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Prologue: In organ transplantation policy, a fundamental issue is how to increase the supply of organs to meet the ever-growing demand. The problem is not a shortage of organ donors but rather a breakdown of the organ donation system in the procurement stage. In this article, Jeffrey Prottas and Helen Levine Batten offer some striking results from their survey of medical professionals involved in the organ procurement process. The findings seem to show that neurosurgeons—key players in organ procurement—are afraid to approach the families of potential donors. They fear upsetting the families in their time of grieving, when, in actuality, research has shown that families welcome the opportunity to donate and to make something positive out of death [Helen Levine Batten and Jeffrey M. Prottas, “Kind Strangers: The Families of Organ Donors,” Health Affairs (Summer 1987)]. The article describes the various barriers that prevent neurosurgeons from asking families of “brain-dead” patients to consider donation. The authors write: “Understanding neurosurgeons’ perceptions and attitudes is central to increasing the supply of organs.” Prottas is deputy director of the Bigel Institute for Health Policy, Heller Graduate School, Brandeis University, and has been affiliated with the institute for the past six years. Prior to joining Brandeis, he taught at Harvard University’s Kennedy School of Government as an associate professor. Prottas received his doctorate in political science from Massachusetts Institute of Technology. Batten is a senior research associate at the Bigel Institute and recently received her doctorate in sociology from Boston College.
There is no shortage of organ donors, yet there is a chronic and, indeed, increasing shortage of organs for transplantation. Although estimates of the number of suitable donors potentially available are crude, their order of magnitude demonstrates that we are in no immediate danger of exhausting the supply. A range of 17,000 to 26,000 donors per year, potentially yielding 34,000 to 52,000 kidneys, is often cited. In 1987, less than 8,000 cadaveric kidneys were retrieved in the United States, representing about 20 percent of the potential. With such disparities, even serious errors in the original estimate become irrelevant. This is not to say that the 4,000 donors are insignificant; they represent a success rate almost unmatched in the world. However, they are also clearly inadequate to the nation's need and demand. In the same year that a record 7,100 cadaveric kidneys were transplanted (not all retrieved kidneys get transplanted), the queue of those awaiting a kidney transplant went up by over 1,200 people.

The key to the unpleasant paradox of shortage amid surplus lies in the difficulties the organ procurement system encounters in obtaining access to potential donors. Overcoming the access problem is, in essence, what organ procurement is all about. The core of this access problem lies not with the families of potential donors, but within the hospitals where these patients die. The general public is supportive of organ donation, and, more importantly, willing to permit organ donation when approached after the death of a relative. A national survey of organ procurement agencies (OPAs) found that about 70 percent of those families asked granted such permission. Indeed, what set successful organ procurement agencies apart from unsuccessful ones was their success not at obtaining permission but rather at obtaining timely information from intensive care units about potential donors. The access issue in organ procurement hinges upon cooperation among medical professionals.

Two professional groups are critical to the organ procurement process: the nurses in the intensive care units and the neurosurgeons (or more rarely the neurologists) who treat those who could become donors. Both groups are essential because, without cooperation from both, “referral” (the technical term for the process of informing an OPA that a potential donor exists) is unlikely to occur. Nevertheless, the legal and professional importance of the neurosurgeon makes his or her cooperation the sine qua non of OPAs' access to donors. The neurosurgeon must give formal permission for the referral; under the neurosurgeon's authority and responsibility, donor maintenance steps are taken; and the neurosurgeon can declare a patient dead by braindeath criteria.

Everything we know about organ procurement indicates that the attitudes of neurosurgeons are critical to its success. Surveys of other key
medical actors show that their willingness to cooperate is greatly influenced by their perception of physicians' attitudes. It is unlikely that any changes in the way organ procurement is done will change the preeminence of physician support. While potentially useful, required request/routine inquiry laws cannot change the central role that the physician must play. It is neither possible nor, perhaps, desirable to coerce physician involvement. Too many professional judgments can stand legitimately between death and donation. Most required request laws aim at persuasion, not coercion.

It follows, therefore, that understanding neurosurgeons' perceptions and attitudes is central to increasing the supply of organs. Equally, it is necessary to understand the distribution of these perceptions and attitudes. Neurosurgeons, like the rest of society, differ among themselves. Our goals here are to explain the sources of variation among neurosurgeons and, at the same time, to explore the factors that explain more or less support among neurosurgeons for organ procurement.

The Role Of The Neurosurgeon

The centrality of the neurosurgeon in organ donation is well recognized by the organ procurement community. In a survey of the nation's largest OPAs, 58 percent of agency directors reported that neurosurgeons were the single most important medical professionals in the organ procurement system. The only other group prominently mentioned was intensive care unit (ICU) nurses, who were considered the most important by one-third of those surveyed. All of those who did not list the neurosurgeon as the most important professional in the process listed the neurosurgeon as the second most important. There was even greater unanimity as to which professional groups were the most and least cooperative, with 75 percent of those surveyed rating nurses as the most cooperative and 73 percent rating neurosurgeons as the least cooperative.

To anyone concerned about organ procurement, this is a most disturbing finding. The directors of organ procurement agencies deal with the access question daily, and, while they are not infallible, their opinions must carry weight. In their judgment, neurosurgeons are both the most important and the least cooperative group controlling access to organ donors, a combination that bodes ill for organ procurement.

Data and methods. We conducted a mail survey of a random sample of 362 neurosurgeons, 13 percent of all U.S. neurosurgeons, drawn from the membership lists of the American Association of Neurological Surgeons.
The survey yielded a response rate of 69 percent, representing 246 neurosurgeons currently practicing in the continental United States. Respondents were asked fifty questions about their attitudes and experience with organ donation and organ procurement. The high response rate reflects both an aggressive follow-up protocol and the high level of public debate regarding transplantation.

We also conducted mail surveys of representative random samples of informants affiliated with 344 community, nontransplant hospitals, each with more than 100 beds. The list of these hospitals, stratified by region, was generated randomly by the American Hospital Association. The hospital administrator, the director of nursing, and four intensive care nurses from each of the sampled hospitals were asked to complete questionnaires specifically designed for each group. Response rates from each of these groups were above 65 percent.

We then carried out descriptive and multivariate statistical analyses to examine the range of neurosurgeons' attitudes toward different aspects of donation and to identify salient characteristics of neurosurgeons in support of donation. On some topics, neurosurgeons' responses were compared with those of hospital administrators and intensive care nurses.

**Attitudes toward organ donation.** Organ procurement specialists are not alone in perceiving neurosurgeons as lukewarm toward organ procurement. Results from surveys of hospital administrators and intensive care nurses concerned about organ donation reveal that they believe physicians are less supportive of organ procurement than are other professionals involved in the process.

Both administrators and nurses from across the country not only believe that their own professions are more supportive of organ procurement than are physicians but, even more strikingly, they each believe that the other is more committed than are the physicians. In addition, Exhibit 1 shows that both groups see physicians as quite uninvolved in organ procurement activities. But the perceptions of neurosurgeons differ rad-

<table>
<thead>
<tr>
<th>Exhibit 1</th>
<th>Perceptions Of Nurses And Administrators Regarding Organ Transplantation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hospital administrators (N = 227)</strong></td>
<td><strong>Nurses (N = 919)</strong></td>
</tr>
<tr>
<td>Personally strongly approve of organ procurement</td>
<td>90.5%</td>
</tr>
<tr>
<td>Physicians strongly support</td>
<td>41.4</td>
</tr>
<tr>
<td>Administrators strongly support</td>
<td>71.8</td>
</tr>
<tr>
<td>Nurses strongly support</td>
<td>68.1</td>
</tr>
<tr>
<td>Physicians often refer patients</td>
<td>11.6</td>
</tr>
<tr>
<td>Physicians are the first to recognize donors</td>
<td>54.1</td>
</tr>
</tbody>
</table>
ically from those of nurses and hospital administrators. In the eyes of the neurosurgeons, they and their medical colleagues are very supportive and involved in organ procurement.

As Exhibit 2 demonstrates, neurosurgeons’ self-reporting and self-perception are greatly at odds with the feelings of those people with whom they work. They report themselves and their colleagues as supportive and involved; ICU nurses and hospital administrators see them as neither. We need to account for these differences, especially those between the nurses and physicians. These two groups routinely work together and must cooperate if organ procurement efforts are to succeed.

Part of the differences found may be explained by the fact that the two groups are answering questions with regard to different aspects of physicians' behavior and attitudes. The general questions asked of neurosurgeons had two characteristics that may encourage positive responses: they were relatively abstract, and there was a socially appropriate answer. Organ donation is almost universally seen as admirable, and questions pertaining to support for it that have no clear behavioral implications can be expected to be favorably received. This is not to say that physicians (and the other groups asked similar questions) are answering untruthfully, only that there is a strong response bias to the question.

However, when nurses report their perceptions of physicians' attitudes, they probably are forming their opinions based not on the opinions they hear from physicians, but on direct encounters with physicians around the actual process of organ procurement. For neurosurgeons and ICU nurses, “organ procurement” is not a single global activity but a series of concrete steps that must be taken in sequence. The willingness to do the least pleasant or most distasteful of those actions defines the actual level of involvement of both nurses and doctors. To understand the real willingness of neurosurgeons to participate in organ procurement and, perhaps, to understand the differing perceptions of those who work with neurosurgeons, we need to examine the organ procurement process.

### Exhibit 2
Neurosurgeons' Perceptions Of Their Own Involvement In And Support Of Organ Procurement

<table>
<thead>
<tr>
<th>Perception</th>
<th>Neurosurgeons (N = 246)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personally strongly support organ procurement</td>
<td>90.6%</td>
</tr>
<tr>
<td>Would donate own organs</td>
<td>91.5</td>
</tr>
<tr>
<td>Would consider letting kin donate</td>
<td>93.4</td>
</tr>
<tr>
<td>Other neurosurgeons strongly support organ donation</td>
<td>71.2</td>
</tr>
<tr>
<td>Other neurosurgeons often refer donors</td>
<td>51.3</td>
</tr>
<tr>
<td>Other neurosurgeons are the first to recognize a donor</td>
<td>84.2</td>
</tr>
</tbody>
</table>
The Organ Procurement Process

Neurosurgeons generally engage in five principal tasks in organ procurement. They identify the patient as a potential donor, make the determination of death by brain-death criteria, tell the patient’s family that their relative is dead, establish the management regime for the potential donor, and often present the option of organ donation to the family. For neurosurgeons, each of these tasks may raise one or more difficult issues regarding their involvement. The appropriateness of certain medical definitions and practices may come into question. The physician’s relationship with the donor’s family may trouble some physicians. Finally, and influenced by the first two, the personal “cost” to the neurosurgeon may have to be considered. These “costs” may arise in the time that must be committed to an organ procurement and/or in the emotional wear and tear of involvement in such a tragic event.

Neurosurgeons seem to have little difficulty with the medical issues surrounding organ procurement. An overwhelming percentage of neurosurgeons believe that medical criteria on the subject are generally accepted and well established (Exhibit 3). Likewise, they have little doubt about their ability to identify a still living but terminal patient as a potential donor. Nor do many doubt the propriety of doing this. Only in the area of the clinical management of the patient do a substantial percentage of neurosurgeons express concern. Many are concerned that managing the hemodynamics and other clinical factors in a way that protects the usability of a patient’s organs may not always be compatible with the preferred protocols for helping the patient to recovery. This is primarily a problem when there is doubt about the patient’s prognosis.

When asked specific questions about their relations with families of potential donors, neurosurgeons appear to have far greater ambivalence than they do about medical matters (Exhibit 4). This is to be expected. Medical issues are their area of expertise; they have spent half a lifetime preparing to resolve such issues. Facing a grieving family is a far more

| Medical guidelines for organ procurement are well established | 87.9% |
| Brain death criteria are well established | 90.4 |
| Comfortable designating a patient as a potential donor while the patient is still on a respirator | 81.4 |
| Treating patients sometimes conflicts with protecting organs | 54.5 |
Exhibit 4
Neurosurgeons’ Perceptions Of Family/Physician Relationships In Organ Procurement

<table>
<thead>
<tr>
<th>Percentage in agreement (N=246)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurosurgeons are responsible for informing the family that their relative is brain-dead</td>
</tr>
<tr>
<td>Organ donation helps families in their grieving process</td>
</tr>
<tr>
<td>Families of donors are somewhat likely to see a conflict of interest in a neurosurgeon’s involvement in organ donation</td>
</tr>
<tr>
<td>Neurosurgeons do not often express concern about legal liabilities in organ procurement</td>
</tr>
<tr>
<td>Neurosurgeons are reluctant to approach donor families</td>
</tr>
</tbody>
</table>

personal matter, for which they have no particular training. Nevertheless, 75 percent of neurosurgeons do recognize that it is their responsibility to inform the family that their relative is dead by brain-death criteria, a figure quite consistent with that found regarding purely medical issues.

However, when nonmedical aspects of the process are involved, positive attitudes drop off sharply. While two-thirds of the respondents do believe that organ donation helps a family with its grief, about half believe that their involvement may bring them into conflict with the family on a personal or legal level. Most strikingly, over two-thirds of neurosurgeons consider that their colleagues are reluctant to approach a family about organ donation. This is the highest level of hesitancy about organ procurement we have encountered and represents a critical bottleneck for neurosurgeons’ involvement. It is, in fact, higher than any individual reservation yet expressed, perhaps implying that factors in addition to anticipated family reaction are at play. Some of these factors may be related to the emotional and time costs of organ procurement.

Involvement in organ procurement requires that neurosurgeons commit more time from their busy schedules to a case than they might otherwise. Moreover, they must commit this time when they can no longer help the patient. The death of a patient is undoubtedly a difficult thing for any physician, and death in general is an emotionally difficult experience to confront. We asked a number of questions designed to measure the degree to which these matters tended to dissuade neurosurgeons from involvement in organ procurement.

A minority of neurosurgeons believe that both the time commitment and the need to make a brain-death determination impede involvement in organ procurement (Exhibit 5). While a majority do not believe this, the size of the minority indicates that these are problems on a practical level. However, there is more unanimity on the issue of the emotional
Exhibit 5
Neurosurgeons' Attitudes About The Demands Of Organ Procurement

<table>
<thead>
<tr>
<th>Percentage in agreement (N = 246)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurosurgeons find organ procurement emotionally demanding</td>
</tr>
<tr>
<td>Neurosurgeons are somewhat likely to hesitate to become involved in organ procurement because of the time involved</td>
</tr>
<tr>
<td>Neurosurgeons don't like to make brain-death decisions</td>
</tr>
</tbody>
</table>

demands of procurement. Considering that the opportunity for an organ donation only arises following the death of a previously healthy young person, the contrary finding would be surprising.

Differences among neurosurgeons. We can see that neurosurgeons have little trouble with the medical aspect of their involvement in organ procurement, moderate reservations regarding the time it requires and the potential it has for bringing them into conflict with families, and important concerns regarding its emotional demands in general and actually approaching donor families in particular. But neurosurgeons are not all alike. They differ in age, in the medical setting of their work, and in their exposure to organ procurement issues; in addition, they show variation in all the attitudes we have discussed. Most important, for our purposes, they vary in their level of support for organ procurement. Given that their active support is critical, it is important to understand the factors associated with a higher or lower level of support. However, level of physician support for organ procurement is a complex matter.

A physician's willingness to cooperate in organ procurement differs from the expressed willingness of the general public to donate organs. Public respondents never expect to have to act upon their willingness; physicians can reasonably expect to be called upon to act. Moreover, the action expected is relatively complex and may involve medical and social decisions, commitments of time and energy, and exposure to real or imagined risks. As we have seen, numerous variables are associated with neurosurgeons' support for organ procurement.

An Explanatory Model Of Neurosurgeon Support

We developed a three-stage model to test our hypotheses about neurosurgeons' approval for donation (Exhibit 6). Multiple regression analysis, the multivariate technique used here, is especially useful in uncovering complex structural relationships. The summary statistic for multiple regression is the R2, which, roughly, explains the proportion of variance in the dependent variable accounted for by all of the independent variables in the equation. Beta coefficients, or standardized regression
coefficients, are indicators of the relative effect of each independent variable on the dependent variable being explained. By ranking the beta coefficients, one is able to identify the relative strength of each predictor variable and to distinguish which independent variables are more or less significant in explaining the variation in the dependent variable.

The variables can be arrayed in a three-stage sequential model to display the potential for their independent and combined effects on neurosurgeons' approval of donation. We describe each stage, examine correlations between the independent variables in each stage and the dependent variable (neurosurgeon approval of donation), and present a multivariate regression analysis of these stages.

**Findings.** The first stage of the model includes characteristics of neurosurgeons' professional environment: teaching hospital affiliation, perceived effectiveness of the local organ procurement agency, and donation experience. The second stage of the model suggests that neurosurgeons' beliefs about their professional responsibility for procurement activities and colleagues' support for donation predict levels of approval of donation. The third stage of the model represents possible barriers to approval of donation. These barriers include concerns about friction...
with families, fears of legal liability, reservations about conflicting medical protocols, hesitation due to the time demands of a donation, and reluctance to pay the emotional price levied by further involvement in a family tragedy. Indicators of neurosurgeons' positions on these issues were extracted from questionnaire responses.\(^\text{15}\)

Correlation analysis demonstrates that eight of these ten independent variables hold statistically significant associations with the dependent variable, neurosurgeons' approval of donation. Two of the three variables from the professional environment stage of the model, teaching hospital affiliation and donation experience, prove not to be correlated with approval of donation. However, the effectiveness of the local OPA has considerable importance.

Both variables from the professional attitudes stage of the model—belief that organ procurement activities are a professional responsibility of neurosurgeons and the conviction that peers support donation—are moderately associated with approval of donation. All five variables in the third stage are statistically related to approval. However, worry about conflicts with donor families and concerns about the time required for declaring brain death and medically monitoring the potential donor’s condition appear to present the strongest barriers to referral of donors to organ procurement agencies.

Multiple regression analysis permits an assessment of the individual contribution of each of the predicting variables while controlling for the effects of the others. At the same time, it is possible to examine the sequential effects of each stage of the model on neurosurgeon approval of donation. The model reveals that when all ten independent variables are entered into the regression equation, only variables from the professional attitudes stage and the professional concerns stage of the model have a statistically significant impact on neurosurgeons' approval of donation (Exhibit 6). The regression shows that if a neurosurgeon has a sense of professional responsibility toward procurement, does not anticipate hostility from a family asked to consider donation, and is not worried about time costs, he or she is more likely to approve of donation.

The model also shows, however, that the variables with direct effects on approval are themselves influenced by variables from the earlier professional environment and professional attitudes stages of the model. A sense of professional responsibility clearly is affected by the three professional environment variables in the first stage of the model. Neurosurgeons are more likely to advocate professional responsibility for procurement activities if they work in a teaching hospital, have had experience with donation, and perceive that their local organ procurement agency effectively manages donations. This finding suggests, not surpris-
ingly, that professional attitudes may be linked with a more “scientific” professional environment. Neurosurgeons affiliated with teaching hospitals are more likely to come into contact with transplant programs and to subscribe to the belief that their professional responsibilities extend to the medical/scientific community.

The effectiveness of the local OPA also can have a considerable effect on neurosurgeons' perceptions of peer support for donation activities. Neurosurgeons who have previously experienced a well-run procurement may be more likely to have positive perceptions about a community of physicians who support donation. The importance of the OPA's role for neurosurgeons' approval of donation is underscored by the negative relationship between OPA effectiveness and concerns about the time costs of donation. Where physicians felt the OPA effectively managed the procurement, there is an inverse relationship with time costs, indirectly affecting the association between time costs and approval.

Professional attitudes also indirectly affect approval of donation through variables in the third stage of the model. The arrows from belief in professional responsibility show negative relationships with family concerns and hesitation due to time costs. The inverse relationship between perceived peer support for donation and family concerns is the strongest in the model (–.36), suggesting that neurosurgeons who believe colleagues approve of donation are also likely to anticipate positive attitudes from families. They also are less reluctant to diagnose brain death and to approach families for donation, and they are more likely to believe donation helps families in their grieving process.

Implications For Policy

Up to now, policymakers have found no substitute for the voluntary and altruistically motivated cooperation of physicians in organ procurement. There is no evidence that required request laws have diminished the need to motivate physicians. Even if these laws had significant coercive content (which they do not), the medical profession's monopoly on information and its strong attachment to autonomy make legal remedies an unlikely solution. A resort to material incentives is also futile. In the first instance, neurosurgeons reject such a course. In the second, the Uniform Anatomical Gift Act and medical ethics both prohibit giving a physician caring for a patient a material interest in obtaining that patient's organs after death. Finally, such a step could have a negative effect on donor families, since they are asked to act out of kindness and might well resent the fact that others are to profit from their generosity. Steps to increase neurosurgeons' cooperation in organ donation must be
less dramatic than new laws and more subtle than payments; they must address the legitimate fears and the best values of physicians.

Much of the key work must occur at the local level, because organ procurement is inherently a local activity. Organ procurement agencies provide a service to medical professionals, and the core of this service is to do all the difficult, time-consuming, and painful work associated with the donation, often to the degree that this work does not absolutely require a physician. An OPA therefore can affect neurosurgeons' cooperation by minimizing the time demands on them and providing emotional support in their unavoidable encounters with donor families. It also can ensure that the physician is only asked to engage in unavoidable encounters—those where medical information is conveyed and death proclaimed. Neurosurgeons accept this responsibility. OPA staff can take from physicians all of the burden of actually asking for a donation. An OPA that does these things and, equally important, sees to it that physicians know that the OPA will do so before a donor is located, can go far toward minimizing the reasons neurosurgeons are reluctant to make referrals.

Neurosurgeons are unnecessarily concerned about families' reactions. Physicians expect hostility and conflict when gratitude is the more likely response to the opportunity to donate. Obviously, no encounter with the family of a newly dead child or spouse will be easy, but while physicians see organ donation as an imposition, most families see it as solace. A creative educational program at the local level could diminish this misperception. OPAs often use donor families in public education efforts; perhaps they would be more useful in professional education. The key to this kind of education may lie in matching the message and the source to maximize credibility. OPAs and families are unlikely to have much effect on neurosurgeons' cooperation by telling neurosurgeons about professional responsibilities, but they are much more credible regarding family attitudes.

Finally, it is important that neurosurgical associations take visible positions regarding cooperation in organ donation efforts. Neurosurgeons do many difficult and painful things as part of their calling. Long hours, hopeless cases, and other stressful factors are acceptable because of neurosurgeons' strong commitment to their profession and its duties. Neurosurgeons who see organ donation as a professional responsibility deal with this aspect of their work just as they do with the other demands of their profession. If professional associations and leadership make a commitment to organ donation, substantial improvements are possible. From no other source is the message regarding the professional legitimacy of organ procurement credible, and no other message is as likely to influence the behavior of neurosurgeons.
The quick fix is not available. New laws, new money, television ads, and endorsements from rock stars—as gratifying as these are—will not increase referrals from doctors. What is called for is appreciation of the real needs and concerns of key medical professionals and dogged and repeated proofs that those concerns will be met. Organs must be obtained night after night in hundreds of different hospitals and with the daily cooperation of hundreds, even thousands, of physicians. Change, like the activity of transplantation itself, must be institutionalized and permanent. The levers of change are there. If they are used, it will be possible to save thousands of lives through organ transplants.

NOTES

7. Prottas and Batten, “Attitudes and Incentives in Organ Procurement.”
12. Prottas and Batten, “Attitudes and Incentives in Organ Procurement.”
13. The standardized regression coefficients (beta weights), their significance in the model, and the proportion of variance (R²) explained by each regression are available on request from the authors at the following address: Bigel Institute for Health Policy, Heller Graduate School, Brandeis University, Waltham, Massachusetts 02254.
15. A listing of these questions, the mean scores of the variables, and their standard deviations are available on request from the authors.
16. Prottas and Batten, “Attitudes and Incentives in Organ Procurement.”