Eye Care Productivity and Access in the Veterans Affairs Health Care System

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ABSTRACT  Objectives: Eye care in the Veterans Affairs Health Care System is challenged with increasing demand and higher prevalence of patients with complex ocular conditions. Understanding factors that impact eye care productivity and access is necessary for appropriate allocation of resources. The purpose of this study was to determine the impact of various eye clinic personnel on eye care provider productivity and patient access. Methods: Utilizing data from the Veterans Health Administration National Data Warehouse, workload and level of staffing were analyzed. Trends in the data were analyzed using descriptive and regression analyses employing both linear and curve fitting modeling methods. Results: There was a significant positive correlation between ophthalmology technicians and ophthalmologist productivity (p < 0.001), number of unique patients seen per year per provider (p = 0.047), and total yearly number of office visits per provider (p < 0.001). Similarly, there was a significant positive correlation between number of ophthalmology residents and productivity (p = 0.046) and number of clinic visits per provider (p < 0.001) but not the number of unique patients seen. Positive correlation was found between optometry technicians and the number of unique patients seen by optometrists (p = 0.041) and total number of clinic visits per provider (p < 0.001) but not optometrist productivity. No significant correlations were present for nurses, nurse practitioners, physician assistants, or clerical staff. Conclusion: Eye care technicians provide a cost-effective multiplier effect for provider productivity, especially in ophthalmology clinics, allowing significant increases in total clinic visits and number of unique patients seen per year.

INTRODUCTION

Vision is a critically important sense. Blindness leads to isolation, depression, decreased quality of life, and a substantial burden that impacts all of society.¹⁻⁵ In the elderly population, including veterans, eye care is a valued and sought-after service. Eye care services in the Veterans Health Administration (VHA) represent the third largest demand for care behind primary care and mental health services. Eye care in VHA medical facilities ranges from routine eye examinations and refractions to complex medical and surgical management of sight-threatening diseases. The demand for eye care has grown 24% nationally over the past 5 years and some local medical facilities have grown by as much as 40%.²⁻⁶ Timely access to eye care has become a greater challenge with the growth in demand; therefore, it is imperative to evaluate which factors impact provider productivity and access to care in order to determine what health care models are most cost-effective to deliver eye care to veterans.

In fiscal year (FY) 2012, national data for specialty care clinics within the VHA System were collected and released as the Specialty Physician Productivity Report.⁷ The productivity report included information on the number of providers in the eye clinics, support personnel (e.g., nurses, eye technicians, clerical staff), number of unique patients seen (panel size), number of total clinic visits, and provider productivity measured in work relative value units (wRVUs).

As productivity standards within the VHA are established for ophthalmology and optometry, it will be important for planners to know which factors allow providers to achieve optimal productivity and which factors contribute to increased access to eye care. The current report is a statistical analysis of the FY2012 productivity report and describes the effect of support personnel on (1) eye care provider productivity, defined as wRVUs per provider, and (2) access to care, measured by (a) panel size (the number of unique patients cared for per provider) and (b) the number of actual clinic visits managed per provider.

METHODS

After the Emory University Institutional Review Board determined that approval was not required for this study, the research protocol was reviewed and approved by the Atlanta Veterans Affairs (VA) Research and Development Committee.

Data from FY2012 for both the VHA Specialty Physician Productivity Report for Eye Care Clinics⁷ and the VHA Support Service Center⁶ were evaluated. Data from these registries are reported separately for ophthalmology and optometry. Information from every eye clinic in the VHA was available, including 126 ophthalmology clinics and 137 optometry clinics.
Within the VA system, providers can be hired for both part-time and full-time work, and the number of hours they work are quantified based on a 40-hour work week, where 40 hours per week is full time (1.0 full-time equivalent = 1 FTE). Providers who are working at the VA only part time are partial FTE; for example, a 20-hour work week is 0.5 FTE. Similarly, two full-time providers equal 2.0 FTE. Only those clinics that employed at least a 5/8 (0.625) FTE provider were included in the analysis. Eye clinics employing less than 5/8 FTE were excluded because the clinics were felt to be too small to utilize in the analysis. Thus, data were analyzed for 109 (86.5%) ophthalmology clinics and 133 (97.1%) optometry clinics.

A de-identified number was assigned to each facility, and multiple data elements (Table I) were imported into the SPSS software version 21.0 (IBM Corporation, Armonk, New York).8

Productivity calculations were based on wRVUs generated by VHA-salaried (paid full-time or part-time) providers and the trainees (residents) they supervised both in the outpatient clinic and the operating room. wRVUs were determined by fee schedules from the Centers for Medicare and Medicaid Services.9 VHA providers who were not full-time or part-time employees (i.e., fee-basis, contract physicians and fellows) were not included in the analysis as the workload they generated was not included in the productivity report. Information regarding space (examination rooms per provider), testing equipment, and organizational structure also was not collected for the productivity report and not included in the analysis.

In the VHA, optometry and ophthalmology technicians operate under different standards and possess different knowledge, skills, and abilities. For example, optometry technicians do not perform spectacle refractions nor assist in surgical procedures, whereas ophthalmology technicians routinely do. Therefore, the current analysis considered technicians assigned to ophthalmology as “ophthalmology technicians” and those assigned to optometry as “optometry technicians.” Clerical support staff perform similar duties in both ophthalmology and optometry clinics, i.e., scheduling and check-in, whereas nurses or physician assistants (PAs) may provide either clinical or administrative support. Ophthalmology resident skills and duties vary by years of graduate medical education; first-year residents are highly supervised and third-year residents have a larger degree of autonomy.

Data were analyzed using SPSS (version 21) descriptive and regression analyses employing both linear and curve fitting modeling methods. Effect size estimates (expressed as $r^2$) and slopes of the models (unstandardized beta weights) were gathered to determine which factors had the greatest effect on access (measured by eye clinic panel size and number of clinic visits) and provider productivity (measured by wRVUs). $P$ values ($\alpha = 0.05$) were used to test the statistical significance of the models.

### RESULTS

The results are summarized in Table II. In FY 2012, there were 342.06 ophthalmology clinical FTE and 633.06 optometry clinical FTE in VHA. Ophthalmology had higher average ratios of resident providers (0.91) and technical support staff (1.05) than optometry (0.28 and 0.47, respectively). Both ophthalmology and optometry had relatively low levels of nursing support; however, when there was nursing support present, registered nurses (RNs) were more common in ophthalmology clinics than licensed practical nurses (LPNs) and licensed vocational nurses (LVNs). The reverse was true for optometry clinics.

### TABLE I. Data Elements Imported for Each Eye Care Clinic From the FY2012 VHA Specialty Physician Productivity Report and the VHA Support Service Center

<table>
<thead>
<tr>
<th>Data Element</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Total Provider Clinical FTE</td>
<td>The aggregate amount of FTE dedicated to clinical patient care (e.g., examination, surgery, resident supervision) by either ophthalmologists or optometrists</td>
</tr>
<tr>
<td>Total Resident FTE</td>
<td>The aggregate amount of FTE provided by residents</td>
</tr>
<tr>
<td>Total Ophthalmology Technician FTE</td>
<td>The aggregate amount of FTE provided by ophthalmology technicians</td>
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<tr>
<td>Total Optometry Technician FTE</td>
<td>The aggregate amount of FTE provided by optometry technicians</td>
</tr>
<tr>
<td>Total RN FTE</td>
<td>The aggregate amount of FTE provided by RNs</td>
</tr>
<tr>
<td>Total LPN FTE</td>
<td>The aggregate amount of FTE provided by LPNs</td>
</tr>
<tr>
<td>Total LVN FTE</td>
<td>The aggregate amount of FTE provided by LVNs</td>
</tr>
<tr>
<td>Total Workforce Extender FTE</td>
<td>The aggregate amount of FTE provided by PAs and/or nurse practitioners</td>
</tr>
<tr>
<td>Administrative FTE</td>
<td>The aggregate amount of FTE provided by administrative personnel (e.g., front desk staff to schedule appointments)</td>
</tr>
<tr>
<td>Clerical FTE</td>
<td>The aggregate amount of FTE provided by clerks</td>
</tr>
<tr>
<td>Panel Size of Ophthalmology and Optometry</td>
<td>Average number of unique patients cared for per 1.0 FTE provider in FY 2012</td>
</tr>
<tr>
<td>Clinic Visits Seen by Ophthalmology and Optometry</td>
<td>Total number of clinic visits (one patient may make multiple visits) seen in FY 2012</td>
</tr>
<tr>
<td>Average Provider Productivity</td>
<td>wRVUs/1.0 FTE/year</td>
</tr>
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</table>

1.0 FTE = 40 hours per week dedicated to clinical care (outpatient clinic, surgery, resident supervision, etc.).
Ophthalmology and optometry technicians, residents, and nurses were found to positively impact provider productivity and/or access (Table II). PAs, nurse practitioners, administrative, and clerical personnel had no statistically significant impact on provider productivity or access.

**Productivity**

The ratio of ophthalmology technician to ophthalmology provider was highly associated with increasing productivity and a linear equation best described this impact ($r^2 = 0.406; p < 0.001$). Each increase in one technician per FTE increased the productivity of an ophthalmologist by 1,655 relative value units (RVUs) per year. The ratio of optometry technician per optometry provider was not associated to a significant degree with the productivity of optometric providers.

Resident FTE had a significant impact on ophthalmology productivity ($r^2 = 0.200; p = 0.046$) but not on optometry productivity.

Nursing FTE had no significant impact on the productivity of either ophthalmology or optometry.

**Panel Size**

The ratio of ophthalmology technician per ophthalmology provider was associated with increasing panel size and an “exponential” equation best described this impact ($r^2 = 0.193; p = 0.047$). Technical support for ophthalmology had a minimal impact on panel size until the level of support reached approximately one technician per provider. Thereafter, the ophthalmology panel size increased exponentially with a 15% increase in the number of unique patients per provider for every increase of one ophthalmology technician per provider.

The ratio of optometry technician per optometry provider was associated with increasing panel size and a “linear” relationship best described this impact ($r^2 = 0.178; p = 0.041$). Optometry panel size increased by 226 unique patients for each increase of one optometry technician per provider.

Neither resident FTE nor nursing FTE had a statistically significant impact on panel size for either ophthalmology or optometry.

**Clinic Visits**

The ratio of ophthalmology technician to provider was associated with increasing clinic visits and a linear equation best described this impact ($r^2 = 0.182; p < 0.001$). Each increase in one ophthalmology technician per provider increased the number of clinic visits managed per ophthalmologist by 959 visits per year.

The ratio of optometry technician to provider was associated with increasing clinic visits and a linear equation best described this impact ($r^2 = 0.194; p < 0.001$). Each increase in one optometry technician per provider increased the number of visits managed per optometrist by 964 visits per year.

The ratio of nursing FTE to both ophthalmologist and optometrist FTE was associated with higher clinic visits, although a lower percent of variance could be attributed to nursing personnel compared to eye care technician personnel ($r^2 = 0.092$ for Ophthalmology Medical Doctors [MDs] and $r^2 = 0.055$ for Optometric Doctors [ODs]).

Resident FTE had a highly significant impact on ophthalmology clinic visits ($r^2 = 0.336; p < 0.001$) but not on optometry clinic visits.

**High Productivity and High Access**

Since ophthalmology and optometry technicians had the greatest overall impact on provider productivity and access,
a four-quadrant analysis (independent Student t test) was performed on all eye care clinics segregated into high versus low productivity (above and below the national median) and high and low panel sizes (above and below the national median). Ophthalmology clinics with low productivity and low panel sizes had an average ophthalmology technician to provider ratio of 0.911, whereas ophthalmology clinics with a high productivity and high panel size had an average ophthalmology technician to provider ratio of 1.247. The difference was statistically significant (p = 0.042).

Optometry clinics with low productivity and low panel sizes had an average optometry technician to provider ratio of 0.445, whereas optometry clinics with a high productivity and high panel size had an average optometry technician to provider ratio of 0.672. This difference was statistically significant (p = 0.016).

Nine ophthalmology clinics had productivity levels that were at least 150% higher (>9,654 RVUs per MD FTE) than the national average for VHA (6,611 RVUs per MD FTE). Seven of these clinics also had panel sizes (unique patient per MD FTE) that were at or above the national average (1,522 patients per MD FTE). The mean level of technical support for these seven clinics was 1.97 ophthalmology technicians per MD FTE.

DISCUSSION
In an effort to meet the increasing workload and improve veteran access to care, the Veterans Access, Choice and Accountability Act of 2014 (Public Law 113-146) was signed into law on August 7, 2014. Several billion dollars of the appropriation was to be applied to increased staffing in VHA facilities. The data in this study suggest that hiring additional support personnel may be a cost-effective way to increase productivity and access within VHA eye care, which is presently the third-busiest service, after primary care and mental health.

Subjective self-reports have suggested that an ophthalmology technician can improve the productivity of an ophthalmologist by 23%. In addition, two surveys showed that a majority of ophthalmologists believe that certified ophthalmology technicians improve provider productivity and the volume of patients seen per hour. The current study is the first to provide objective data on ophthalmology and optometry provider productivity and access from a large health care system and to analyze the effect of support personnel on this care. The study data clearly demonstrate that eye technicians improve access to patient care for both ophthalmology and optometry more than other ancillary staff such as RNs or PAs.

Furthermore, our data illustrate that ophthalmology technicians significantly improve the productivity of ophthalmology, but a similar effect was not noted in optometry. The advanced technical skills of ophthalmology technicians compared to optometry technicians may explain this difference. Perhaps optometry productivity could be improved in the VA system if optometry technicians receive further specialized training or if ophthalmology technicians were fully utilized in all eye clinics. Additionally, optometry patients often are followed on a 2-year cycle, whereas many ophthalmology patients are followed more frequently. It is possible that optometry technicians would have a greater impact on productivity over a 2-year interval.

Limitations of this study include lack of productivity data for providers other than full-time and part-time employees (contract and fee-basis providers). Including the workload of these providers would increase the overall wRVUs collected for each service but might alter the average productivity per provider. In addition, spectacle fitting and repair which may be incidentally performed by a technician during an eye clinic visit may not be routinely captured with a code. In the future, it will be important for all technical workload to be captured in the VA including workload associated with spectacle care as well as diagnostic testing. Other factors likely to influence productivity and access such as space (examination rooms per provider), availability of testing equipment, and organizational structure are not included in the VHA Physician Productivity Report and were not addressed in this study.

Any analysis of “Big Data” is limited by the extent of data elements that are collected by the system. For many years, the VA has been collecting data on a variety of elements related to clinical care. Only recently has the VA begun to collate this data into reports addressing various issues including provider productivity. The current study was limited by the selected elements that currently are being collected for eye care. In the future, as more elements become available, a more detailed analysis will be possible.

CONCLUSION
In conclusion, technicians significantly impact the productivity of ophthalmology and enhance patient access to care by increasing the number of clinic visits and the number of unique patients seen per year for both ophthalmology and optometry. The impact was most significant in ophthalmology clinics, where the number of unique patients seen increased logarithmically after a base level of one technician per ophthalmologist was reached. The data suggest that two technicians per ophthalmologist should be set as the minimal requirement, with potentially higher ratios appropriate for mid-sized and large medical centers that have a more complex patient profile. Moreover, it is possible that if optometry clinics utilized more highly skilled eye technicians, then optometry clinics may also improve productivity and access in an exponential, rather than a linear, fashion.

The findings of our study may be self-evident. However, policy is more likely to be made based on statistically analyzed data rather than impressions. The data on eye care productivity and access that is beginning to emerge from the VA Health Care System may help to shape policy. The information presented in the current study will be critical for strategic planning within VHA and may be applicable to ophthalmology and optometry community practices. Eye care
technicians enhance the quality of eye care, access to eye care, and provide efficiencies that allow providers to maximize their clinical work.

ACKNOWLEDGMENT

M.G.L., G.C.C., and W.D. had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

REFERENCES