro level look

- *Identify the factors that were used in the model to predict dental provider productivity*
- *Recognize how to select a candidate that has a higher probability of being a productive asset*
- *Recognize how open access scheduling and other innovations can affect the dynamics of access to dental services*
- **Dental is always budgeted to lose money (drives me crazy!!!)**
- **Look for opportunities to improve productivity**
- **In order to attempt to decrease the shortfall you first need to understand why you have one in the first place**
- **The answer is not that we need to work harder, but that we need to work smarter**
- **Need to find the special mix of procedures/provider ratio to maximize our efforts**

All we need to do is break even and hopefully make a little profit...



Linear Regression



Definition

A technique in which a straight line is fitted to a set of data points to measure the effect of a single independent variable. The slope of the line is the measured impact of that variable.

The steeper the slope the more impact a variable has on the X value.

The sign of the slope reveals if the variable has a positive or negative effect on the X value.

Our Linear Regression model answers the question: what factors effect the productivity of a dental provider?

- *Factors tested*
 - Panel size
 - Continuity rate
 - NS rate
 - RVU/visit
 - Years since graduation
- *Data Collection*
 - 2 separate 18 month periods
 - All five measures collected from centricity billing system
 - Mathematically equalized each provider to FTE
- *Our expectations*
 - “Experienced providers with stable patient panels and low no show rate are more productive”





Motivation for creating a linear regression model

- Numerical representation of provider behavior as explained by various variables
- Which variables are actually controllable by admin processes and front desk functions?
 - panel size
 - continuity rate
 - provider clinical experience
 - no show rate
 - RVU per visit
- beyond the financial benefits to the health center: patient care improved
 - completed and expedited treatment,
 - better patient flow, and
 - less under utilized time as with a no show rate.

Variable definitions

- *Panel*
 - the number of patients who over a period of 18 months have seen a particular provider the majority of the time
 - Measure of “quantity”
 - relatively unused measure
- *Continuity rate*
 - the percentage of time a patient was seen by their primary provider
 - Measure of “quality”





Variable definitions cont...

- ***Years since graduation***
 - a positive relationship on productivity
 - threshold number of 5 years post graduation
- ***No Show rate***
 - a low no show rate is indicative of patient compliance and adherence to treatment plans
 - the number of appointments that were broken by the patient as a percentage of their total productivity.
- ***Average RVU/visit or panel stratification***
 - the amount of relative value units (RVU) delivered by the provider per each visit delivered
 - standard units assigned to each ADA procedure codes
 - complexity or panel stratification

In this sample, the RVU/visit, ranged from 1.80 to 3.52, for providers who differed in experience by 25 years



What we expect from our providers

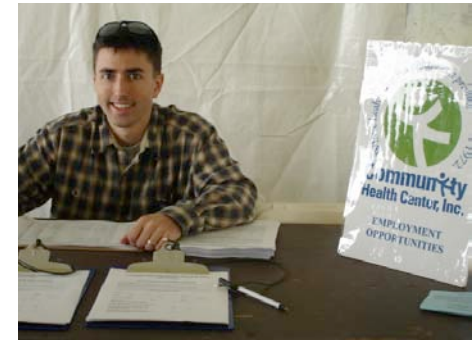
- FTE Equivalent dentist 3200 visits/yr
 - Roughly translates into 14 pt encounters/day
 - 30 minute slots in a 8.5 hr day
 - All slots are equal*
 - “catch up” time at the end of the day
- FTE hygienist 2100 visits/yr
 - 30/60 or 40 slots (more variability based on local practice factors)
- Preset templates
- Daily measures to access available slots, percentage utilization against capacity
- Not all providers and all visits are equal





Factors effecting individual productivity

- “global” factors: each provider has to deal with them
 - NS rate when we have a heavy snow fall or the first nice day in the spring
 - Front desk efficiency in filling open/cancelled slots
 - Admin support/expectations
- “individual and intangible” factors
 - Provider tenure, yrs of experience
 - Yrs with CHC
 - FT vs PT status
 - Personality traits
 - Language ability
 - Actual procedures performed reflected in RVU/visit count
 - Panel size





Linear regression table

Regression Statistics on Combined Periods

• Multiple R	0.79
• R Square	0.62
• Adjusted R Square	0.57
• Standard Error	424.80
• Observations	40.00



Regression Summary Output

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.79
R Square	0.62
Adjusted R Square	0.57
Standard Error	424.80
Observations	40.00

ANOVA

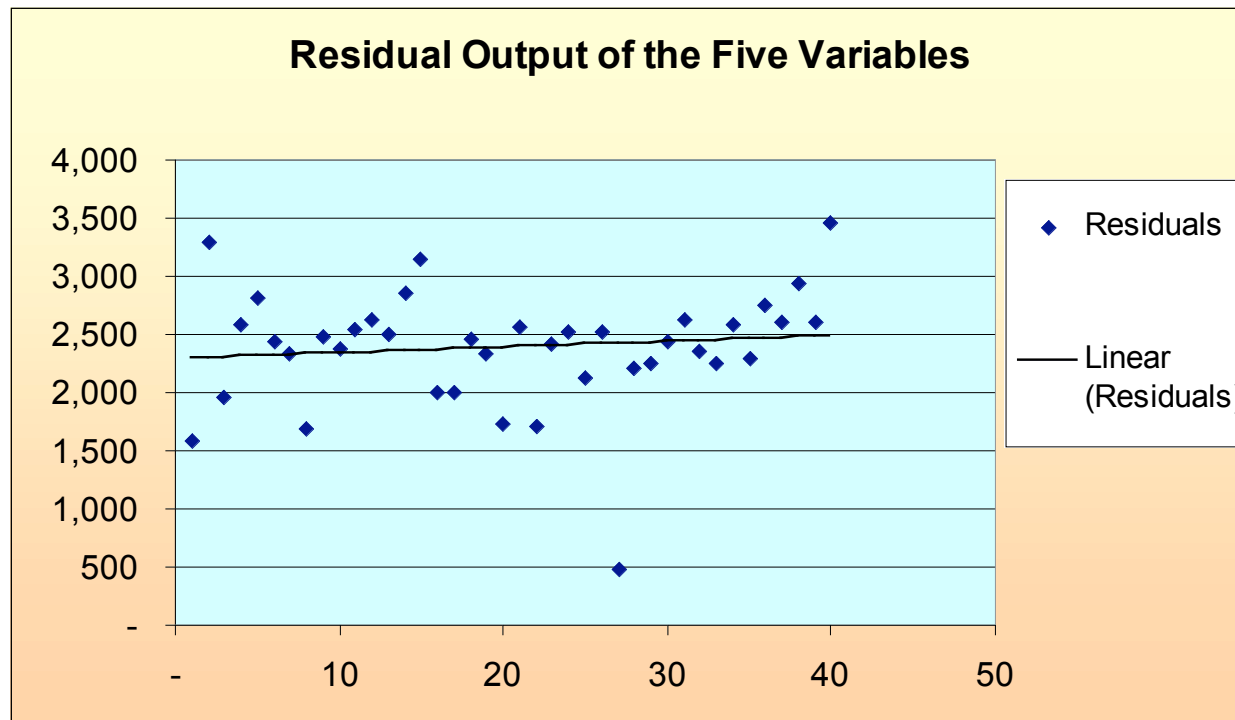
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	5.00	10,069,783	2,013,957	11.16	0.00
Residual	34.00	6,135,370	180,452		
Total	39.00	16,205,153			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	1,741.31	966.84	1.80	0.0806	(223.54)	3,706.16	(223.54)	3,706.16
Panel	0.58	0.15	3.88	0.0005	0.28	0.89	0.28	0.89
Continuity	(1,836.22)	1,286.36	(1.43)	0.1626	(4,450.41)	777.97	(4,450.41)	777.97
N/S rate (total n/s / Raw Prod)	(1,295.16)	496.44	(2.61)	0.0134	(2,304.05)	(286.27)	(2,304.05)	(286.27)
Avg RVU per visit	862.23	234.22	3.68	0.0008	386.23	1,338.22	386.23	1,338.22
Years Since Grad	(14.35)	11.94	(1.20)	0.2375	(38.61)	9.91	(38.61)	9.91



Final Results

multivariate chart: relatively flat...
62% predictability



Results and interpretation

- All data collected from two time periods was combined
- All observations were then grouped together and analyzed with linear regression in a combined periods regression analysis.
- The R square is .62, meaning that 62% of the variation in the productivity of the dentist can be explained by the five explanatory variables.
- Only two variables had statistically significant p-values and standard error: panel size and average RVU/visit.





Results in a nutshell...

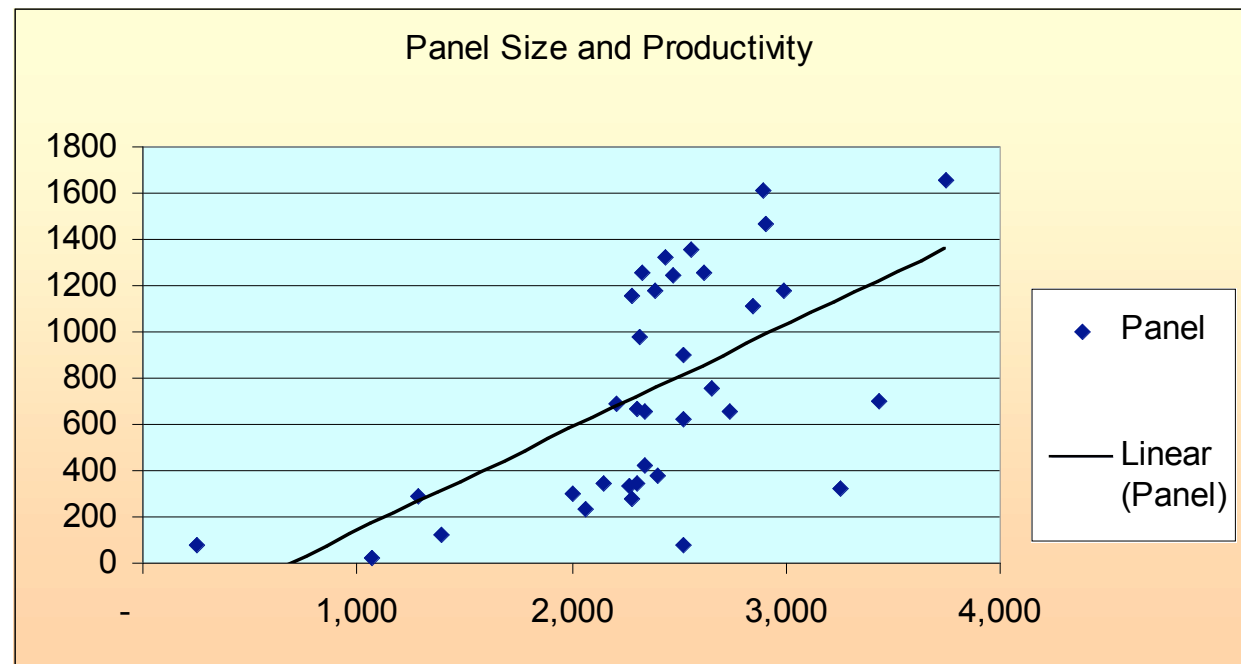
- Panel size: POSITIVE
- Continuity rate: flat slope
- N/S rate: NEGATIVE
- Experience: POSITIVE
- RVU/Visit: POSITIVE





Panel Size and Productivity

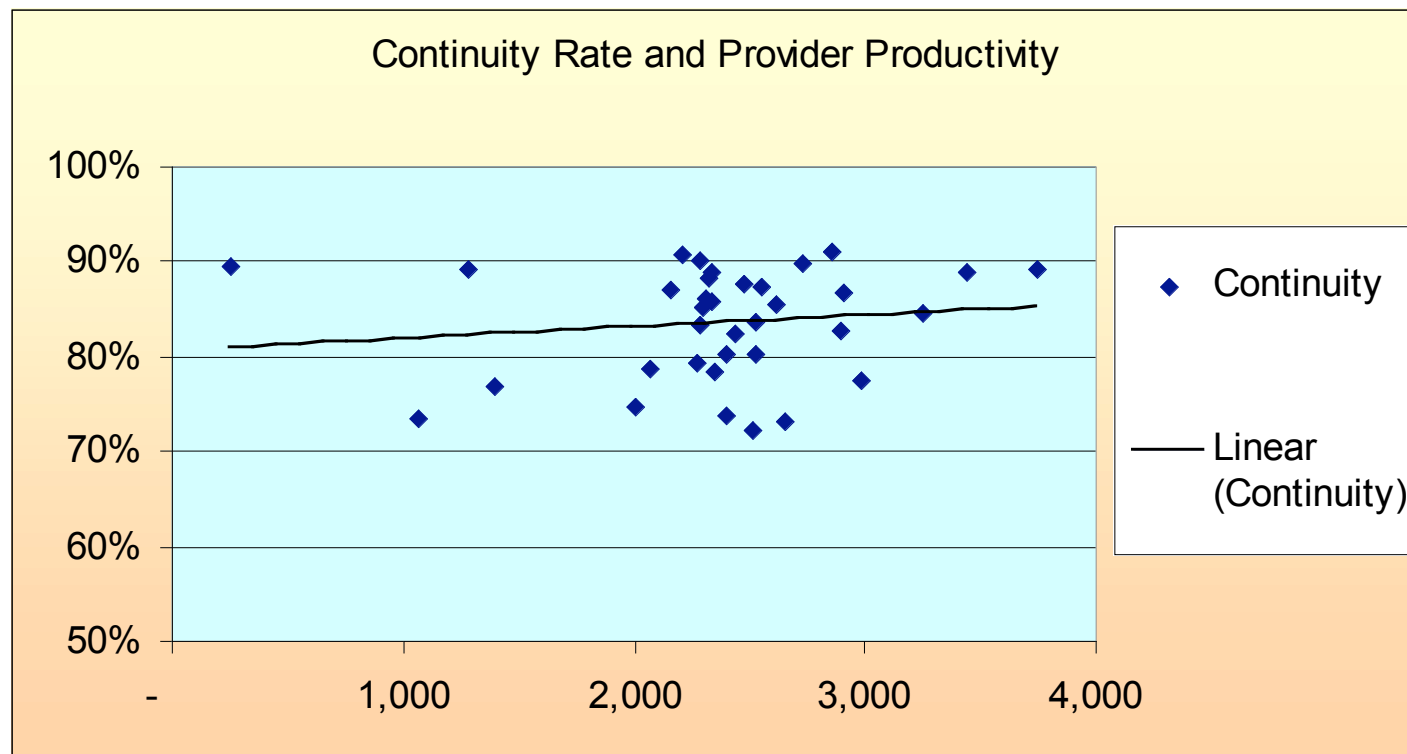
- Strong positive relationship
- If we keep a stable panel, our providers do better
- Be careful, how you assign a panel because of hygiene visits only





Continuity Rate

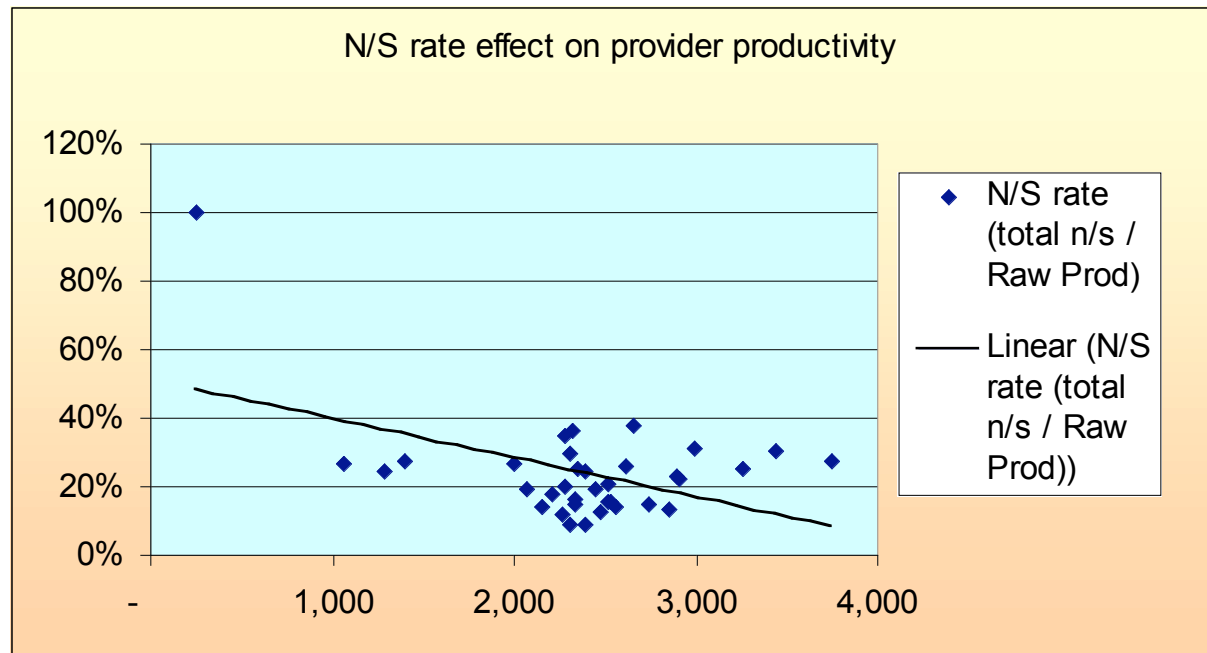
- Measure of “quality”
- Very little effect on productivity: Surprising result!





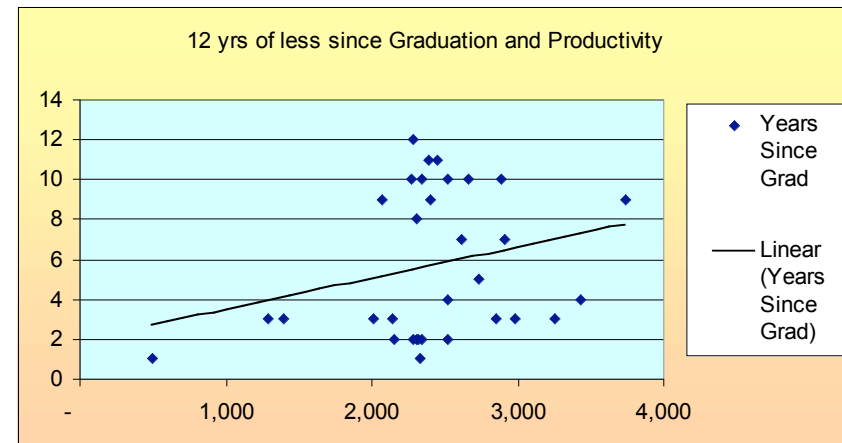
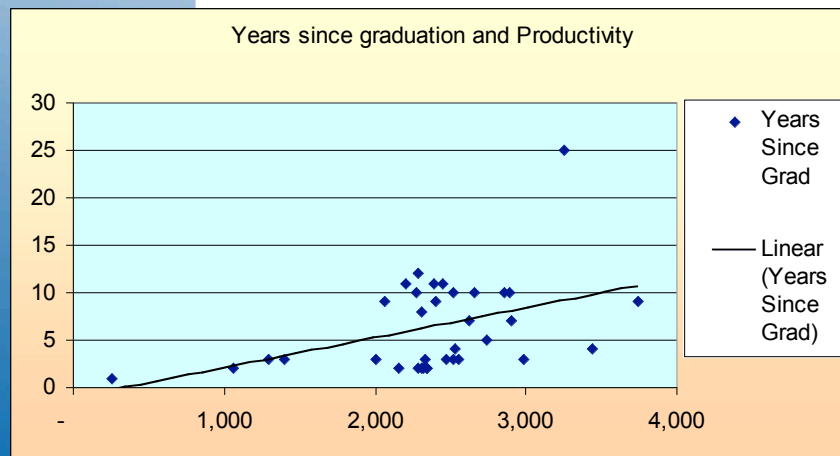
No Show Rate

- High no show rate is **BAD** no matter how you look at it!
- Low no show rate = better patient compliance & Tx plan adherence
- Fairly strong **negative** relationship



Years Since Graduation

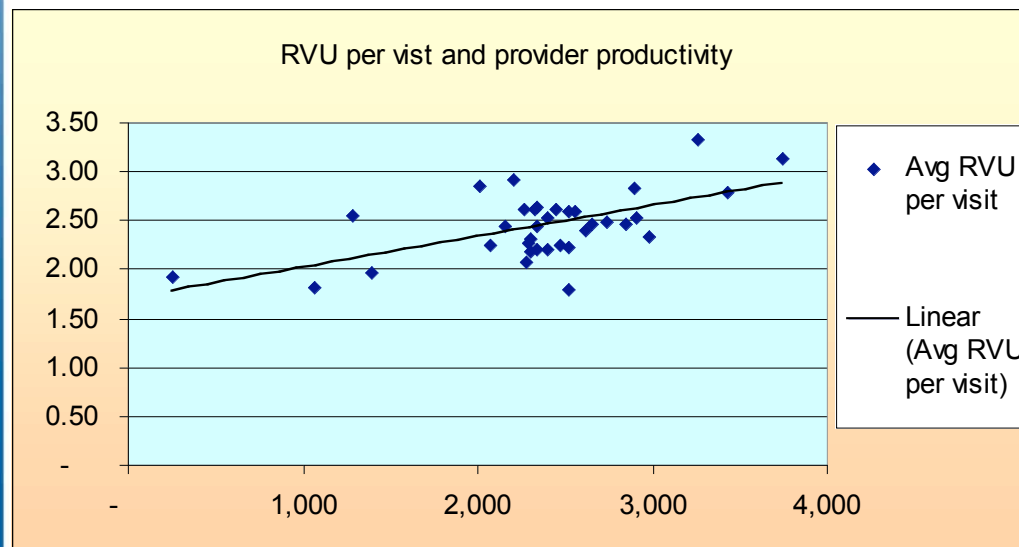
- positive relationship on productivity
- appears to be a threshold of 5 years post graduation where little additional effect on productivity is seen





RVU Impact

- RUV/visit was *expected* to have a negative relationship
- complexity or panel stratification
- **positive relationship** between provider productivity and RVU's attained per visit
- RVU analysis details the complexity of procedures
- Coupled with encounter counts provides a better insight into the true productivity



In this sample, the RVU/visit, ranged from 1.80 to 3.52, for providers who differed in experience by 25 years



How do we now use this information...

- Obtain the “best possible” hire
- Optimize the panel size
- Minimize the NS rate
- Monitor RVU/Visit in addition to visit count...know what your docs are doing
- *don't limit the procedures that the dentist can do...keep them interested in working, happy dentist * = productive dentist*

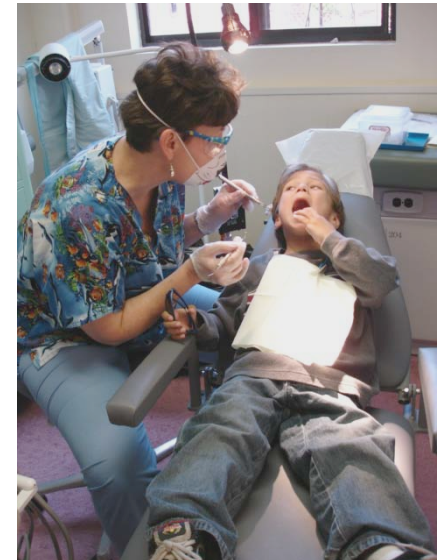
*employee satisfaction...



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Further analysis...

- Strip out the outliers
- Looks for other tangible variables
 - Additional data points needed
 - Increased length of time?
- Examine intangible variables: 38%
 - Personality
 - Language ability
 - Special skills
 - Special interests
- Local factors in each community
 - Different towns = different communities with different needs
 - What if any is the effect on provider productivity
 - Mobile vs permanent sites
- Prospective analysis of each provider hired against predicted productivity





Techniques to improve efficiency/productivity

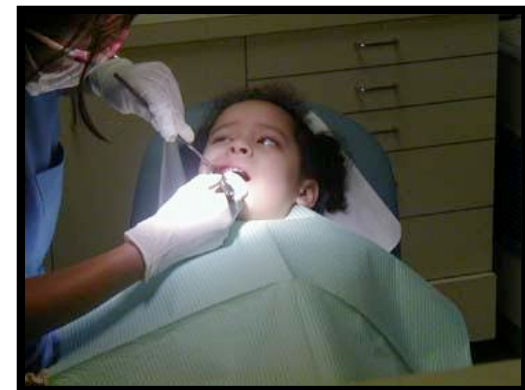
- Advanced Access
- Physical flow of patients
- Instrumentation changes
- Increased Use of Specialists
- Monitoring and Reporting





Physical Flow of Patients

- Floater DA's
- Created DA "schedule" 30 min ahead of DMD schedule to allow for more efficient pt intake, FMX films **HAS ISSUES**
- At least 2 ops per dentist
- If possible 2 ops for RDH, floater helps with films, ect
- Lab cases recalled





Specialists

- Improved patient satisfaction
- Able to keep patient care “in-house”
- Endodontist: complicated rcts are done more efficiently by specialist than GP, so GP has more slots for other procedures
- Pediatric dentist
- Externship in oral surgery





Instrumentation

- Rotary endo and obturation systems
- Cavitrons for hygienists
- Busy offices have duplicate equipment; autoclave and film processor to improve efficiency
- Centralized equipment processing
- Use of cassettes





Principles Of Advanced Access

- Demand for appointments is fixed and predictable
- Match your daily demand for visits with appropriate supply of providers
- >75% of patients will be delighted with a “same-day” appointment when offered
- Schedule patients on or near the same day whenever possible
- Patients should see their own provider whenever possible
- Patients have a right to determine if and when they need to see a healthcare provider
- Active (hour by hour) template management
- Clear contractual agreements on clinical hours and schedules
- **Daily** feedback
 - capacity, demand, utilization





Groundwork for Advanced Access

- Demand study: How many requests for visits per day?
 - Adjust schedules, FTEs to match supply with demand
 - Cross train staff to focus on phones in the am
 - Start putting patients in recall instead of booking out beyond “go-live” date
-
- | | |
|------------------------|---------------|
| • Meriden Dental | March 2004 |
| • New London Dental | August 2004 |
| • Middletown Dental | November 2004 |
| • New Britain Dental | January 2005 |
| • Old Say Brook Dental | February 2005 |
| • Stamford Dental | mid 2007 |





How Does Advanced Access Work?

- Patients are encouraged to schedule appointments on the day they want to be seen, or within 24-48 hours
- After each visit, patients given a reminder card for follow up, and asked to call on or around the day the provider wants them back
- Patients recalled if they don't do so: **particularly important in lab cases**
- Appointments rarely scheduled out further than 1-2 weeks





The New System

- Advanced Access
 - ~ the system formerly known as Open Access
- Doing today's work today
- Patients offered an appointment *with their own PCP* on or near the day that they call
- We got rid off...
 - No Show rate of 40% ~ **Reduced to 13%!**
 - Double booking
 - Long waits for visits, especially preventive care
 - Low patient and provider satisfaction
 - Defined our “importance” based on length of our backlog





Does Advanced Access work in Dentistry?

- First principal is violated – matching capacity to demand
 - Demand far outstrips our capacity
 - At times we had to go further out into the future
- Changes the dynamic of WHO is seen as a patient and is willing to navigate the system
 - Motivated patients
 - Same day ER patients





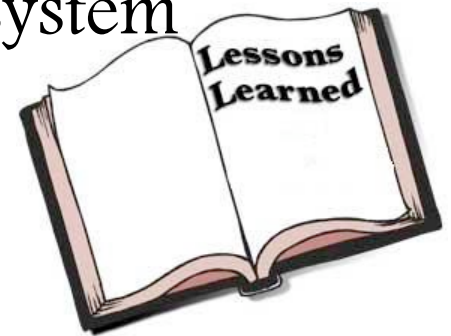
How does it help with access to care?

- No new cost outlays, but basic technical expertise.
- No show rate down from average of 30~40% to 10~15% and less
- Eliminates appointments booked out for months
- Increased patient satisfaction
- Improved patients/provider continuity
- Available slots for same day ER patients
- **MOST OF OUR CLINICS
ARE AT OR BEYOND CAPACITY**



Lessons learned...

- Need to match supply and demand
 - Very difficult when the system is already overloaded
 - May need to alter the new patient intake
 - Optimize panels for each provider
- Need to rely heavily on recall system
 - Appointments need to be entered when patient leaves
 - Weekly/Monthly resolution of recall lists
 - Tendency to create a “Lottery” for appointments
- Patient/Staff need to “trust” the system
- Need to allow for flexibility
 - Transportation problems
 - Translation problems
 - Scheduling difficulties





How Do You Support (Or Impede) Productivity?

Support



3 exam rooms/medical provider
2-3 operatories per dentist



1 medical ass't per medical provider
1 RN for every 2 medical providers
1 dental ass't per dentist plus a "floater"
for more than 3 dentists



automated recall postcards and nightly
phone calls (July Soft)



Language Line in every room vs. pulling
staff to translate (100k per yr)



low turnover, especially key receptionist
positions

Impede





Monitoring and Reporting

- Keeping a “score card” in front of people can increase awareness of the overall goal (**Overall Profitability! Expanded Services!**)
- Frequent Reporting and goal setting yields information about current status
 - Instead of “what went wrong last month” we have “I have a problem that needs to be addressed today.”





Measure, Communicate, Investigate

- Are we utilizing the resources that we have in place and available today as efficiently as possible?
- Leaving a chair vacant is a waste of scarce resources
- Looking to measure against “Budget” can frustrate providers
 - PTO / CME / Sick time utilization is not factored as a measurement in the budget
 - How did We do today with the resources available?





Measure, Communicate, Investigate

- On a daily basis an email is sent measuring how well or poorly each component used the assets at hand.
- Total Number of “slots” or 30 minute appointments available (14 for dentist) against how many slots were filled.
- Hygiene standard is eleven 45 minute “slots”



Daily Reporting of Capacity Utilization

Visits Week ending 12/08/2006

	Mon	Tue	Wed	Thur	Fri	Totals	2007 Budget
Dental							
New London	13.5	24.5	24.0	0.0	27.5	89.5	106
Meriden	17.0	27.0	24.0	12.0	13.0	93.0	110
New Britain	27.0	49.0	48.5	25.5	41.0	191.0	199
Middletown	33.0	34.0	24.0	35.0	36.0	162.0	159
Old Saybrook	14.0	12.0	15.0	15.0	14.0	70.0	55
Stamford	17.0	22.0	20.0	19.0	8.0	86.0	95
Totals	121.5	168.5	155.5	106.5	139.5	691.5	736

Available Slots	Mon	Tue	Wed	Thur	Fri	Totals
New London	14	28	28	0	28	98
Meriden	19	26	24	15	12	96
New Britain	28	50	55	25	45	203
Middletown	42	42	28	42	42	196
Old Saybrook	14	14	14	14	14	70
Stamford	20	20	20	20	20	100
Totals	137	180	169	116	161	763

Percentage Capacity	Mon	Tue	Wed	Thur	Fri	Totals
New London	96%	88%	86%	100%	98%	91%
Meriden	89%	104%	100%	80%	108%	97%
New Britain	96%	98%	88%	102%	91%	94%
Middletown	79%	81%	86%	83%	86%	83%
Old Saybrook	100%	86%	107%	107%	100%	100%
Stamford	85%	110%	100%	95%	40%	86%
Totals	89%	94%	92%	92%	87%	91%



Measure, Communicate, Investigate

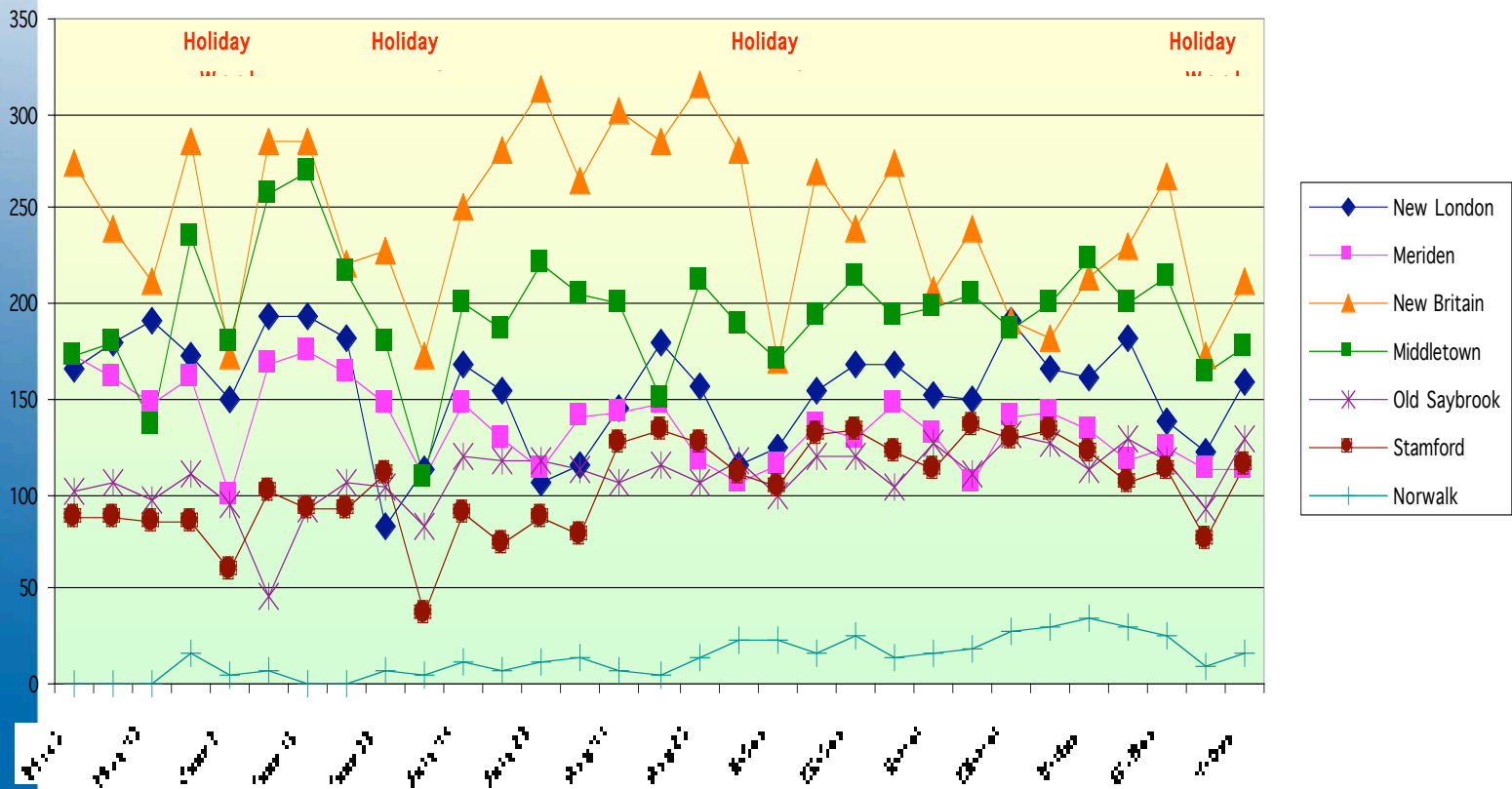
- On a weekly basis, through email, the sites are sent an overall look at how each site did relative to the others
- Capacity trends are also sent weekly for both Hygiene and Dental visit utilization
 - Questions as to what went right or wrong for the week
 - Corrective action can be more immediate and effective





Dental & Hygiene Visits by Week

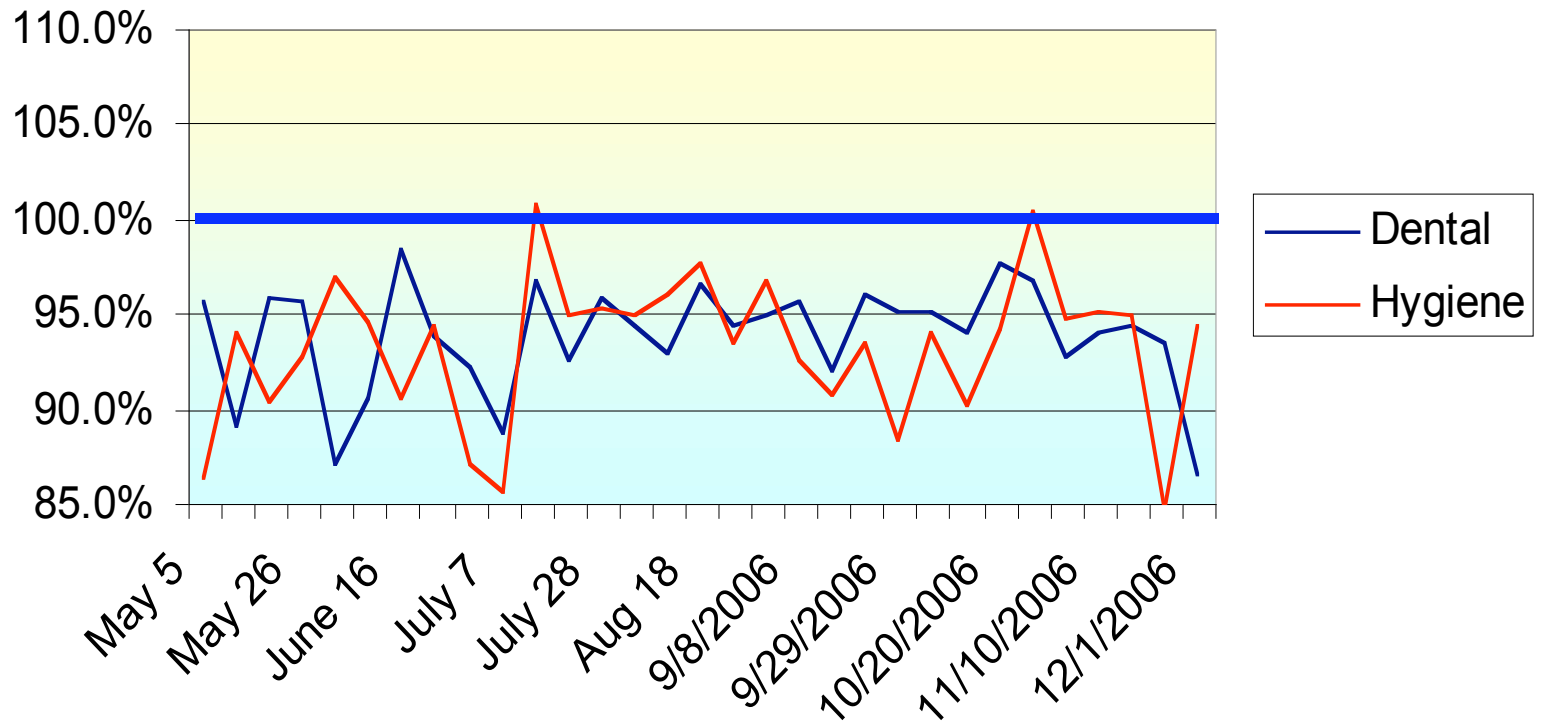
Dental & Hygiene Visits by We





Weekly Capacity Reporting

Dental & Hygiene Percentage of Capacity





Effective Communication of the Goal and Progress towards it

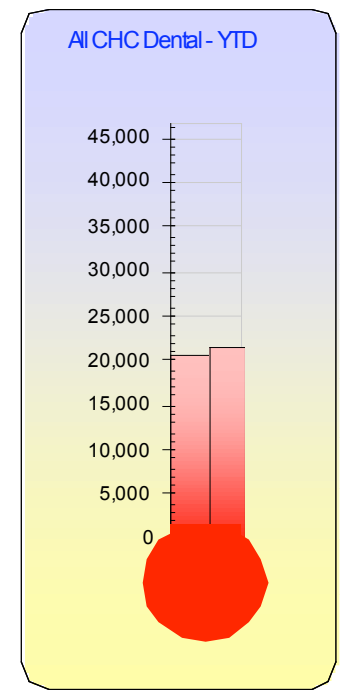
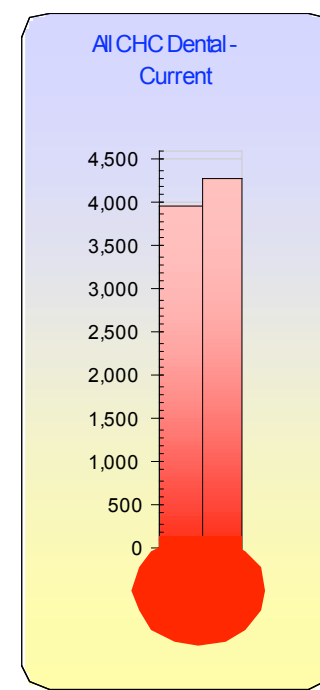
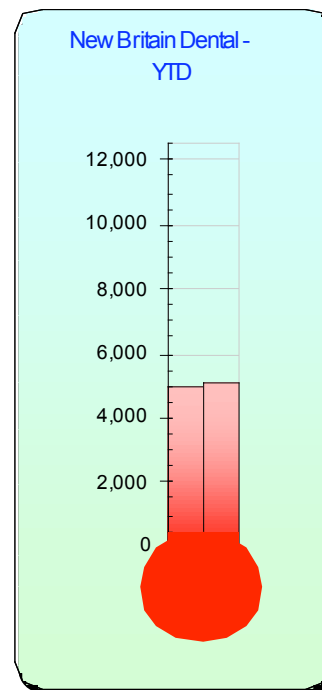
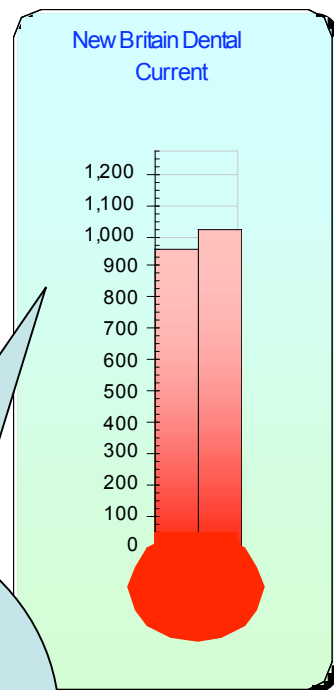
- Utilize as many forms of communication as possible to convey the same message in different formats
 - Intranet – Internal website
 - Emails
 - Video conferencing
 - Wall boards
 - Handouts in meetings





Example of Our Intranet Posting of Goal towards Budget Updated Weekly and accessible to all members of staff

Community Health Center, Inc. Billable Visit Measures



All sites are shown as well as the Overall

Visits as of Today 1,056
Target as of Today 1,028
Total Month Goal 1,028

Visits as of Today 5,356
Target as of Today 5,189
Total Yearly Goal 12,434

Visits as of Today 3,985
Target as of Today 4,327
Total Month Goal 4,327

Visits as of Today 20,988
Target as of Today 21,840
Total Yearly Goal 52,333



Tie it all Together

- Effective hiring in selecting for known variables that have a high likelihood of increasing productivity
- Actively managing to traits that strongly affect productivity:
 - Panel Management
 - Assigning patients as they are added to the practice to the providers with under filled panels
 - Reduction in No-show rates
 - Utilization of Advanced Access Scheduling
 - RVU Analysis
 - No limitations on complexity of procedures. Varied work day increases overall provider satisfaction





Tie it all Together

- Recruit and utilize specialists within your own practice
 - Endodontics / Pediatric / Specialty Training in Oral Surgery
- Optimize the workflow
 - Increased Dental Assistants
 - Ensure minimum two rooms per Dentist
- Invest in Instrumentation that improves productivity
 - Rotary Endo / Cassettes / Multiple Autoclaves





Tie it all Together

- Report and Act upon the Results
 - Involve as many individuals as possible
 - Information is simply Information, it is not personal
 - Convey that Productivity is a means to a Goal, not a Measure for Punishment.
 - Transparency and Timeliness of Data is an Absolute necessity





Tie it all Together

- Increased Productivity will allow Expanded Dental Care to the underserved
- “No Margin No Mission”
- Finding and maintaining the break even point





Productivity data is for planning, projecting – not for Punishment



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