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Disclosures

I have no financial relationships to disclose relevant to my presentation  
**AND**  
My presentation does not include discussion of off-label or investigational drugs

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Acknowledgments

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## Learning Objectives

1. To describe trends in organ utilization
2. To identify factors associated with long-term and post-KAS kidney discard rate trends
3. To discuss the relative sizes of differential sources of potential missed opportunities for transplantation

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## Waste Not, Want Not

### Deceased donor

*A decedent from which at least one solid organ was recovered for the purpose of transplantation.*

### Deceased kidney donor

*A deceased donor from which at least one kidney was recovered for transplantation.*

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## Waste Not, Want Not

### Organ “discard” definition

*An organ recovered for the purpose of transplantation but not transplanted.*



<https://nz.pinterest.com/explore/organ-donation/>

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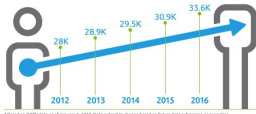
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## Waste Not, Want Not

**NEW record!**  
More than  
**33,500**  
U.S. organ  
transplants  
in 2016

20% increase in  
transplants over 5 years\*



Deceased donor organ transplantation is no longer stagnant

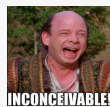
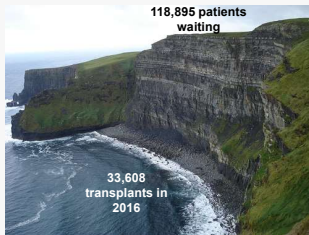


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## Waste Not, Want Not



Still, the vast supply-to-demand gap remains



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## Waste Not, Want Not

(Interactive polling question)

If none of the transplant-quality kidneys discarded under current practice was **“wasted”** but all were instead transplanted, would the 100,000 patients on the kidney waiting list no longer be **in want**?

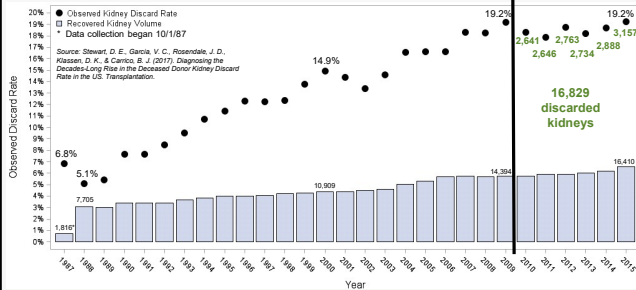
(Yes, **No**)

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## Kidney Discard Rate Trend



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## Waste Not, Want Not

How many of the ~3,000 annually discarded kidneys *should* have been discarded?

How many were “transplantable” and represent missed opportunities?

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## Filtering Analysis of Kidneys Discarded in 2012

Source: ATC Symposium 2013  
Stewart, Rosendale, Delmonico

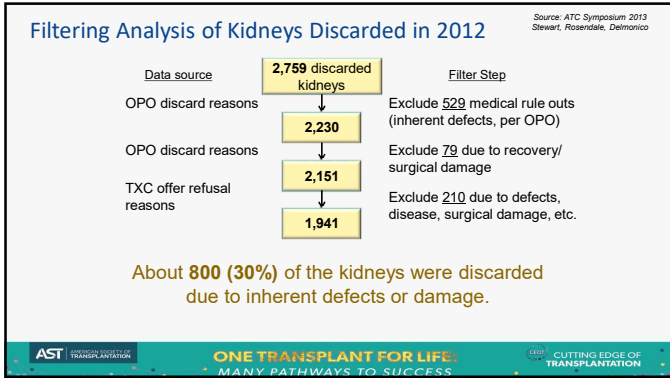
Data source: 2,759 discarded kidneys

Filter Step

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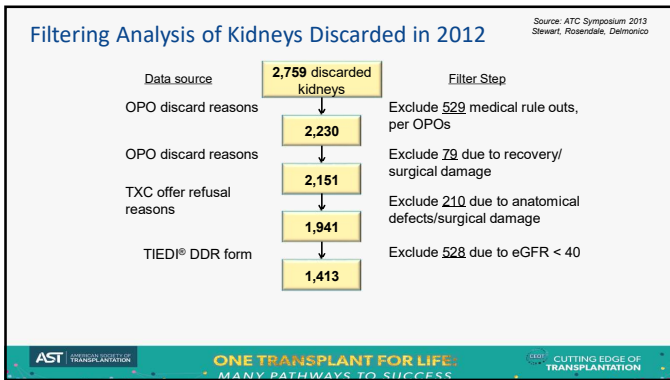
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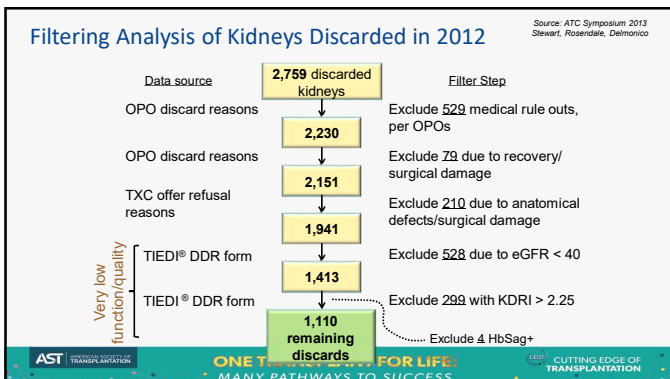
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## 1,110 Discards by KDRI and eGFR

Source: ATC Symposium 2013  
Stewart, Rosendale, Delmonico

	eGFR					All
	40-60	60-80	80-100	100-120	120+	
KDRI (KDPI approx)						
2.00-2.25 (90-95%)	82	34	42	30	4	192
1.75-2.00 (82-90%)	71	66	60	21	14	232
1.50-1.75 (70-82%)	88	58	71	56	33	306
1.25-1.50 (50-70%)	51	50	43	70	12	226
<=1.25 (<50%)	20	37	13	38	46	156
All	312	245	229	217	109	1,110

633 kidneys with eGFR>40, KDRI<2.25  
("Group B")

477 kidneys with eGFR>80, KDRI<2.00  
("Group A")

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## Descriptions of Group A & B Discards

Source: ATC Symposium 2013  
Stewart, Rosendale, Delmonico

	Group A (eGFR>80, KDRI<2.0)	Group B (eGFR>40, KDRI<2.25)
N (kidneys)	477	633
Mean terminal creatinine	0.70	1.23
Mean eGFR (CKD-EPI formula)	111.9	64.0
DCD	33.1%	14.0%
ECD	21.6%	44.4%
Glomerulosclerosis > 20%	20.1%	27.6%
CDC/PHS High Risk Donor	21.0%	11.4%
HCV+	20.3%	11.1%

72% had **at most**  
**one** of these risk  
factors

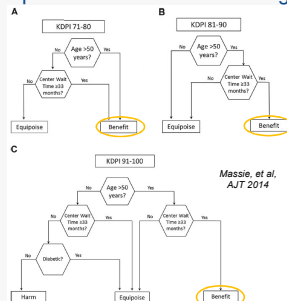
- ✓ Most of these kidneys (especially Group A) had good estimated function and no more than one risk factor.

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## Candidates expected to "benefit" from a high KDPI kidney



- ✓ Candidates predicted to benefit from high KDPI transplantation were on match run for nearly all 1,110 kidneys.

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## Filtering Analysis Conclusions

- 500 to 1000 kidneys ostensibly of transplant quality were discarded in 2012.
- At least 25% of discarded kidneys
- Significant unrealized transplant potential exists among discarded kidneys

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## Waste Not, Want Not

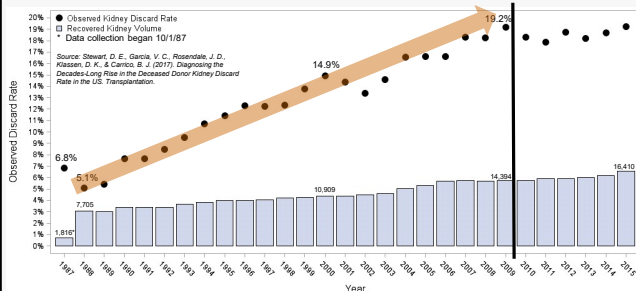
Why did the kidney discard rate rise from about 5% in the late 80's to nearly 20% by 2009?

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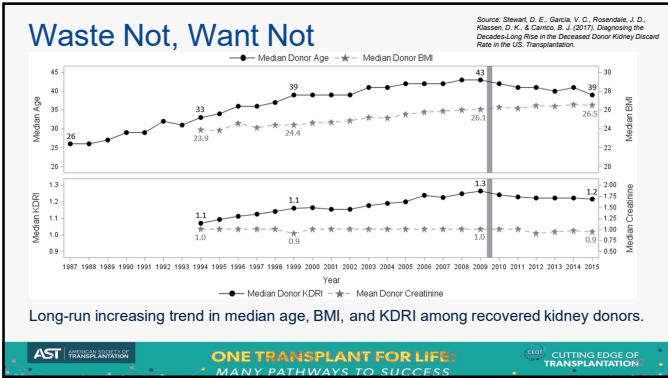
## Kidney Discard Rate Trend



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### Waste Not, Want Not

What percentage of the long term, increasing discard rate trend can be explained by the recovery of an increasingly older, comorbid, and lower quality donor pool?

- A. 0%
- B. 1-25%
- C. 26-50%
- D. 51-75%
- E. 75-100%**

(Interactive polling question)

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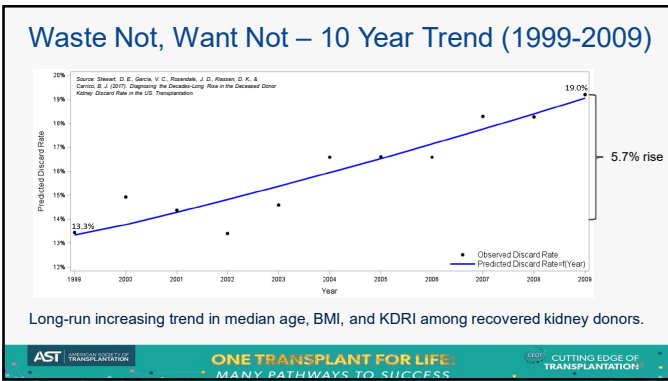
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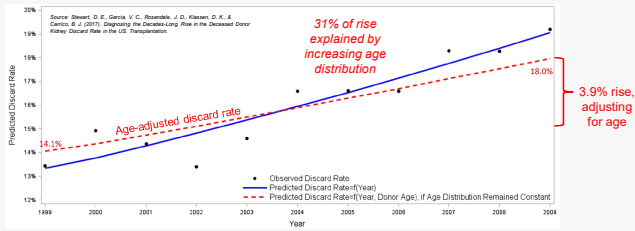
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## Waste Not, Want Not – 10 Year Trend (1999-2009)



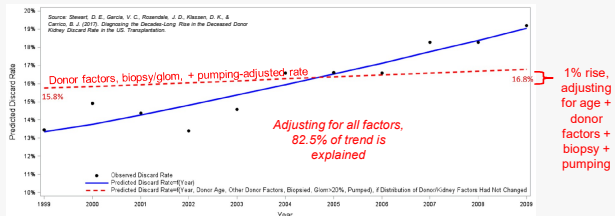
Had donor ages not increased, discard rate rise would have been shallower, but still present.

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## Waste Not, Want Not – 10 Year Trend (1999-2009)



Final analysis suggests if pumping hadn't risen from 10 to 30% of kidneys, discard rate would have risen 1% higher than it did. I.e., protective effecting of more pumping on kidney utilization.

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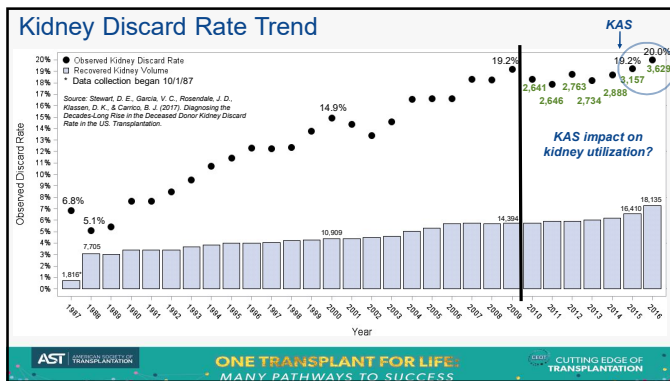
## Trend Analysis Conclusions

- > Most (>80%) of the long-run increasing discard rate trend can be explained by changes in donor factors (including biopsy, pump)
- > A statistically significant, residual increase in the discard rate was found, suggesting
  1. Transplant center (or patient) risk aversion may have increased over time
  2. Allocation efficiency may have declined
- > Increase in biopsies contributed to the discard rate rise
- > Increase in pumping prevented the discard rate from rising further

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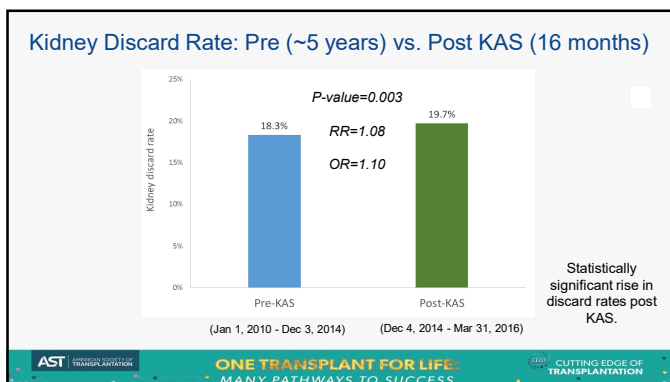
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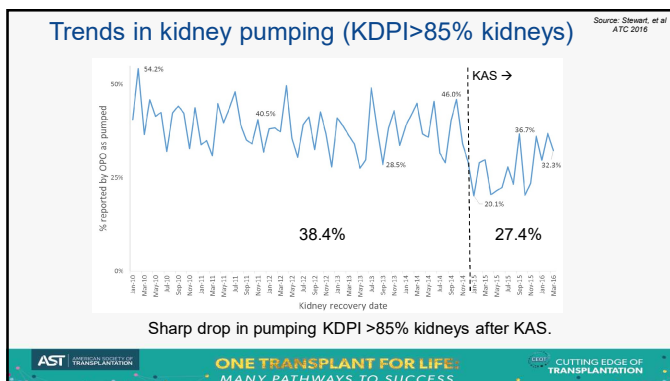
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## KAS Impact on Kidney Discards - Key Findings

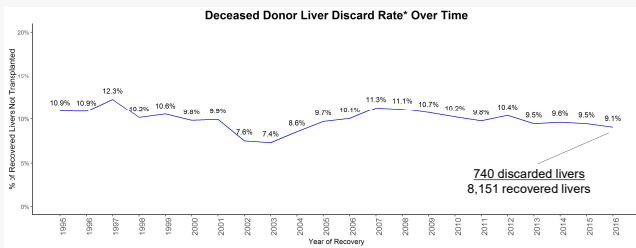
- Discard rate has risen about 10% after KAS
  - Not explained by changes in donor KDPI
  - Poorer biopsy findings appear to have played a role
  - Practice changes – less pumping for KDPI>85% kidneys – appear to have played a role

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## Waste Not, Want Not – Liver Discard Rate



In contrast to kidneys, liver discard rate has remained relatively low and stable over time.

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doi: 10.1111/ajt.12731

Special Article

### The OPTN Deceased Donor Potential Study: Implications for Policy and Practice

D. K. Klassen<sup>1,\*</sup>, L. B. Edwards<sup>2</sup>, D. E. Stewart<sup>3</sup>,  
A. K. Glazier<sup>4</sup>, J. P. Orlowski<sup>5</sup>, C. L. Berg<sup>6</sup>

<sup>1</sup>United Network for Organ Sharing, Richmond, VA

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<sup>6</sup>Corresponding author: David K. Klassen, david.klassen@unos.org

The Organ Procurement and Transplantation Network (OPTN) Deceased Donor Potential Study, funded by the Health Resources and Services Administration, characterized the current pool of potential deceased donors and estimated changes through 2020. The goal was to inform policy development

tion; NCHS, National Center for Health Statistics; OPO, Organ Procurement Organization; OPTN, Organ Procurement and Transplantation Network; SRTN, Scientific Registry of Transplant Recipients

Received 16 September 2015, revised 06 January 2016 and accepted for publication 17 January 2016

#### Introduction

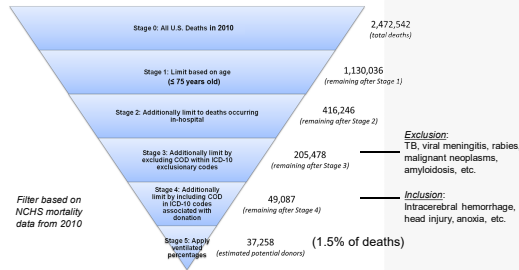
The number of deceased organ donors in the United States lags far behind the increasing number of patients on transplant waiting lists (1). Factors likely contributing to this include shifts in demographics, changes in population health, improvements in transportation safety, and improvements in hospital and critical care practices (2-4). The last extensive assessment of the organ donor potential in the United States was published by Sheehy and colleagues in 2005 (5). Since then, the landscape of

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## Deceased Donor Potential Study (DDPS) "Filter"



Due to data limitations, filter estimate likely reflects an "upper bound" on donation potential.

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## Deceased Donor Potential Study: Organ-Specific Estimates\*

Estimate Type	Potential Donors ("cell 2": Ages99 <sup>th</sup> percentile, LOS≤14, Severity Scores≤18)	% Change
Non-organ specific (ages75)	38,292	N/A
Kidney-specific (no renal failure, ages69)	28,996	-24.3%
Lung-specific (no chronic pulm/circ disease, ages65)	24,601	-35.8%
Heart-specific (no CHF or pulm/circ disorder, ages56)	18,184	-52.5%

\*Based on Nationwide Inpatient Sample (NIS) from 2010

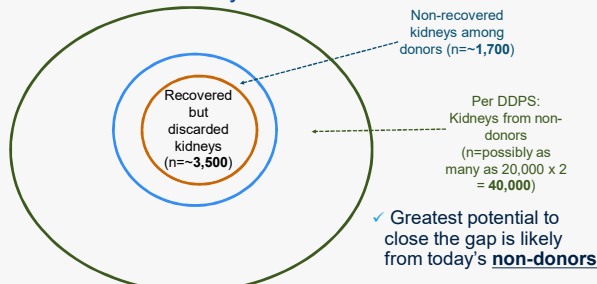
A significant portion of the estimated donor potential would not be viable for kidney, lung, or heart donation.

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## Deceased Donor Kidney Sources

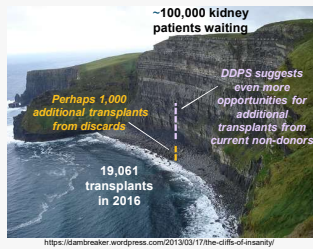


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## Bridging the Gap (kidney)



Reducing discards and identifying new donation opportunities could help reduce the gap.

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## Waste Not, Want Not – Conclusion

**Opportunities to further narrow the gap exist among discarded organs & donation potential unrealized under current practice.**

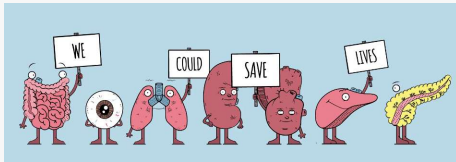


Image used with permission from NHS Blood and Transplant (UK), <https://www.organdonation.nhs.uk>

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## Waste Not, Want Not - Solutions

- Improve allocation
- Share OPO best practices
- Reduce transplant center & OPO risk aversion
- Improve the transplant reimbursement model
- Recondition marginal organs
- Increase living donation

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David Klassen, MD  
Cherri Taylor

Thank you!

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## Post-test question

Numerically, the greatest opportunity to narrow the kidney transplant supply to demand gap exists among which group?

- A. Recovered but discarded kidneys
- B. Non-recovered kidneys from deceased donors
- C. Non-recovered kidneys from non-donors

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Extras

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## Waste Not, Want Not

Did the discard rate reach 20% for the first time in 2016 due to a shift in donor quality?

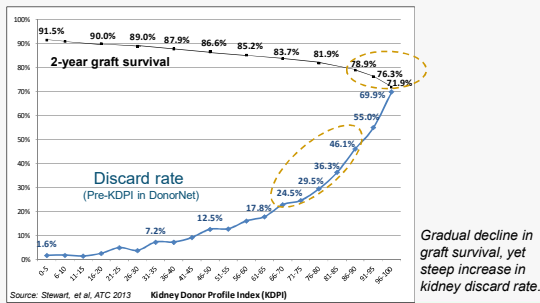
(no, KDRI distribution largely unchanged. Slightly lower KDRI distribution among donors, actually, likely due to slight declining trend in donor ages due to opioid epidemic.)

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## Graft Survival & Discard Rates by KDPI – Is There a Disconnect?

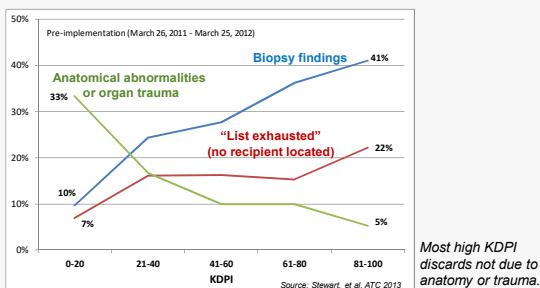


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## Reasons for Kidney Discards by KDPI



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