

Improving diagnostic reimbursement incentives

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PACCARB Top 10 Recommendations*

Human Health

Incentives to Develop

Animal Health



Include the development of a concomitant AST as part of any new antibiotic funding (or funding for new antibiotics)



Provide financial support for diagnostic manufacturers to bring new tests to market



Continue funding for clinical trial networks with common rules or shared IRBs



Diagnostics



Promoting educational programs for veterinarians on the use and interpretation of diagnostic tests

CARB-X implements these first 2 recommendations; the 3rd is beyond the scope of CARB-X

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*PACCARB 2017

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Advantages of Dx – PACCARB 2017

Advantages mentioned

- Reduce inpatient LoS
- Prevent inpatient admission
- Reduce inappropriate antibacterial use
- Benefit society by curtailing AMR
- **Better patient care***
- **Targeted use of higher-value antibiotics***

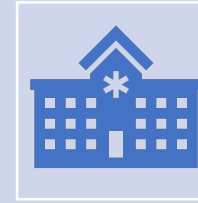
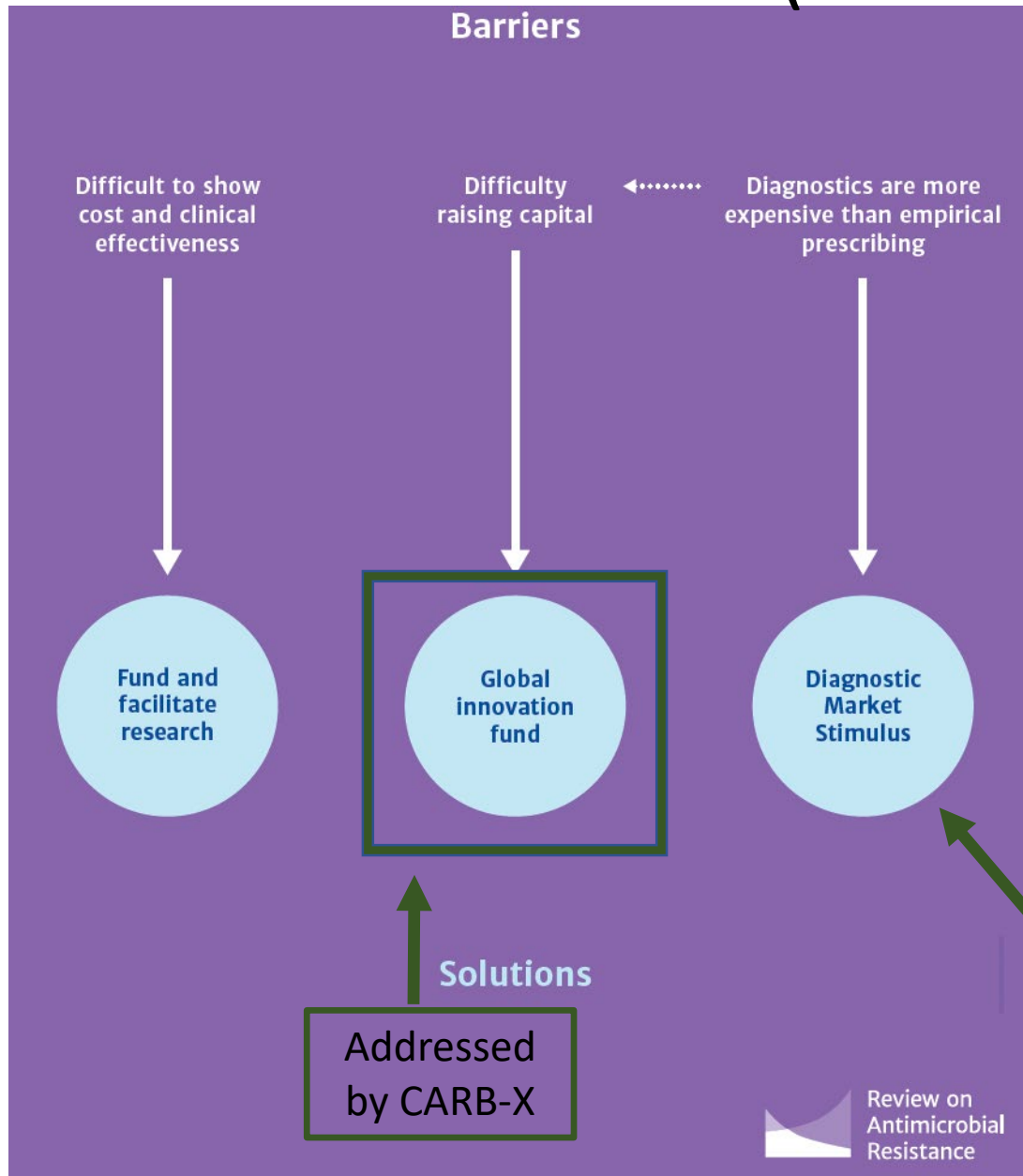
Who benefits financially (or not)

- Hospital inpatient budget
- Payer (less revenue for hospital)
- Hospital pharmacy budget; less revenue for antibiotic sponsor
- Providers and drug sponsor do not reap any financial benefit
- **Patient (unreimbursed cost to H)**
- **Drug sponsor (unreimbursed cost to H)**

*Green items added by KO here

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The Review on AMR (O'Neill, Dx, 2015)



2 major reviews: PACCARB 2017 & Review on AMR (Diagnostics, October 2015)

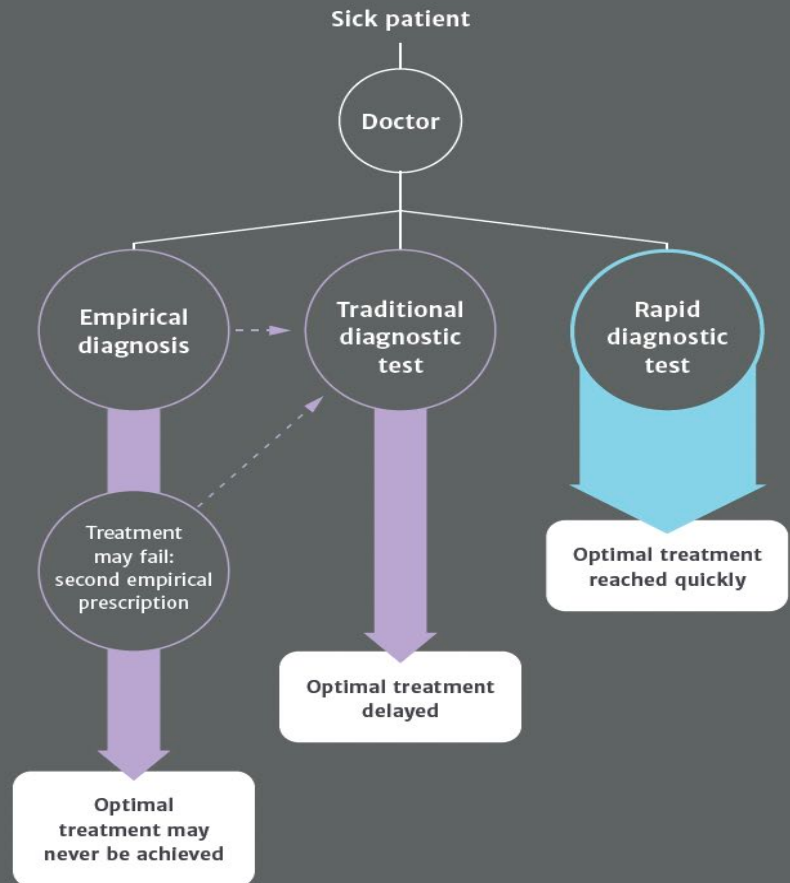


Recommend we fully implement these recommendations.



Remainder of today's presentation focuses on US Medicare inpatient reimbursement, what O'Neill calls the "Diagnostic Market Stimulus"

NEW RAPID DIAGNOSTICS WOULD OPTIMISE TREATMENT



Review on
Antimicrobial
Resistance

While we can all agree on these benefits, the key actors are not financially incentivized to move towards the best case

Most benefits flow to others in the health care system, patients, or society at large

As a result, timely diagnosis and appropriate treatment are often delayed

Patterns, Predictors, and Intercenter Variability in Empiric Gram-Negative Antibiotic Use Across 928 United States Hospitals

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Table 2. Distribution of Empiric Gram-Negative Antibiotic Use by Days of Therapy (Hospital Day ≤ 2)

Narrow-Spectrum Gram-Negative Antibiotics*	Total Empiric Days of Therapy (DOTs) in Cohort (n, % of total empiric DOTs) ^a	Broad-Spectrum Gram-Negative Antibiotics**	Total Empiric Days of Therapy (DOTs) in Cohort (n, % of total empiric DOTs) ^a	Extremely Broad-Spectrum Gram-Negative Antibiotics***	Total Empiric Days of Therapy (DOTs) in Cohort (n, % of total empiric DOTs) ^a
Ceftriaxone	1 883 838 (60.1%)	Piperacillin-tazobactam	1 495 491 (43.0%)	Tigecycline	2268 (40.0%)
Metronidazole	654 142 (20.9%)	Cefepime	778 853 (22.4%)	Ceftolozane/tazobactam	1690 (29.8%)
Ampicillin/sulbactam	172 720 (5.5%)	Levofloxacin	419 586 (12.1%)	Ceftazidime/avibactam	1432 (25.8%)
Ampicillin	166 724 (5.3%)	Ciprofloxacin	211 415 (6.1%)	Meropenem/vaborbactam	252 (4.4%)
Cefoxitin	79 590 (2.5%)	Meropenem	207 012 (6.0%)		
Amoxicillin-clavulanate	65 718 (2.1%)	Gentamicin	134 444 (3.9%)		
Cefuroxime	48 703 (1.6%)	Aztreonam	72 326 (2.1%)		
Cefotetan	19 863 (0.6%)	Ertapenem	63 768 (1.8%)		
Amoxicillin	19 548 (0.6%)	Tobramycin	31 963 (0.9%)		
Cefdinir	17 773 (0.6%)	Ceftazidime	26 546 (0.8%)		
Cefpodoxime	5288 (0.2%)	Moxifloxacin	9401 (0.3%)		
		Ceftaroline	7382 (0.2%)		
		Imipenem-cilastatin	5471 (0.2%)		
		Amikacin	4172 (0.1%)		

*The following antibiotics with ≤0.1% frequency were excluded from this column: cefixime, cefprozil, and cefaclor.
**The following antibiotics with ≤0.1% frequency were excluded from this column: colistin, delafloxacin, plazomicin, and kanamycin.
***The following antibiotics with ≤0.1% frequency were excluded from this column: cefiderocol. In statistical analyses, broad and extremely broad-spectrum antibiotics were combined into a single “broad-spectrum” category.
^aEmpiric DOTs represent only the DOTs received on or before Hospital Day 2. If a patient was continued on the same antibiotic(s) after Day 2, when use may have no longer been empiric, those DOTs are not captured in this table.

Only 4 on-patent G- drugs are being used empirically at scale in US hospitals, with very limited DOTa

My analysis:

- Data are consistent with the hypothesis that the DRG drives cheaper generics
- Key to appropriate escalation to a new agent must be rapid diagnosis

Medicare inpatient incentives

- DRG drives cost cutting for items in the Part A bundle
 - Nursing, facility, food, bed, pharmacy
 - Part A drugs are typically generic, while innovative (expensive) patented drugs are mostly reimbursed outside the DRG
- Inpatient dx / abx → cost centers, not a source of revenue
 - Cmp. hospital-affiliated outpatient surgical centers
- Hospitals are not financially incentivized to:
 - Quickly adopt a new (more expensive) diagnostic tool,
 - Ensure that newer antibiotics are added to AST panels & breakpoints (>2 years),
 - Quickly add a new antibiotic to the hospital formulary (years),
 - Use a higher-priced antibiotic, or
 - Identify a hospital-associated infection.

Labs care about 4 things: Space, Time, People, \$

- Company w/ a new dx is asking for all 4
- Extra reimbursement goes to another account in hospital, not the lab
- Every hospital views lab as a cost center only
- NTAP lowers the cost by about \$50
- Hospital must still decide to adopt, knowing the new box will generate about \$100 in costs with each use (rising to \$150 when NTAP expires in 2-3 years)
- Each use might trigger a clinical decision that will drive the pharmacy budget & DRG case into deficit, by using a newer antibiotic

AMR dx in the emergency department (ED)

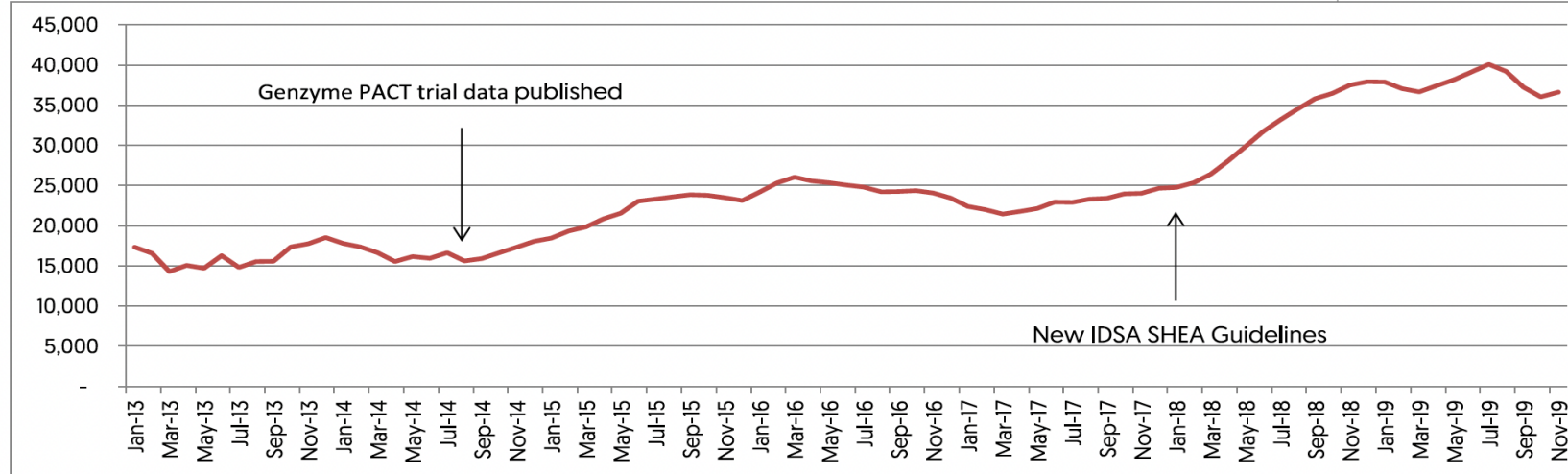
- Better adoption case b/c can support a quick decision to admit or send home
- CPT coding for these new devices in the ED is confusing
- Small positive margin for ED if they can bill correctly and the patient is not admitted
- If admitted, test is generally part of the hospital DRG

Has NTAP worked?

- New Technology Add-on Payment (NTAP)
 - Created 2001 to deal with unanticipated consequences of 1983 Medicare reforms
 - Separate reimbursement for up to 50% of the added cost to hospitals for 2-3 years for selected (clinically valuable) products
 - NTAP covered one AMR diagnostic company and a small number of antibiotic companies (easier after change in Medicare IPPS Rule)
 - Expensive to stand up a bespoke hospital reimbursement process for an expected small volume of small \$\$ additional claims
 - Funds do not return to cost center (hospital pharmacy or lab), undermining goal
- Outcome for the antibiotics → bankruptcy for Achaogen & Melinta, low market cap for Nabriva, only Paratek achieved sales > \$100m
- Outcome for dx device adoption → T2 stock price \$0.10

The role of guidelines

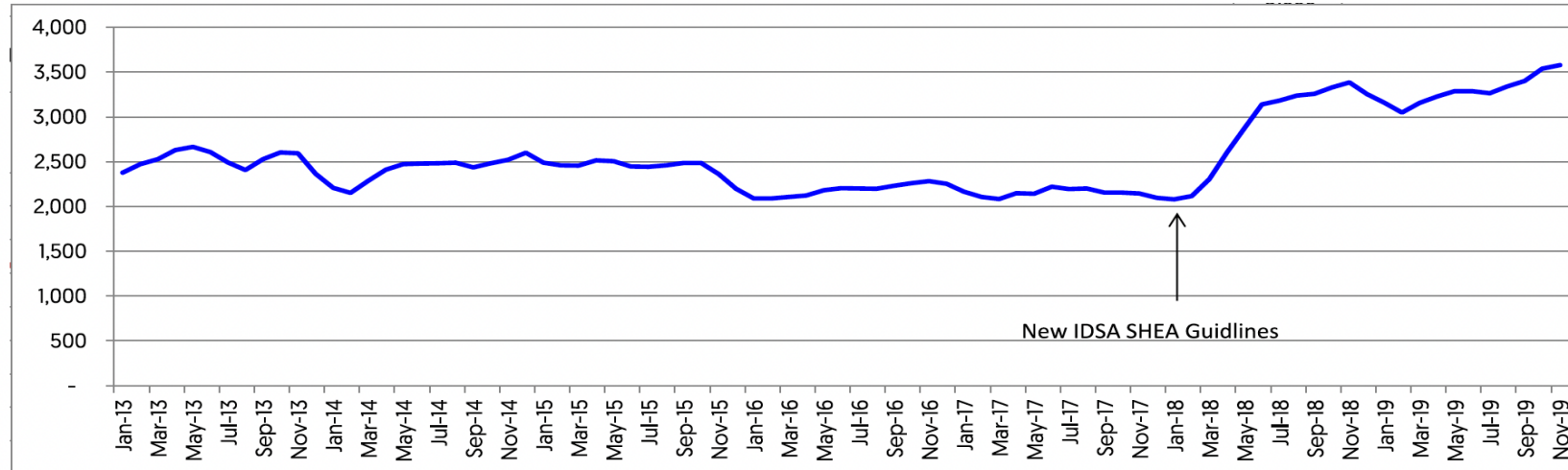
Graph 5 - Estimated Oral Vancomycin Courses (125mg and 250mg)



Upticks in use were driven by guideline publications recommending use

Publication of trial data was less impactful until guideline was published

Graph 6 - Estimated Difcoid Courses



IDSA + have now stepped up guideline cadence

PASTEUR Act includes guideline updates, led by HHS

Why Aren't There More Outcome Studies?



These studies are very difficult to perform well

- Time consuming
- Requires great manpower and inter-departmental cooperation
- Hospital financial data difficult to obtain



Source: ASM Webinar Series, Erin McElvania, Is Faster Actually Better? The Role of Rapid Blood Culture Diagnostics in Patient Outcomes and Cost-effective Patient Care, 2019.

Recommendations

1. Better outcome studies designed to test for benefits to patients and broader society, not just hospital budgets
2. Ensure that new antibiotics are quickly added to:
 - Hospital formularies
 - Clinical guidelines (PASTEUR includes this)
 - AST panels on diagnostics
3. Create a significant, sustained financial incentive to support uptake of improved AMR diagnostics:
 - Must consider patients, physicians, hospitals, & companies (at a minimum)
 - Focus Stewardship on broader value of appropriate antibiotic therapy, not just savings to Medicare, the hospital pharmacy budget, or any budgetary silo