The Urgent Heart Allocation System in the UK

The Heart Allocation System in the UK is divided into three tiers based on severity or baseline risk of mortality – non-urgent (NUHAS), urgent (UHAS) and super-urgent (SUHAS) heart allocation schemes. The latter was introduced in 2016 in response to the prolonged wait for transplant in patients on temporary mechanical circulatory support (MCS) devices [Table 1].

Data from January 2020 to December 2021 showed that almost 82% of all registrations on the UHAS were under Category 21. This criterion was established on the basis that the 'need' for continuous inotropes identified a cohort of patients at increased mortality risk over a particular time horizon (eg: one-year mortality). In the absence of objective criteria to define the indications for inotropes, registration on Category 21 of the UHAS is susceptible to variations in clinical practice, inevitably resulting in heterogenous risk profiles.

Indeed, data from a survey of the six heart transplant centres in the UK indicated significant heterogeneity in risk profiles among patients registered under Category 21. For example, inotropes were initiated in some patients with recurrent hospital admissions with or without symptomatic deterioration, and these patients had significantly better renal function. In contrast, inotropes initiated in patients with cardiogenic shock had more severe renal dysfunction, blood lactate and high pulmonary artery wedge pressure, consistent with a significantly higher risk profile. The 'equitable' distribution of donor hearts via the UHAS to patients of such heterogenous risk profiles fails to deliver on 'priority for the sickest', utilitarianism and creates inequity in opportunity to benefit from transplantation. In addition, the lack of objective, consistent and transparent criteria may compromise the legitimacy of the UHAS in the eyes of the patients it serves.

The Heart Allocation Working Group, consisting of representatives from each of the six heart transplant centres, was tasked with reviewing /revising the UHAS. The Working Group firstly agreed on a combination of principles that should govern the allocation of donor organs, namely principles of prioritarianism, utilitarianism and equal opportunity to benefit. These three principles, despite their limitations could provide the basis for a pragmatic heart allocation system in the UK.

Secondly, the Working Group agreed that changes in the UHAS must be operationally deliverable. It was agreed that a wholesale change in the UHAS was not feasible, and the focus should be on review/ revision of Category 21.

Thirdly, the Working Group agreed that a set of objective criteria for inotrope therapy could define 'broadly comparable' risk profiles for the UHAS, although it is plainly not possible for all patients on the UHAS to have identical baseline risk of mortality. We recognised that the adoption of a set of objective criteria would reduce the 'flexibility' that the current system affords, but there is recourse to the adjudication process in individual cases.

Finally, the Working Group agreed on the following sub-categories for the UHAS [Table 2]. The criteria were extensively discussed, with reference to international consensus documents and guidelines. In addition, the experience of the clinicians representing the individual centres of the Working Group was taken into consideration in defining the sub-categories. There was agreement that the criteria should not be overly prescriptive. A number of criteria, though

not explicitly specified should be axiomatic. For example, the Working Group agreed that there should not be a requirement to define a specific level of filling pressure for congestive renal/ liver dysfunction (raised filling pressure is implicit), or in specifying that renal/ liver dysfunction be predominantly related to the underlying heart failure (implicit in the terms 'cardiorenal' and 'cardiohepatic').

Recommendations:

1. The Working Group would recommend the adoption of the three proposed sub-categories to Category 21 of the current UHAS.

2. Audit on the impact of this revision of the UHAS on:
    - Proportion of patients registered on UHAS;
    - Waiting times and deterioration (death/ escalation to SUHAS) on the UHAS;
    - Number and indications for referral to the adjudication process for urgent registration.

3. Regular (5-yearly) review of the UHAS.

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Table 1: Adult Urgent and Super-Urgent Heart Allocation Scheme

Criteria for adult Urgent Heart Allocation Scheme registration	
Category 21	Adult in-patient on intravenous inotropes and/or IABP which cannot be weaned
Category 22	Adult long-term VAD or TAH patient, agreed by CTAG Adjudication Panel with one of the following complications • Right heart failure dependent on inotropes • Recurrent systemic infection related to VAD/TAH • Other VAD/TAH complications including recurrent or refractory VAD/TAH thrombosis
Category 23	Exceptionally sick adult patient (high risk of death or irreversible complication) but does not meet other urgent listing criteria, agreed by CTAG Adjudication Panel
Category 31	Patients with ACHD and refractory arrhythmia (>1 hospital admission over last 3 months with hemodynamic instability or associated liver/ kidney dysfunction)
Category 32	Patients with ACHD with no option for conventional escalation of therapy (In-patients unsuitable for inotropes and/or VAD) with one of the following: Bilirubin and transaminase >2x normal Deteriorating renal function (eGFR <50ml/min/1.73m^2, or 20% reduction) Recurrent admissions (>3 in preceding 3 months) with episodes of right heart failure or protein-losing enteropathy requiring ascites drainage
Criteria for adult Super-Urgent Heart Allocation Scheme registration	
Category 11	Patient on short-term mechanical circulatory support (exclude IABP)
Category 12	Patient at imminent risk of death or irreversible complications, meeting criteria for urgent listing but not suitable for long-term VAD and/or other exceptional circumstances, agreed by CTAG Adjudication Panel

Table 2: Proposed sub-categorisation of Category 21 of the UHAS

Advanced heart failure **AND** cardiac index <2.0L/min/m^2, **AND** inotrope therapy AND/OR intra-aortic balloon pump support, **AND** at least one of the following sub-categories:	
Sub-category	Criteria
a. Cardiogenic shock	Blood lactate >2.0mmol/L **AND** clinical evidence of hypoperfusion
b. Cardiorenal or hepatic indication	Estimated glomerular filtration rate <40ml/min/1.73m^2, **OR** bilirubin >2x upper limit of normal (40umol/L)
c. Adverse pulmonary haemodynamics	Transpulmonary gradient (TPG) >12mmHg **AND/OR** pulmonary vascular resistance (PVR) >4WU at baseline, despite conventional medical therapy, leading to the use of inotropes, resulting in improvement in TPG and PVR, in patients deemed unsuitable for durable left ventricular assist device therapy