Nephrology Workforce: Challenges for the Future

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Ground Zero: 1997

Supplement to: Journal of the American Society of Nephrology

Estimating Workforce and Training Requirements for Nephrologists Through the Year 2010
Scenario #6

- Annual ESRD prevalence growth 5%
- Annual CKD prevalence growth 5%
- Nephrologists provide primary care services to CKD and non-CKD patients
- Would need total increase in nephrology FTEs of 4900 by 2000 (but only 2400 for the renal care)
- Actually increased by 1000 so far by 2008
Doom and Gloom in 1997

- Intensivists taking over nephrology care in ICUs (including CRRT)
- Radiologists taking over renal biopsies
- Nephrology nurse practitioners competing with nephrologists for business
- PCPs withholding referrals of CKD patients because of fear of losing patients
How Has Nephrology Adapted?

- Physician extenders (0.32/FTE nephrologist in 2005)
- Relinquish care of general medicine patients
- Relinquish primary care of CKD and ESRD patients
- Sub-subspecialize practice to increase efficiency
### How Many Dialysis Patients Are There?

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>SI MS</td>
<td>345,280</td>
<td>358,132</td>
<td>370,014</td>
</tr>
<tr>
<td>USRDS</td>
<td>354,754</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevalence Dec. 31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Increase</td>
<td>3.8%</td>
<td>3.7%</td>
<td>3.3%</td>
</tr>
</tbody>
</table>
Projected counts of prevalent dialysis patients through 2020 (autoregression model)

Figure 2.34

How Many Transplant Patients Are There?

<table>
<thead>
<tr>
<th>Year</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>USRDS</td>
<td>136,136</td>
<td>141,693</td>
<td>151,502</td>
</tr>
<tr>
<td>OPTN (K + K/P)</td>
<td>102,320</td>
<td>104,388</td>
<td></td>
</tr>
<tr>
<td>Annual Increase</td>
<td>6.2/6.1%</td>
<td>4.1/2.0%</td>
<td>6.9%</td>
</tr>
</tbody>
</table>
Projected counts of prevalent transplant patients through 2020 (autoregression model)

Figure 2.35

Counts projected using forecasting & time series analysis. Original projection uses two models with data from 1982 through 1997; new projection uses data from 1980 through 2005. Original actual counts are consistently lower than present actual counts; in remaining figures, original actual counts differ substantially from present actual counts.
Stages of CKD and Prevalence Estimates

An estimated 8 million patients have later stage chronic kidney disease and an additional 20 million have some degree of renal impairment.

<table>
<thead>
<tr>
<th>Stage</th>
<th>GFR Level</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>&gt;90</td>
<td>10,500,000</td>
</tr>
<tr>
<td>Stage 2</td>
<td>60-89</td>
<td>7,100,000</td>
</tr>
<tr>
<td>Stage 3</td>
<td>30-59</td>
<td>7,600,000</td>
</tr>
<tr>
<td>Stage 4</td>
<td>15-29</td>
<td>400,000</td>
</tr>
<tr>
<td>Stage 5</td>
<td>&lt;15 (or dialysis)</td>
<td>300,000</td>
</tr>
</tbody>
</table>

*Data for Stages 1-4 from NHANES III (1988-1994): Population of 177 million adults age < 20 years. Data for Stage 5 from USRDS (1998): include approximately 230,000 patients treated by dialysis, and assume 70,000 additional patients not on dialysis. GFR estimated from serum creatinine using MDRD Study equation based on age, gender, race and calibration for serum creatinine. For stages 1 and 2, kidney damage estimated by spot albumin-to-creatinine ratio >17 mg/g in men or >25 mg/g in women on two measurements.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>1.7%</td>
<td>1.8%</td>
<td>4.3 million</td>
</tr>
<tr>
<td>Stage 2</td>
<td>2.7%</td>
<td>3.2%</td>
<td>7.7 million</td>
</tr>
<tr>
<td>Stage 3</td>
<td>5.4%</td>
<td>7.7%</td>
<td>18.5 million</td>
</tr>
<tr>
<td>Stage 4</td>
<td>0.21%</td>
<td>0.35%</td>
<td>840,000</td>
</tr>
<tr>
<td>Total</td>
<td>10.0%</td>
<td>13.1%</td>
<td>31.3 million</td>
</tr>
</tbody>
</table>

U.S. Medical School First-Year Enrollment, 1998-2008

AAMC Data Warehouse: As of October 10, 2008
>85% of medical schools have either already expanded their first-year enrollment or plan to expand.

A number of new medical schools plan to matriculate their first classes in the near future.

Projections indicate that a 30 percent increase in first-year enrollment will be reached by 2017.
Renal Fellowship Training 2008

- 8 new fellowship programs since 2005 (total 136)
- About 390 fellows complete training each year (increased 50 since 2005)
  - 1/3 are women (more likely to work part-time)
  - 31% stay in academic environment
  - 6% take additional training (e.g. interventional)
  - 48% are IMGs and 5-7% have visa issues
Trends In Adult Nephrology Training

![Graph showing trends in number of trainees and programs from 1998 to 2007. The number of trainees increases gradually, while the number of programs remains relatively constant.](image-url)
Applicants to Internal Medicine Specialties

Data from ERAS (http://www.aamc.org/programs/eras/programs/statistics)
<table>
<thead>
<tr>
<th>Nephrology Tracks</th>
<th>Number of Participating Programs</th>
<th>Number of Programs Filled</th>
<th>Number of Positions Available</th>
<th>Number of Positions Filled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical</td>
<td>114</td>
<td>104</td>
<td>305</td>
<td>291</td>
</tr>
<tr>
<td>Research (general)</td>
<td>16</td>
<td>13</td>
<td>42</td>
<td>39</td>
</tr>
<tr>
<td>Clinical Research</td>
<td>6</td>
<td>5</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>Basic Science Research</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>142</td>
<td>127</td>
<td>367</td>
<td>348</td>
</tr>
</tbody>
</table>
# Nephrology Match 2008

<table>
<thead>
<tr>
<th>Type of Graduate</th>
<th>Nephrology Fellowship Positions Filled by SMS by Applicant Type</th>
<th>All Internal Medicine Fellowship Positions Filled by SMS by Applicant Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMG</td>
<td>170 (49%)</td>
<td>942 (33%)</td>
</tr>
<tr>
<td>USMG</td>
<td>132</td>
<td>1558</td>
</tr>
<tr>
<td>US IMG</td>
<td>27</td>
<td>246</td>
</tr>
<tr>
<td>DO</td>
<td>17</td>
<td>134</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>348</td>
<td>2889</td>
</tr>
</tbody>
</table>
Role of International Medical Graduates in the U.S. Physician Workforce

American College of Physicians - 2008

IMGs are critically important to U.S. health care, accounting for 36% of internal medicine physicians.

In FY2005, 45.3% of H-1B visas were granted to computer-related occupations, while 6.2% were awarded in medicine.

Recommendation of the American College of Physicians

Streamline and expand the process for obtaining J-1 and H1B visas for IMGs who desire postgraduate medical training and/or medical practice in the U.S.
USMG applicants to fellowships

Data from ERAS (http://www.aamc.org/programs/eras/programs/statistics)
2007 Nephrology graduates' career plans

<table>
<thead>
<tr>
<th>Career Plan</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completing training With known plans</td>
<td>368</td>
<td>305 (82.9%)</td>
</tr>
<tr>
<td>Pursuing more training</td>
<td>32</td>
<td>192 (63.0%)</td>
</tr>
<tr>
<td>Practicing in the US</td>
<td>192</td>
<td>77.6%</td>
</tr>
<tr>
<td>Group practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In NHSC or similar underserved area</td>
<td></td>
<td>1.6%</td>
</tr>
<tr>
<td>Academician</td>
<td>76</td>
<td>76 (24.9%)</td>
</tr>
</tbody>
</table>

http://www0.ama-assn.org/vapp/freida/career/0,1238,148,00.html
Imprinting Nephrology on Medical Students and Residents

- Increased clinical involvement
  - Follow patient and family through renal transplant
  - Become involved in CKD outreach (NKF KEEP)
- Mentorship
  - Innovative approaches - new models that consider gender, race, background
- Nephrology fast track
Are we meeting fellows’ educational needs?

Teaching and evaluation

- National core curriculum
- In-training examination
- Training the teachers
- Scholarly analysis of outcomes
- ACGME
Milestones Project

• Every 6 months, faculty report fellow's progress through the ACGME portfolio
• Program’s performance compared to specialty-specific national milestones
• Program directors annually report program data
• Accreditation cycles may extend to 8 to 10 years.
• “Within our grasp” in a few years
Are we meeting fellows’ educational needs?

Preparation for practice

- Effectiveness of renal fellowship training not published since 1991*

- Areas needing improved training
  - Peritoneal dialysis
  - Geriatric nephrology
  - Interpretation of radiographic tests
  - End-of-life care
  - Business of nephrology
  - The nephrologist in society

*Kimmel and Bosch, AJKD, 18: 249
Are we meeting educational needs?

Sub-specialization and procedures

- Prior to 2008, no analysis of training program procedural training for almost 20 years*
  - Biopsies and temporary access almost universally taught despite current practice trends
  - 15-20% of programs train interventionalists
  - Estimate 20-30% of programs will train interventionalists in near future, meeting projected needs
  - Evidence-based guidelines for all procedures needed
  - ACGME accreditation or ABIM certification

- Transplant nephrology
  - Most nephrologists care for transplant patients
  - All fellows should be trained
  - Are separate transplant fellowship valuable?
  - ACGME accreditation or ABIM certification

*Berns and O’Neil, CJASN, 2008
Developing system awareness and responsibility: Our future at risk

- Training fellows to understand the forces driving changes in academic internal medicine and to develop the tools to help challenge traditional beliefs*
- Training fellows to understand the renal healthcare system in the context of national priorities and evolving economic pressures.
- Training fellows as leaders in social and economic renal healthcare policy: The Renal MPH.

*Ibrahim, CJASN, 2008*
U.S. Academic Nephrology Faculty

Data from http://www.aamc.org/data/facultyroster/reports.htm
Increasing Nephrology Research Amongst Trainees

- Mentoring - new models are needed
- Research opportunities
  - Target all, particularly MD-PhDs
  - Local, regional and national meetings
    - Workshops for trainees
    - Conferences with trainee focus
- Loan payback
- Nephrology fast track
Target Areas for Nephrology Workforce Enhancement

- Enrollment
  - Increase interest in nephrology as a career
  - Increase interest in nephrology research as a career

- Education
  - Meeting RRC regulations
  - Core curriculum
  - Teaching toolkit online
  - Conferences
  - Specialized training centers and simulations
  - Testing - summative and formative

- Evaluation
  - Scholarly analysis and publications/abstracts
  - Outcomes data used to direct education training and RRC rules
  - Multicenter studies
  - Interaction with other societies
  - Interaction with public policy makers
## Workforce Catching Up?

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected Growth in ESRD Population (%)</th>
<th>Actual Growth in ESRD Population (%)</th>
<th>ESRD Mortality Relative to Current Levels (%)</th>
<th>No. of Nephrologists Needed to Train per Year</th>
<th>No. of Nephrologists Receiving Their Initial Board Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996 to 1998</td>
<td>+6</td>
<td>+5</td>
<td>100</td>
<td>497</td>
<td>283 and 296</td>
</tr>
<tr>
<td>1998 to 2000</td>
<td>+5</td>
<td>+5</td>
<td>90</td>
<td>480</td>
<td>313 and 333</td>
</tr>
<tr>
<td>2000 to 2002</td>
<td>+5</td>
<td>+3</td>
<td>90</td>
<td>442</td>
<td>359 and 376</td>
</tr>
<tr>
<td>2002 to 2004</td>
<td>+5</td>
<td>+3</td>
<td>80</td>
<td>484</td>
<td>386 and 400</td>
</tr>
<tr>
<td>2004 to 2006</td>
<td>+3</td>
<td>+4</td>
<td>80</td>
<td>359</td>
<td>390</td>
</tr>
<tr>
<td>2006 to 2008</td>
<td>+3</td>
<td>+4</td>
<td>70</td>
<td>395</td>
<td>—</td>
</tr>
<tr>
<td>2008 to 2010</td>
<td>+3</td>
<td>—</td>
<td>70</td>
<td>395</td>
<td>—</td>
</tr>
</tbody>
</table>

*Data collated from US Renal Data System, Neilson et al., and American Board of Internal Medicine.

The two numbers represent the numbers of nephrologists receiving their initial board certification for each year in the 2-yr interval depicted in that row.
Current Workforce Issues

- About 5500 FTE nephrologists in the US (increased from 4500 in 1997 or 22% or \(\sim 2\%/yr\))
- Emphasis on the MCP for dialysis (G codes) has
  - Increased the role of physician extenders to round
  - Shifted resources from CKD to ESRD
  - Not improved patient outcomes
- Increased duties for the Medical Director in new Conditions of Coverage (25% effort)
- Will increased role of LDOs in pre-ESRD care make it more cost-effective and shift nephrology work in that direction?
How Nephrology PAs Spend Their Time

Fig 2. Distribution of effort among all physician assistants responding to the survey. (Solid box), interquartile range (25th to 75th percentiles); (internal line), median; (upper and lower T-bare), largest and smallest values equal to 1.5 times the interquartile range; (dots), outliers; ICU, intensive care unit.

Anderson et al: AJKD 33: 647, 1999
Be Careful What You Wish For

- 19.3 million stage 3 and 4 CKD patients means 3450 per FTE nephrologist
- Based on 20/80 rule, only 3.7 million stage 3 and all stage 4 CKD patients require a nephrologist’s care (818 CKD patients per nephrologist)
- Currently, each FTE nephrologist cares for
  - about 500 stage 3 and 4 CKD patients*
  - 70 stage 5 CKD patients not yet on RRT*
  - 85 ESRD patients (dialysis + transplant)**
- Triggers for nephrology referral vary widely by practice

*BioTrends data   **Prevalent/FTEs
Q2. How long have you been in practice? (n=182)
Q9. Would your practice best be described as office based nephrology specialty, office based multi-specialty group, hospital based academic center, hospital based community hospital, VA, or Other (n=182)
Q10. Including yourself, how many TOTAL Nephrologists are in your practice? (n=182)
Q11. Is your practice located in an urban, suburban, or rural location? (n=182)
Prevalence of CKD: Nephrologists

Nephrologists report having an average of more than 500 CKD Stage 3 and CKD Stage 4 patients

<table>
<thead>
<tr>
<th>Stage of CKD Patients</th>
<th>Patients Under Management</th>
<th>Patients Seen in a Given Month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
</tr>
<tr>
<td>Stage 1 CKD Patients (GFR &gt; 90)</td>
<td>76</td>
<td>40</td>
</tr>
<tr>
<td>Stage 2 CKD Patients (GFR 60-89)</td>
<td>160</td>
<td>80</td>
</tr>
<tr>
<td>Stage 3 CKD Patients (GFR 30-59)</td>
<td>315</td>
<td>200</td>
</tr>
<tr>
<td>Stage 4 CKD Patients (GFR 15-29)</td>
<td>192</td>
<td>150</td>
</tr>
<tr>
<td>Stage 5 CKD - Not on Dialysis (GFR &lt;15)</td>
<td>71</td>
<td>40</td>
</tr>
</tbody>
</table>
Reasonable Triggers for Nephrology Referral

- Early age of onset
- Rapid progression
- Uncertain etiology
- Significant proteinuria
- All patients with stage 4 CKD
- Known autoimmune disease
- Severe or difficult-to-control hypertension


Partnership with PCP desirable for early-stage kidney disease; could be managed with little input from nephrologists until late stage 3.

DuBose: ASN Presidential Address, 2006
How Do Nephrologists Prove Their Worth?

- Is the decrease in growth of the ESRD population due to improved CKD care or more deaths among a sicker CKD population?
- Will the CKD and ESRD elements in the PQRI and the Phase III ESRD CPMs show good patient care?
- Will nephrologists be marginalized by the LDOs in a (possible) global capitated environment for ESRD?
Physicians Quality Reporting Initiative (PQRI)

- Voluntary, associated with a 1.5% bonus payment on Medicare patients
- Inevitably the first step toward physician P4P and public accountability
- Chose Column A or Column B
<table>
<thead>
<tr>
<th>Column A – CKD</th>
<th>Column B – ESRD</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ACE or ARB Rx</td>
<td>• % HD patients with AVF or referred to surgeon</td>
</tr>
<tr>
<td>• Testing for Ca, phos and PTH</td>
<td>• % patients who received flu vaccine</td>
</tr>
<tr>
<td>• BP management</td>
<td>• % patients with Hgb ≥11 or with plan of care</td>
</tr>
<tr>
<td>• Plan of care for Hgb &gt;12 in patients taking ESAs</td>
<td>• % HD patients with Kt/V ≥1.2 or with plan of care</td>
</tr>
<tr>
<td></td>
<td>• % PD patients with Kt/V ≥1.7 or with plan of care</td>
</tr>
</tbody>
</table>
CKD patients under the care of a nephrologist in the two years prior to ESRD, by age & race/ethnicity

Figure hp.9

Incident ESRD patients, age 67 & older at initiation; pre-ESRD nephrologist care identified through at least one physician/supplier claim with a physician specialty code of “nephrologist.” For Hispanic patients we present data beginning in 1996, the first full year after the April 1995 introduction of the revised Medical Evidence form, which contains more specific questions on race & ethnicity.

2007 ADR
Objective 4.3: Pre-ESRD counseling, (nephrologist care)

Figure hp.28

Incident dialysis patients, 2005, with new (revised edition) Medical Evidence forms. Only includes patients for whom it is known whether they saw a nephrologist.
Realities of the Future

- The entry of new nephrology trainees will increase the workforce by <3% annually after departures figured in (390 in, 240 out)
- There are 2 open positions available for each nephrology trainee entering practice
- Average FTE nephrologist in 2005 (RPA)
  - Worked 58 hours/week
  - Billed 12,993 RVUs
  - Made $282,280
- In the future, nephrologists will have to work harder
  - To maintain income
  - To take care of the patients
Thanks to

- Dale Singer, RPA
- Jennifer Robinson, BioTrends Research Group Inc.
- Martin Osinski, American Medical Consultants
- Donald Kohan, MD