Leaving No Ethical Value Behind: Triage Protocol Design for Pandemic Rationing

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Synopsis

- COVID-19 pandemic has spurred renewed interest in guidelines for rationing scarce medical resources.
- The most widespread allocation mechanism is based on a point system, which aggregates multiple ethical criteria into a single score and allocates units based on this score.
- **Contribution 1.** We show that a point system is not the right mechanism for this task for it cannot represent a wide range of ethical considerations.
- **Contribution 2.** As a remedy, we propose and analyze a reserve system.
- **Contribution 3.** We discuss how it can help resolve several current debates.

Introduction

- COVID-19 pandemic has motivated policymakers to revisit existing or issue new guidelines on allocating medical resources. (Emanuel et al. *NEJM* 2020, Truog et al. *NEJM* 2020, White & Lo *JAMA* 2020).
- These guidelines appeal to following ethical principles:
  - Saving the most lives
  - Saving the most life-years
  - The life-cycle principle
  - Instrumental value
  - Reciprocity
  - Equal access
- These principles can compete with one another.

  Example: Equal access ignores patient age and conflicts with the life-cycle principle.
- There is a need for an allocation mechanism to implement the desired balance of values.

Metric for Saving the Most Lives: SOFA Score

- For some of these principles,
  - only individual attributes are relevant, and
  - they either have a natural or a well-established cardinal measure.
- Metric for life-cycle principle: Age
- Metric for saving the most lives: Sequential Organ Failure Assessment (SOFA) score
- The SOFA score numerically quantifies the number and severity of failed organs: Each of six organ groups lungs, liver, brain, kidneys, blood clotting and blood pressure is assigned a score of 1 to 4, with higher scores for more severely failed organs.
- The total SOFA score is shown to be useful in predicting the clinical outcomes of critically ill patients.

Single-Principle vs. Multi-Principle Point Systems

- The SOFA score is considered a good proxy for mortality risk.
- So if the sole ethical value under consideration is the utilitarian goal of saving the most lives, a single-principle point system based on SOFA scores may be a good choice.
- But if there are multiple ethical values under consideration, and many argue that should be the case, then a point system is too restrictive to reach an ethically-compelling balance between the desired values.
- It maps individual attributes to a numeric scale, and therefore cannot even incorporate principles which lack a cardinal and monotonic representation, let alone aggregate them.

  Example: It cannot accommodate distributional objectives such as proportional representation of disadvantaged groups.

Example for Science Fiction Fans: Doomsday Scenario

- Consider a future pandemic so devastating that it threatens a significant portion of the human race.
- In this hypothetical crisis, a principle based on survival of the species may suggest a gender balance constraint: Assign at least 40% of the ventilators to female patients and at least 40% to male patients.
- Clearly, considerations based on group composition cannot be represented with a function that relies on individual attributes only.

Emergence of the Point Systems in the US

- While recognizing the need to consider multiple ethical values, many states adopted a point system based on SOFA scores only.
- Others have adopted multi-principle point systems to accommodate multiple ethical values.
- For ventilator allocation, the point system emerged as the mechanism of choice in the US, adopted in the following states:
  - Single-Principle Point System: NY, MN, NM, AZ, NV, UT, CO, OR, IN, KY, TN, KS, VT
  - Multi-Principle Point System: CA, CO, MA, NJ, OK, PA, SC, MD
- Vast majority were adopted in haste after the COVID-19 pandemic.

Illustrative Debate on Prioritizing Essential Personnel

- Many argue that essential personnel should receive priority under triage scenarios.
- This view is also strongly endorsed by medical ethicists based on:
  - the backward-looking principle of reciprocity,
  - the forward-looking principle of instrumental value, and
  - due to the incentives it creates:

    "... but giving them priority for ventilators [...] may also discourage absenteeism." (Emanuel et al. NEJM 2020)

Illustrative Debate on Prioritizing Essential Personnel

- In an attempt to issue their guidelines in a timely manner during the COVID-19 crisis, some states remained vague about essential personnel priority, despite being precise on other dimensions.
- MA recommends a point system that relies on rigorous clinical criteria, but casually suggests "heightened priority" for essential personnel without detailing its implementation.
- The Pittsburgh guideline specifies two tie-breakers, one based on age and the other based on essential personnel status. However, it is silent on how to use these tie-breakers.
- The vagueness in these cases sharply contrasts with widely-accepted calls for clarity in rationing guidelines.

Saturday, May 02, 2020 | Today's Paper

The Philadelphia Inquirer

Unlimited Access

OPINION

I helped write Maryland's ventilator guidelines in 2017. Pa.'s rules are too vague. | Expert Opinion

Updated: April 27, 2020 - 11:33 AM

Darren P. Mareiniss, For The Inquirer

JOSE F. MORENO / STAFF PHOTOGRAPHER

Illustrative Debate on Prioritizing Essential Personnel

- Yet worse, states such as NY and MN had to give up on this consideration, largely due to concerns about extreme scenarios where no units remain for the rest of the society.

  "... it is possible that they [essential personnel] would use most, if not all, of the short supply of ventilators; other groups systematically would be deprived access."
  MN Pandemic Ethics Project, MN Dept. of Health 2010

- **Bottomline:** A concern about the allocation mechanism designed to implement these values resulted in giving up these values!

How to Avoid these Challenges?

- Other groups that have voiced concerns about existing guidelines include advocates for disabled individuals and disadvantaged groups.
- These challenges are artificial consequences of confining mechanisms to point systems and can be overcome by moving beyond them.
- **Key technical limitation:** A point system enforces an identical priority ranking of patients for each of the units, compromising its ability to represent a variety of ethical considerations.
- Hence a remedy has to break this limiting characteristic.

Reserve Systems

- A reserve system divides resources into multiple categories and uses different criteria for allocation of units in each category.
- These category-specific criteria reflect the balance of ethical values guiding allocation of units in the category.
- The division of the resources is not literal and it is for accounting purposes only.
- **Key improvement over point system:** A reserve system does not need to use uniform criteria for all units, making it more flexible than a point system.

Real-Life Applications of Reserve Systems

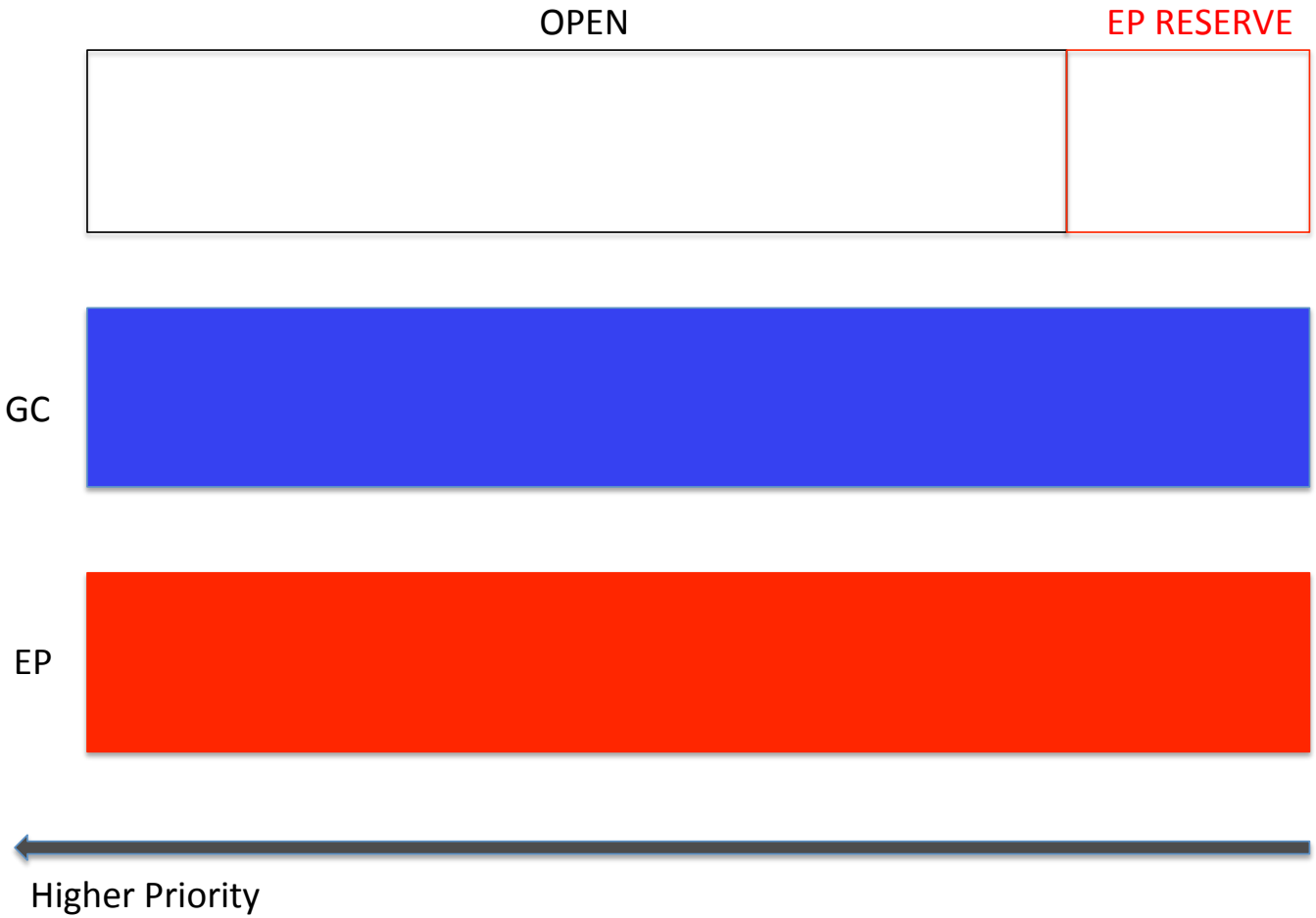
- Deceased donor kidney allocation in the US
  Categories: Higher quality kidneys (20%), other kidneys (80%)
- Assignment of slots for Boston and NYC marathons
- H1-B visa allocation in the US
- School choice
  - Boston
  - Chicago
  - New York
  - Chile
- Affirmative Action in India
- College Admissions in Brazil

Primitives of a Reserve System

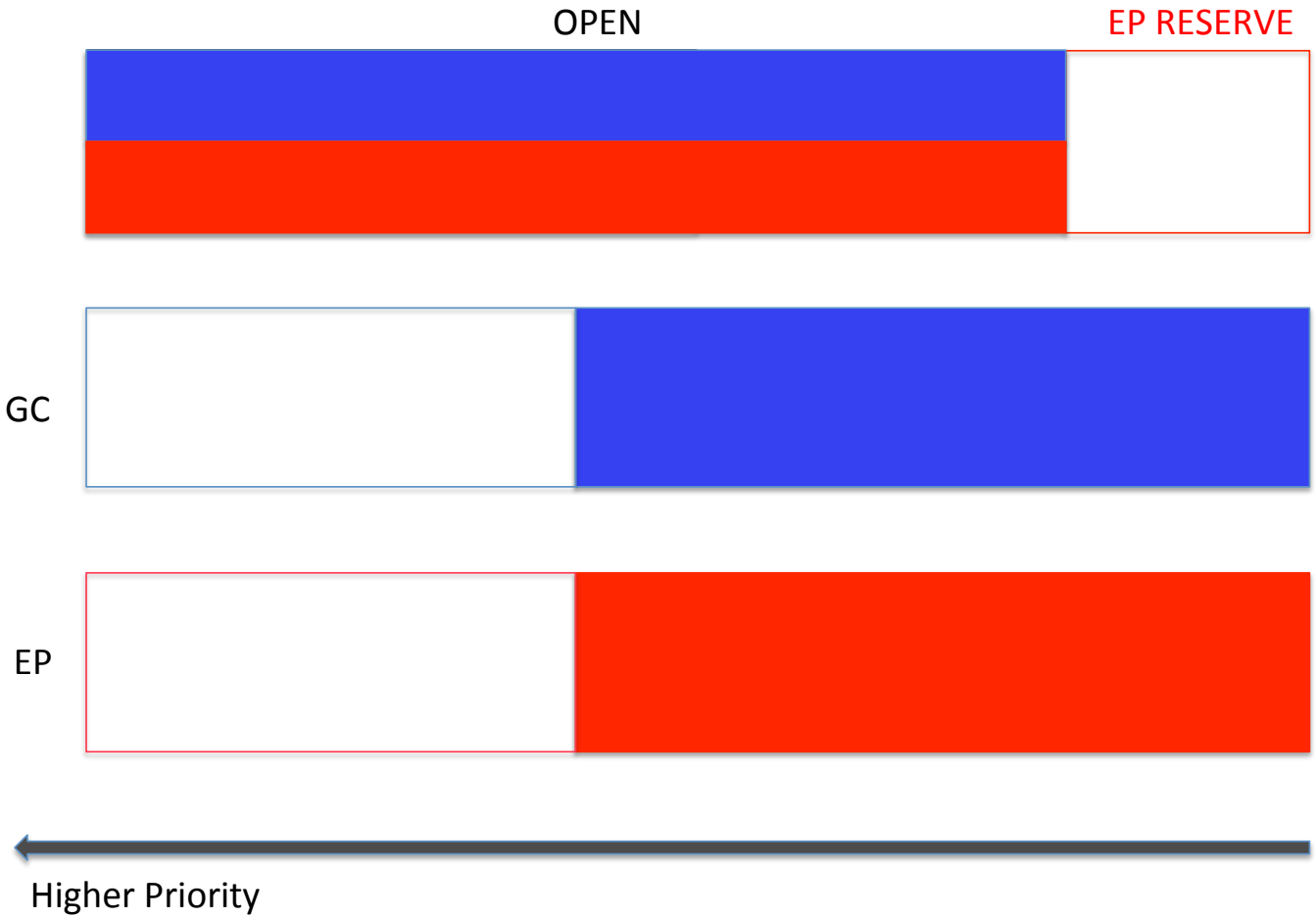
1. Division of the total supply of resources into multiple categories
2. The size of each category
3. Priority order of patients for each category
4. TBD

- In deceased-donor kidney allocation in the US, these primitives uniquely determine the implementation of the reserve system.
  1. Heterogeneous units, each attached to a specific category
  2. Perishable units, immediate assignment
  3. Sequential arrival of units
- Resulting allocation mechanism: Allocate each unit upon arrival to the highest priority patient in its category.
- When units are homogeneous, like ventilators or vaccines, they are not attached to a specific category and implementation is less obvious!

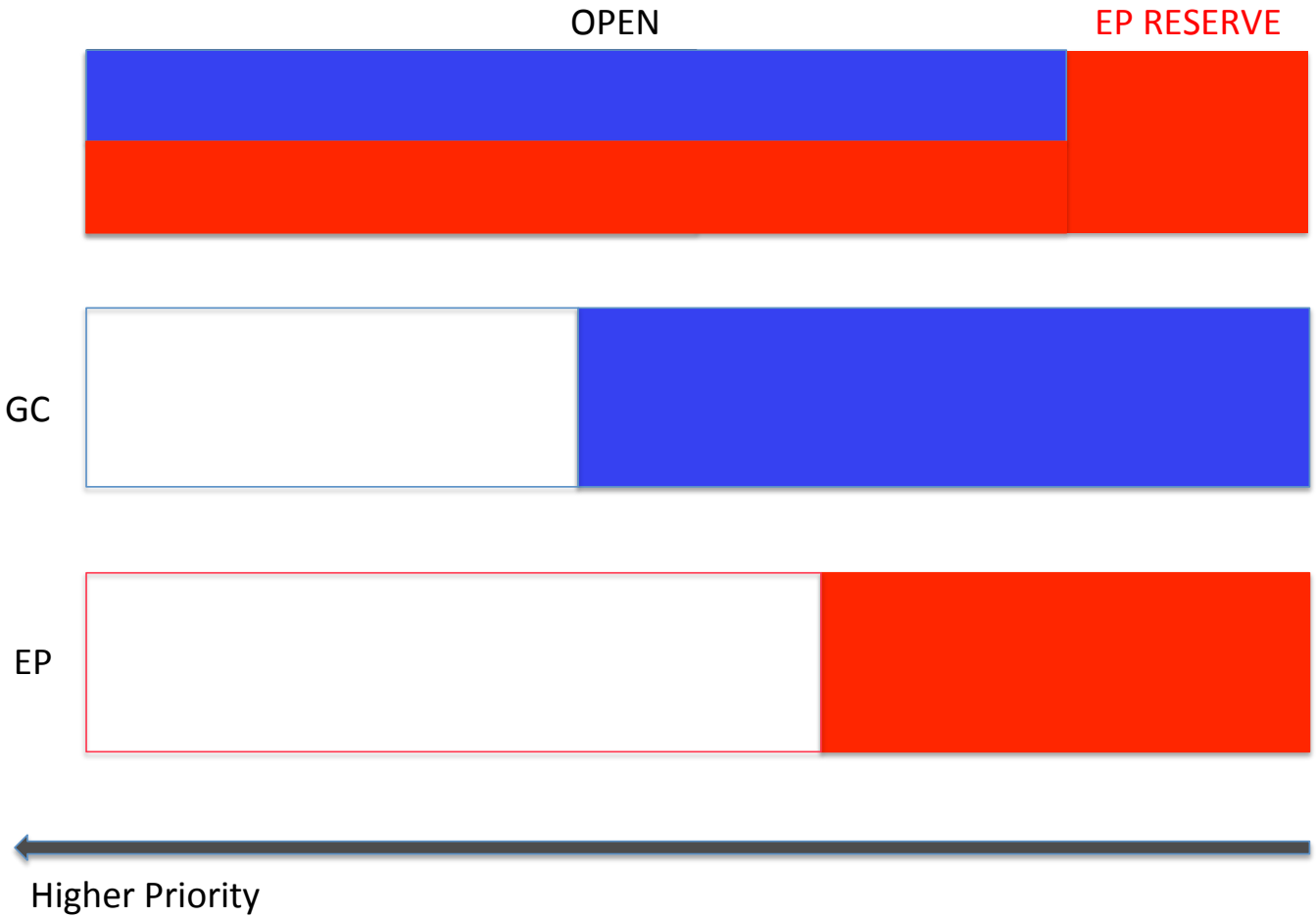
Sequential Category Processing: Open-Reserved



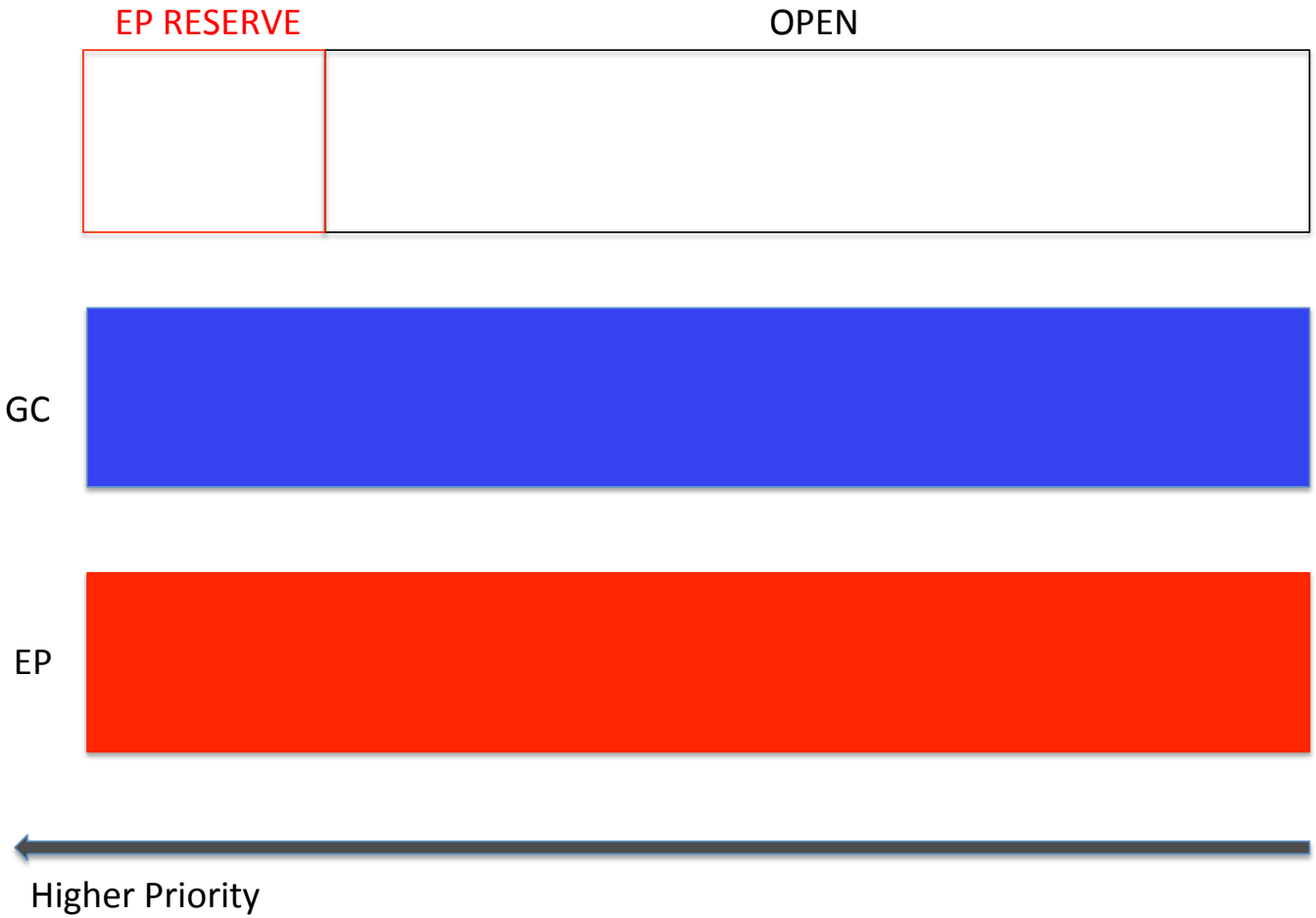
Sequential Category Processing: Open-Reserved



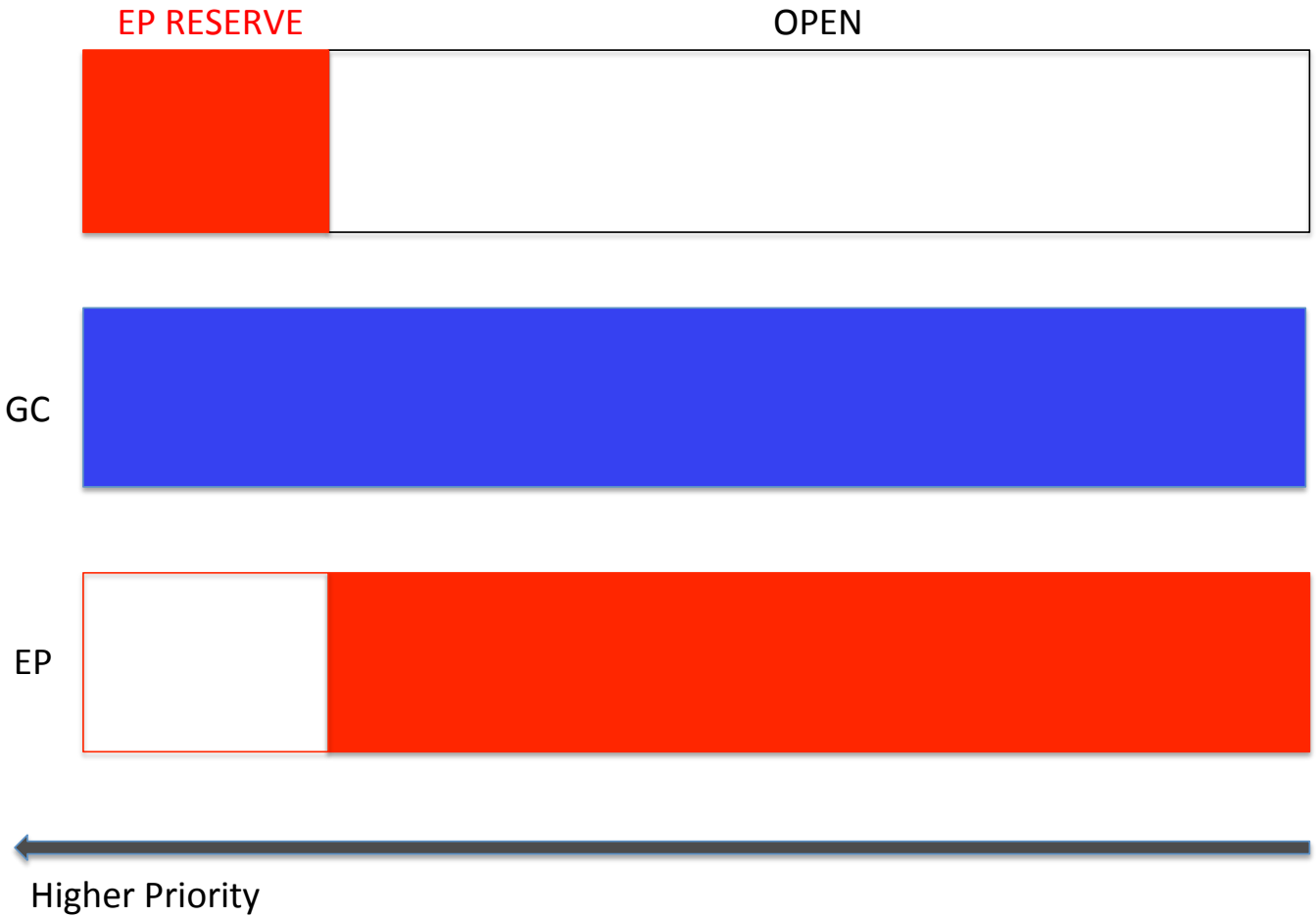
Open First - Reserved Next = Over & Above Policy



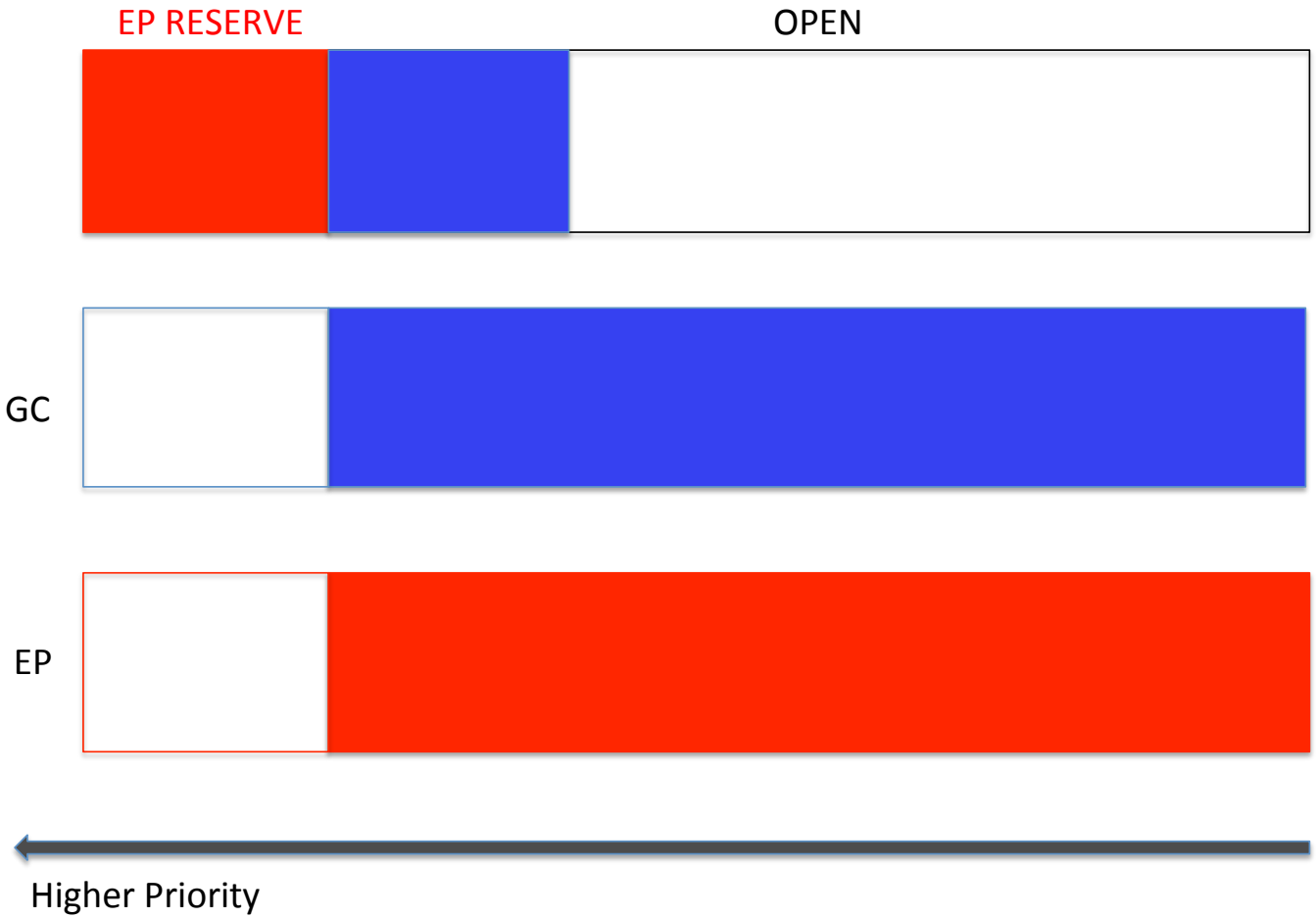
Sequential Category Processing: Reserved-Open



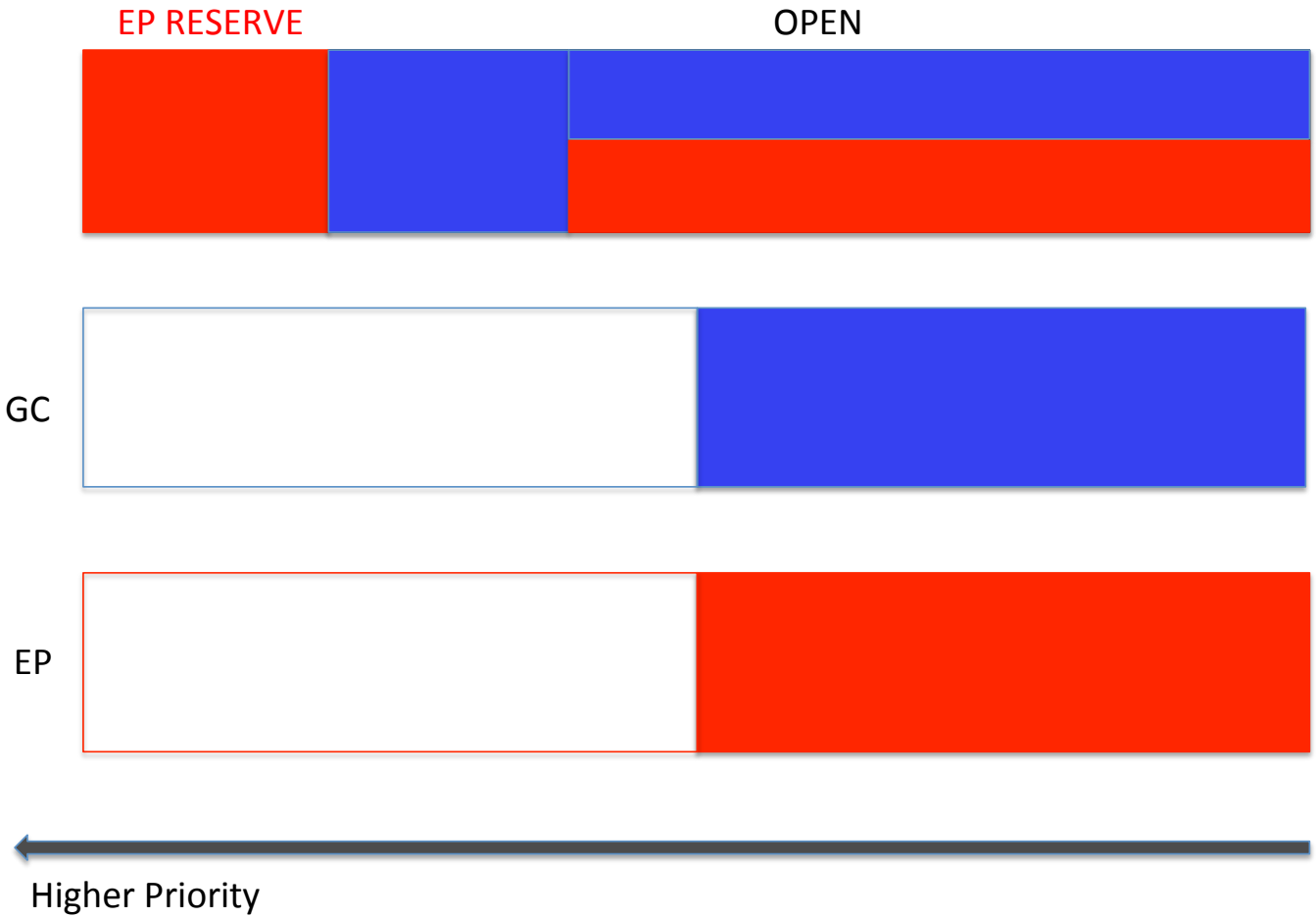
Sequential Category Processing: Reserved-Open



Sequential Category Processing: Reserved-Open



Reserved First - Open Next = Minimum Guarantee Policy



Formal Model

- q: # of identical medical units in short supply
- I: the set of patients each in need of one unit
- $\mathcal{C}$: the set of reserve categories
- π_c: Strict priority order of patients for units in category c
  - $i \ \pi_c \ j$ Patient i has higher priority for category-c units than patient j
  - $i \ \pi_c \ \emptyset$ Patient i is eligible for category c
  - $\emptyset \ \pi_c \ c$ Patient i is ineligible for category c

  $\underline{\pi}_c$: Weak order induced by π_c
- r_c: # of units subject to allocation criteria for category c, s.t.

$$\sum_{c \in \mathcal{C}} r_c = q$$

Outcome & Its Properties

- A matching $\mu : I \to \mathcal{C} \cup \{\emptyset\}$ is an assignment of each patient to either a category or to $\emptyset$, such that no category is assigned to more patients than its size.

$\mu(i) = c$	Patient i receives a unit through criteria of category c
$\mu(i) = \emptyset$	Patient remains unmatched

- A matching complies with eligibility requirements if no patient is assigned to a category for which she is ineligible.
- A matching is non-wasteful if no unit from any category remains idle while there is a patient who is both unmatched and also eligible for the category.
- A matching respects priorities if no patient ever remains unmatched while another patient with lower priority at some category receives a unit through that category.

Cutoff Equilibrium

- We next introduce a natural counterpart of the standard competitive equilibrium, adequately modified for the current model.
- For any category $c \in \mathcal{C}$, a cutoff f_c is an element of $I \cup \{\emptyset\}$ s.t.

$$f_c \; \underline{\pi}_c \; \emptyset$$

A cutoff plays the role of a non-negative price.

- For a given a cutoff vector $f = (f_c)_{c \in \mathcal{C}}$, the budget set of patient i is

$$\mathcal{B}_i(f) = \{c \in \mathcal{C} \; : \; i \; \underline{\pi}_c \; f_c\}$$

Characterization through Cutoff Equilibria

- A cutoff equilibrium is a matching-cutoff vector pair (μ, f) s.t.
  1. For any patient $i \in I$,
     (a) $\mu(i) \in \mathcal{B}_i(f) \cup \{\emptyset\}$, and
     (b) $\mu(i) = \emptyset \iff \mathcal{B}_i(f) = \emptyset$.
  2. For any category $c \in \mathcal{C}$,
     $$|\mu^{-1}(c)| < r_c \implies f_c = \emptyset.$$

  Here,
  - the first condition corresponds to utility maximization within the budget set, whereas
  - the second one corresponds to the market-clearing condition.
- A matching μ is a cutoff matching if it is supported by some cutoff vector f at a cutoff equilibrium (μ, f).
- **Theorem 1.** A matching *complies with eligibility requirements*, is *non-wasteful*, and *respects priorities* if, and only if, it is a cutoff matching.

Cutoff Equilibria in Real-Life Applications

- It is widespread practice to describe the outcome of a reserve system through its cutoff equilibrium, often utilizing a metric that is used to construct the priority order at each category.
- India-Allocation of public jobs and seats at public schools:
  - Outcome defined by cutoff exam scores for each category.
- Chicago-Admission to Selective Enrollment High Schools:
  - Outcome defined by cutoff composite scores for the merit-only seats and for each of the four socioeconomic tiers.
- US-Assignment of H1-B visas:
  - 2005-2008: Outcome defined by cutoff application arrival dates for the general category and the advanced degree category (with ties broken with an even lottery within each category).

Cutoff Equilibria in Real-Life Applications

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

DATE: 23-11-2012

THE CANDIDATES BEARING THE FOLLOWING ROLL NO. FOR THE RAJASTHAN STATE & SUBORDINATE SERVICES COMBINED COMPETITIVE (PRELIMINARY) EXAMINATION, 2012 HELD ON 14-06-2012 ARE DECLARED **PROVISIONALITY QUALIFIED FOR ADMISSION TO THE MAIN EXAMINATION** IF ANY CANDIDATE IS FOUND THAT HE/SHE DOES NOT FULFILL THE CONDITIONS OF ELIGIBILITY PRESCRIBED AS PER ADVERTISEMENT/RULES, **THE COMMISSION SHALL REJECT HIS/HER CANDIDATURE AT ANY STAGE.**

CUT OFF MARKS

CATEGORY		CUT OFF MARKS
GEN	GEN	218.89
	FEM	185.22
	WD	141.80
	DV	162.31
SC	GEN	210.79
	FEM	151.73
	WD	123.68
	DV	141.94
TSP SC	GEN	184.02
	FEM	
ST	GEN	218.91
	FEM	168.86
	WD	138.16
	DV	191.59
TSP ST	GEN	162.10
	FEM	140.59
OBC	GEN	218.91
	FEM	185.22
	WD	142.16
	DV	164.76
SBC	GEN	207.74
	FEM	171.36
BL/LV		140.68
LD		Already pass in respective category
HI		140.91
NG		Already pass in respective category
DC		140.27
EX		143.09

CUTOFF SCORES

SELECTIVE ENROLLMENT HIGH SCHOOLS

2020-2021

School	Selection Method	Min	Mean	Max
Brooks	Rank	806	837.39	894
Brooks	Tier 1	694	729.42	804
Brooks	Tier 2	731	773.39	806
Brooks	Tier 3	759	782.61	806
Brooks	Tier 4	704	758.78	806

School	Selection Method	Min	Mean	Max
Hancock	Rank	826	848.51	890
Hancock	Tier 1	722	754.2	814
Hancock	Tier 2	776	802.4	825
Hancock	Tier 3	784	804	826
Hancock	Tier 4	700	762.95	825

School	Selection Method	Min	Mean	Max
Jones	Rank	891	895.02	900
Jones	Tier 1	799	838.11	889
Jones	Tier 2	845	868.11	890
Jones	Tier 3	855	872.53	890
Jones	Tier 4	883	886.96	890

School	Selection Method	Min	Mean	Max
King	Rank	684	724.34	846
King	Tier 1	600	639.03	684
King	Tier 2	600	642.51	684
King	Tier 3	601	635.24	683
King	Tier 4	624	647.63	677

School	Selection Method	Min	Mean	Max
Lane	Rank	875	885.58	900
Lane	Tier 1	747	788.16	874
Lane	Tier 2	810	836.36	875
Lane	Tier 3	838	855.8	875
Lane	Tier 4	862	869.39	875

School	Selection Method	Min	Mean	Max
Lindblom	Rank	771	813.38	895
Lindblom	Tier 1	687	717.85	769
Lindblom	Tier 2	712	734.78	769
Lindblom	Tier 3	707	733.63	769
Lindblom	Tier 4	603	669.78	771

School	Selection Method	Min	Mean	Max
Northside	Rank	894	897.61	900
Northside	Tier 1	745	817.39	894
Northside	Tier 2	843	871.14	894
Northside	Tier 3	875	884.06	894
Northside	Tier 4	888	891.63	894

School	Selection Method	Min	Mean	Max
Payton	Rank	898	899.44	900
Payton	Tier 1	803	849.11	894
Payton	Tier 2	855	882.74	898
Payton	Tier 3	882	891.13	898
Payton	Tier 4	895	896.61	898

School	Selection Method	Min	Mean	Max
South Shore	Rank	684	734.64	862
South Shore	Tier 1	602	634.69	682
South Shore	Tier 2	602	636.91	684
South Shore	Tier 3	600	633.74	682
South Shore	Tier 4	613	645	677

School	Selection Method	Min	Mean	Max
Westinghouse	Rank	796	821.27	883
Westinghouse	Tier 1	711	744.43	793
Westinghouse	Tier 2	734	765.08	795
Westinghouse	Tier 3	726	759.82	795
Westinghouse	Tier 4	601	693.78	794

School	Selection Method	Min	Mean	Max
Young	Rank	883	891.28	900
Young	Tier 1	808	841.33	883
Young	Tier 2	831	852.64	883
Young	Tier 3	854	870.1	883
Young	Tier 4	872	878.63	883

Note: The 'Rank' score denotes students selected by their point score only, outside of their tiers. The 'Min' score is the cutoff score.

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Construction of Cutoff Equilibria

- Theorem 2 gives an alternative characterization of matchings that satisfy our three baseline axioms.
- This second characterization relies on
  - using the celebrated deferred acceptance algorithm (Gale & Shapley 1962)
  - on a hypothetical many-to-one matching market that relates to the original rationing problem.

Hypothetical Two-Sided Matching Market $\langle I, \mathcal{C}, r, \pi, \succ \rangle$

- I: The set of patients
- $\mathcal{C}$: The set of categories
- r_c: Capacity of category c
- π_c: Strict preferences of category c over $I \cup \{\emptyset\}$
- $\succ_i$: Strict preferences of patient i over $\mathcal{C} \cup \{\emptyset\}$ such that

$$c \succ_i \emptyset \iff \text{patient } i \text{ is eligible for category } c$$

- Observation: All primitives except the student preferences naturally follow from the primitives of the original problem.

Individual-Proposing Deferred Acceptance Algorithm

- Step 1:
  - Each patient applies to her most preferred acceptable category.
  - Each category holds eligible applicants with highest priority up to capacity and rejects others.
- Step k:
  - Each patient who was rejected in the previous step applies to her next preferred acceptable category.
  - Considering all patients on hold and the new applicants, each category holds applicants with highest priority up to capacity and rejects others.
- The algorithm terminates when there are no rejections, and all assignments on hold are finalized.

Characterization through Deferred Acceptance Algorithm

- A matching is DA-induced if it is the outcome of the Deferred Acceptance algorithm for some preference profile $\succ$.
- **Theorem 2.** A matching *complies with eligibility requirements*, is *non-wasteful*, and *respects priorities* if, and only if, it is DA-induced.
- This result has multiple interpretations and potential utilizations:
  - It can be used as a procedure to construct the set of cutoff equilibria, or a selection from it.
  - In the context of affirmative action, it can also be seen as a characterization of desirable policies.

Sequential Reserve Matching

- The hypothetical two-sided matching market relies on an artificial preference profile $(\succ_i)_{i \in I}$ of patients over categories.
- Intuitively this means that any given patient i is considered for categories that deem her eligible in sequence, following the ranking of these categories under her artificial preferences $\succ_i$.
- Critically, this sequence of consideration can differ between patients.

  Example: Patient A can be considered first for open category and then for Essential Personnel category, whereas patient B who has similar attributes can be considered for these categories in the reverse order.
- Unless there is a systematic way to construct these preferences, it may be difficult to motivate this methodology for real-life implementation.

Sequential Reserve Matching

- Not all reserve systems have to process categories sequentially.
  But virtually in all real-life applications they do.

- An order of precedence $\triangleright$ is a linear order over the set of categories $\mathcal{C}$, interpreted as the processing sequence of categories.

  $c \triangleright c'$: Category-c units are to be allocated before category-c' units.

Sequential Reserve Matching

- Sequential Reserve Matching: Fix a processing sequence $\triangleright$ of the categories. Following this sequence allocate units in each category to highest priority patients using category-specific priorities.
- **Proposition 1.** Fix an order of precedence $\triangleright$. Let the preference profile $\succ^{\triangleright}$ be such that, for each patient i and pair of categories c, c',

$$c \succ_i^{\triangleright} c' \iff c \triangleright c'.$$

Then the resulting sequential reserve matching is DA-induced from the preference profile $\succ^{\triangleright}$.

Open & Preferential-Treatment Categories

Next, consider the following version of the problem, common in real-life applications.

- There is an open category with a baseline priority order π_o.
- Any other category c provides preferential treatment to a distinct set of beneficiaries I_c.

  π_c: Prioritizes beneficiaries of category c over others, and
  π_o is used to break ties internally within the two groups

- General-community patients are those who are only eligible for open category units.

Hard & Soft Reserves

- Soft reserves: All individuals are eligible for all categories

  Example: Pandemic resource allocation

- Hard reserves: Only reserve-category beneficiaries are eligible for units from a preferred treatment category

  Example: H1-B visa allocation in the US

Comparative Statics

- While the distributional implications of the processing sequence of categories is intuitively similar for soft and hard reserves, our analytical results are sharper for the latter.
- **Theorem 3.** Assuming hard reserves and that each patient is a beneficiary of at most one preferential-treatment category, the later a preferential-treatment category is processed
  1. the more favorable it is for its beneficiaries, and
  2. the less favorable it is for everyone else.
- **Remark.** The first conclusion of this result holds for soft reserves as well, provided that
  - there are either no more than five categories, or
  - there is sufficiently high demand from all groups to make the difference between soft reserve and hard reserve obsolete.

Competing Interests of Groups

- For a special case of our model with a lot of practical relevance, the **processing sequence of categories** emerges as an important parameter due to Theorem 3.

  Hence, for this special case, we consider it as the **4th primitive**.
- Theorem 3 motivates the following four classes of category processing sequences:
  1. Open Last: Process open category at the end
  2. Open First: Process open category at the beginning
  3. c-Optimal: Process
     - category c at the end,
     - the open category immediately before category c, and
     - all other categories prior to the open category.
  4. c-Pessimal: Process
     - category c at the beginning,
     - the open category immediately after category c, and
     - all other categories following the open category.

Competing Interests of Groups

- **Theorem 4.** Assuming hard reserves and that each patient is a beneficiary of at most one preferential-treatment category, for any general-community patient,
  - a sequential reserve matching with an open last processing sequence produces a weakly better outcome, and
  - a sequential reserve matching with an open first processing sequence produces a weakly worse outcome

  than any matching that *complies with eligibility requirements*, is *non-wasteful*, and *respects priorities*.

Competing Interests of Groups

- **Theorem 5.** Assuming hard reserves and that each patient is a beneficiary of at most one preferential-treatment category, for any category-c patient
  - a sequential reserve matching with a c-Optimal processing sequence produces a weakly better outcome, and
  - a sequential reserve matching with a c-Pessimal processing sequence produces a weakly worse outcome

  than any matching that *complies with eligibility requirements*, is *non-wasteful*, and *respects priorities*.

Directly Related Literature in Market Design

- Reserve Systems: Hafalir, Yenmez & Yildirim (*TE* 2013), Echenique & Yenmez (*AER* 2015)
- Sequential Reserve Matching: Kominers & Sönmez (*TE* 2016)
- Impact of Reserve Processing Sequence: Dur, Kominers, Pathak & Sönmez (*JPE* 2018), Dur, Pathak & Sönmez (*JET* 2020), Sönmez & Yenmez (2019), Pathak, Rees-Jones & Sönmez (2020)
- Additional Applications: Aygün and Bó (2016), Aygün and Turhan (2016, 2017), Correa et. al (2019)

Over & Above Reserve Processing

- Over & Above implementation:
  - Reserve category processed after the open category
  - Provides stronger benefit
  - Best suited for situations that warrants an extra boost
- Real-Life Examples of Over & Above Implementation:
  - Public Positions in India: Scheduled Castes, Scheduled Tribes, OBC
  - School Choice in Chicago: 4 Distinct Socioeconomic tiers (17.5% each)
  - Post-2020 H1-B Visa Allocation in the US: Advanced Degree Cap

Minimum Guarantee Reserve Processing

- Minimum Guarantee implementation:
  - Reserve category processed prior to open category
  - Provides weaker benefit compared to O&A implementation
  - May provide no benefit at all if target minimum already reached in the absence of reserve
  - Best suited for situations that warrants a protective measure
- Real-Life Examples of Minimum Guarantee Implementation:
  - Public Positions in India: Persons with Disabilities
  - School Choice in Boston: Neighborhood (Accidental: O&A Intended!)
  - School Choice in Chile: Low Income, Special Needs, High-Achieving

Potential Reserve Categories for Triage Rationing

- Essential Personnel Reserve (O&A)
- Good Samaritan Reserve (O&A)
- Disadvantaged Groups Reserve (MG or O&A)
- Disabled Individuals Reserve (MG or O&A)

Essential Personnel Reserve

- Provides a tool to prioritize essential personnel at any level without risking no units remain for the rest of the society.

  "[. . .] may mean that only health care workers obtain access to ventilators in certain communities. This approach may leave no ventilators for community members, including children; this alternative was unacceptable to the Task Force."

  Ventilator Allocation Guidelines, NY Dept. of Health 2015

- Eliminates the need for vague specifications of priority to essential personnel (eg. Massachusetts and Pittsburgh guidelines), thus improving the transparency of the system.

Misleading Headlines due to Vague Descriptions

Who gets a ventilator? New gut-wrenching state guidelines issued on rationing equipment

Preference given to medical personnel, people who are healthy, younger

By Liz Kowalczyk Globe Staff, Updated April 7, 2020, 2:49 p.m.

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Good Samaritan Reserve

- Providing some form of priority to individuals who saved lives in the past and who can save in the future is justified based on the principles of reciprocity and instrumental valuation.
- Society can award certain acts with a Good Samaritan status, and provide preferential treatment to individuals with this status for a fraction of the units.
- Acts that may be worthy of a Good Samaritan status:
  - Participation in treatment or vaccine clinical trials
  - Living organ donors
  - Patient-donor pairs who take part in kidney exchange despite being compatible
- Through the incentives created by a Good Samaritan reserve, many lives can be saved even if the guidelines are never used.

Disabled Individuals Reserve

Vox TWITTER FACEBOOK

"We're being punished again": How people with intellectual disabilities are experiencing the pandemic

From ventilator restrictions to the challenges of self-isolation, people with intellectual and developmental disabilities are facing a crisis years in the making.

By Jane Coaston | jane.coaston@vox.com | Updated Apr 9, 2020, 10:39am EDT

NEWS CORONAVIRUS DECISION 2020 OPINION U.S. NEWS BUSINESS WORLD SPORTS PODCASTS

U.S. NEWS

Ventilators limited for the disabled? Rationing plans are slammed amid coronavirus crisis

"In this time of crisis, we cannot devalue the lives of others in our community based o disabilities," an advocate said. "It's morally wrong, and it violates the law."

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Advocacy groups say state guidelines illegally deprive people based on age, mental cognition or disability

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The Disability Community Fights Deadly Discrimination Amid The COVID-19 Pandemic

Andrew Pulrang Contributor
Diversity & Inclusion
Exploring disability practices, policy, politics, and culture.

Disability Discrimination Complaint Filed Over COVID-19 Treatment Rationing Plan in Washington State

March 23, 2020 / in From the Frontlines, Press Releases, Public Policy / by Pam Katz

Disabled Individuals Reserve

- Disabilities advocates voice opposition to rationing plans based solely on survival probabilities.
- Some of them reject a detailed triage protocol in favor of random selection (Persad *Yale Law Journal* 2020).
- In their view, such criteria are inherently discriminatory for certain subsets of disabled patients.
- Not the case under a reserve system!

  A protective reserve category can be established for disabled individuals, and its criteria can be determined without interfering with criteria of other categories.

Disadvantaged Groups Reserve

- Advocates for disadvantaged groups voice opposition to point systems which use survival probabilities as part of the point score.
- They argue that these criteria do not acknowledge pre-existing discrimination in access to health care.
- For instance, disparate access to testing for disadvantaged groups may increase COVID-19 prevalence in these communities.
- Utilizing a legally-permissible measure of historical disadvantage, a protective category can be established to address these concerns.

Reserve Systems in Other Settings

- It is reassuring that reserve systems are often used in applications that involve community involvement.
- Following a years-long community outreach, in 2014 OPTN introduced a reserve system for deceased-donor kidney allocation.

  The new mechanism is designed to increase the role of utilitarianism in the system, and it provides preferential treatment to patients with the highest expected benefit for 20% of the highest quality kidneys.
- Following debates between the pro-neighborhood and pro-choice factions, Boston's school assignment system established a reserve where half of school seats prioritize applicants from the walk zone.
- Reserves were developed as part of India's affirmative action system after more than a decade of community involvement summarized in the 1979 Mandal Commission Report and formulated in the landmark 1992 Indra Sahwney Supreme Court case.

Reduction of Idle Units through a Credit System

- While our analysis pertains to the rationing problem of a single entity, say a hospital or a city, it can be extended to multiple entities.
- Through this extension, waste in the system can be reduced.
- Hospitals in the system can loan their unused units to a virtual hospital that consists of excess units loaned to the system, and they can earn credit for future use of units at the virtual hospital.
- Hospitals can be incentivized to loan their unused units to the virtual hospital, if their patients receive some priority for some of the units in the virtual hospital.

Potential Bank for Convalescent Plasma

- Follow-Up Paper: Kominers, Pathak, Sönmez & Ünver, May 2020. "Paying It Backward and Forward: Expanding Access to Convalescent Plasma Therapy Through Market Design."
- Convalescent plasma therapy involves giving patients an infusion of antibody-rich plasma from recovered COVID-19 patients.
- Preliminary evidence suggests it is highly effective against COVID-19, and considered one of the most effective treatments in the short run.
- Convalescent plasma is also the raw material for Hyperimmune Globulin (HIG), which can be used as passive antibody therapy both as a treatment and also as a short-term vaccine for COVID-19.

Potential Bank for Convalescent Plasma

- There is a shortage of plasma donors. Many potential donors are worried that donating may mean their loved ones may not have access to plasma therapy if they need it in the future.
- A reserve system including a Clinical Trial Reserve, an HIG Reserve, and an Incentivized Reserve can be designed to encourage plasma donation.

- Clinical Trial Reserve: Priority given to participants of clinical trials.
- HIG Reserve: Used for HIG production, which in turn can be used for treatment or as a short term vaccine (prophylactic use) for high risk individuals.

Potential Bank for COVID-19 Convalescent Plasma

- Incentivized Reserve: Helps increase plasma supply.
  1. Pay-it-Backward Incentives:
     - Priority given to the loved ones of current plasma donors, in case they need plasma in the future.
     - For example, a plasma donor could obtain a number of vouchers that can be transferred to the patients of the donor's choosing.
  2. Pay-it-Forward Incentives:
     - Priority given to infected patients who pledge to return the favor back once they are well and eligible for donation.
     - A donor generates on average three units of plasma for each donation, and can donate plasma up to three times.
- The incentives created with this system could therefore help avoid a potential shortage.

Reserve System in Pittsburgh (UPMC)

A MODEL HOSPITAL POLICY FOR FAIR ALLOCATION OF MEDICATIONS TO TREAT COVID-19

HOME (/) • A MODEL HOSPITAL POLICY FOR FAIR ALLOCATION OF MEDICATIONS TO TREAT COVID-19

Available now online:

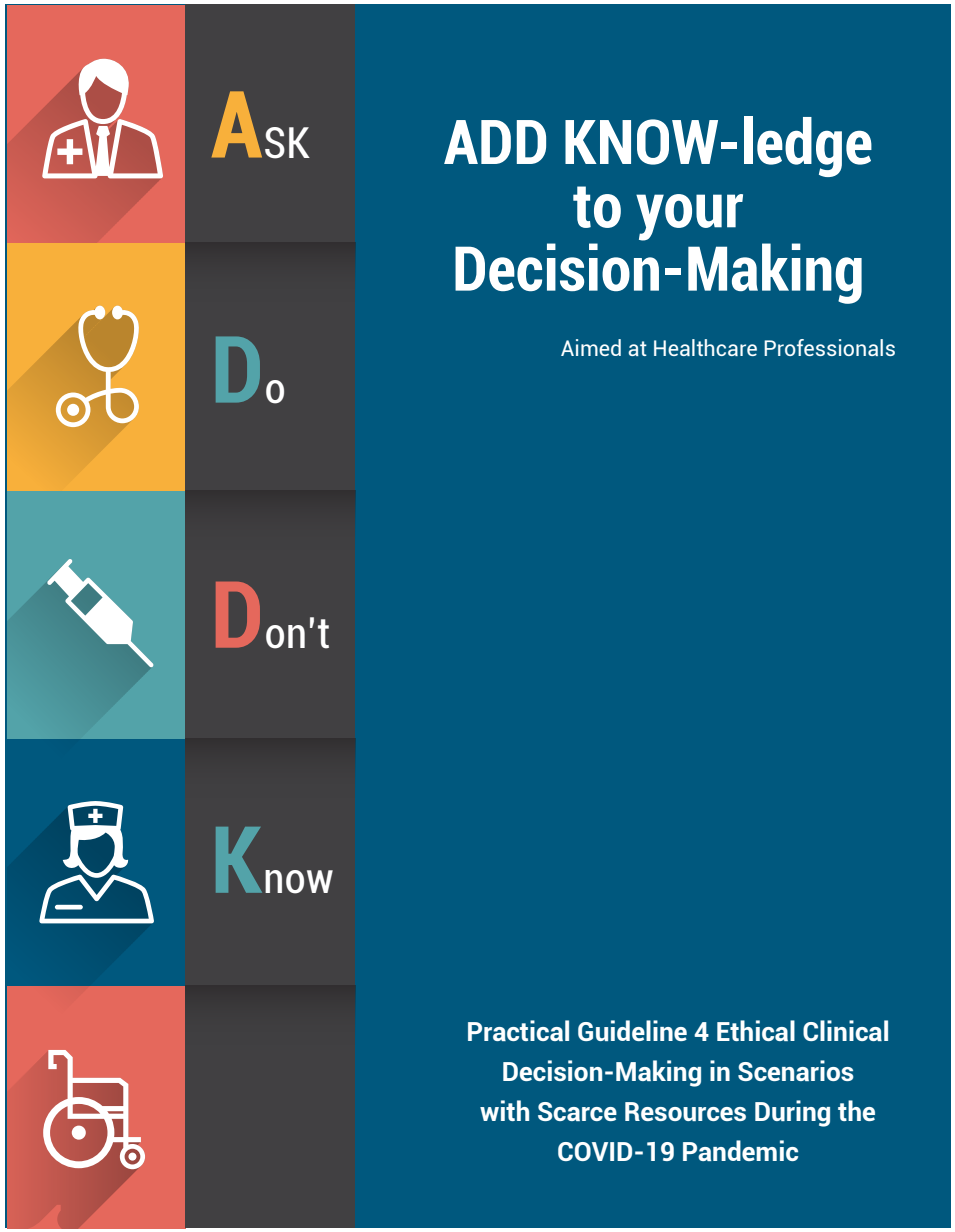
To assist hospitals and health systems to implement a transparent and fair approach to allocate scarce medications to treat patients with COVID-19, we have created a model hospital policy and allocation framework. Hospitals and health systems are welcome to adapt the policy for their specific needs. Click here to download a PDF (https://ccm.pitt.edu/sites/default/files/2020-05-

- Designed by a team of diversity and inclusion experts, ethicists, economists, and medical specialists from the University of Pittsburgh, Harvard University, University of Denver, Boston College and MIT.
- "The model policy uses a weighted lottery or categorial reserve system to fairly allocate drug supplies if there is insufficient supply to treat all eligible patients."

Pittsburgh Model Policy for Anti-viral Medications

- Reserve categories based on the combinations of the following three considerations:
  - Hardest hit (ADI of 8-10)
  - Essential worker (using PA state definition)
  - Is patient expected to die in one-year?
- Priorities are based on lottery
  - In this case reserve system simplifies to stratified lottery (25% boost for each of the first two considerations, 50% reduction for the third)
  - Used for week of May 25th for Remdesivir
  - Outcome determined dynamically through cutoff lottery points for each category

Pandemic Rationing Guideline for Anáhuac-Mexico



Conclusion

- In the first few months of the COVID-19 pandemic, many societies were caught unprepared when they needed guidelines for a possible ventilator rationing.
- In the near future there will likely be a worldwide need for policies and mechanisms for vaccine rationing.
- Poorly designed rationing mechanisms may damage the social contract between different segments of the society.
- Widely accepted but potentially competing ethical values for pandemic rationing require an allocation mechanism to implement the desired balance of values.
- Finding the right mechanism to honor these principles is therefore important for maintaining the social fabric.

Conclusion

- Because the mechanism is a tool to realize ethical values and not an end in itself, it should permit a wide range of options.
- The exclusion or inadequate balancing of certain ethical principles may do more harm than good.

> *"Maybe you end up saving more people but at the end you have got a society at war with itself. Some people are going to be told they don't matter enough."*
>
> *Quote attributed to Christina Pagel in New York Times*

- When revising or modifying guidelines during or after the COVID-19 pandemic, a reserve system should be part of the arsenal.