Chapter 4

ET Kidney Allocation System (ETKAS)

Change record

Date	Author	Version	Change reference
01-01-2007		1.0	Start of change record
13-08-2007	J. de Boer	1.1	Croatia Added as Eurotransplant member state National Kidney exchange balance is calculated on a daily basis (4.2.2.6) Change of ABO selection ESP and 000 HLA mismatches Germany (4.2.4) Rules concerning Positive preliminary cross match adapted (4.2.5.1) Allocation sequence 000 HLA mismatched recipients in case of fully HLA homozygous donors changed (4.2.1;4.3.1;4.3.2) Allocation sequence for donors age < 10 years changed (4.3.1) Adaptation flow charts ETKAS (4.3.1.1;4.3.1.2;4.3.2.1) Update HLA antigen frequency table (4.4.2)
19-09-2007	J. de Boer	1.2	Adaptation AB0 blood group frequency (4.4.3)
17-03-2008	J. de Boer	1.3	Adaptation of definition of a pediatric transplant candidate/ pediatric points (4.2.2.4)
22-12-2008	J. de Boer	1.4	Correction ABO rules Germany (4.2.4.2.1) Change in HU audit
23-03-2009	J. de Boer	1.5	Adaptation of point assignment for waiting time (4.2.2.3) and Distance (4.2.2.5) according to RKAC01.08
18-09-2009	J. de Boer	1.6	Simplified overview pediatric bonus (4.2.2.4). Added Priority for Kidney-non renal candidate recipients within AM program (4.2.6). Added Regional Kidney Exchange Balance Austria (4.2.2.7)
26-11-2010	J. de Boer	1.7	HU Audit procedure adapted (§ 4.1.1.2) Definition of maintenance dialysis added (§4.2.2.3) Adapted pediatric status and pediatric bonus (§ 4.2.2.1) Audit procedure proof of maturation added (§ 4.2.2.4.1) Adaptation definition return of waiting time (§ 4.2.3) Adaptation ABO blood group rules (§4.2.4) Adaptation of the ESP scheme for Germany (§ 4.2.7) ESDP allocation scheme added (§ 4.2.7.3)
23-02-2011	J. de Boer	1.8	Erratum pediatric status: proof of maturation (§ 4.2.2.4.1) Return waiting time after living donor transplant (§ 4.2.3.1) Kidney after liver transplant (§ 4.2.2.9)

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4.1 ETKAS - urgency codes

Urgency codes are used to classify transplant candidates on the waiting list and to prioritize recipients in the kidney match and allocation procedure. The urgency codes combine the aspects of transplantability, medical urgency and the most recent level of allo-sensitization in ENIS.

Urgency codes used in ETKAS						
Urgency code		Transplantability	Medical urgency	allo-sensitization (%PRA*1)		
HU	High Urgency	yes	urgent			
T	Transplantable	yes	normal	no	%PRA	<6
I	Immunized	yes	normal	yes	%PRA	≥6 and <85
HI	Highly Immunized	yes	normal	yes	%PRA	≥85
NT	Not Transplantable	no	no			

4.1.1 High Urgency (HU)

Inclusion criteria:
- imminent lack of access for either hemodialysis or peritoneal dialysis;
- severe (uremic) polyneuropathy,
- inability to cope with dialysis with a high risk for suicide;
- severe bladder problems (hematuria, cystitis etc.) due to kidney graft failure after simultaneous kidney + pancreas transplantation, provided that the pancreas graft is bladder-drained and functioning adequately.

4.1.1.1 Deviant national regulations

Germany

In Germany recipients are eligible for HU only if their life is either already in danger or that the underlying reason for requesting the HU status will inevitably lead to a life threatening situation:
- imminent lack of access for either hemodialysis or peritoneal dialysis;
- inability to cope with dialysis with a high risk for suicide;

or in case of:
- severe bladder problems (hematuria, cystitis etc.) due to kidney graft failure after simultaneous kidney + pancreas transplantation, provided that the pancreas graft is bladder-drained and functioning adequately.

4.1.1.2 HU audit

A transplant center must send a letter of motivation for the recipient's high urgent request in English to ET, including a report from one or two competent specialist(s) in the field of the indication concerned. For submitting a high urgent request the HU request form kidney (see Forms at www.eurotransplant.org) should be used

[1] Percentage of panel reactive allo-antibodies (%PRA) in recipient's most recent screening (excluding auto-antibodies); %PRA must be tested according to ET standard operating procedures.

In case of a high risk for suicide, the ET Medical Staff then evaluates the request according to the standard criteria. All other requests will be evaluated by two members of the Eurotransplant Kidney Advisory committee. In case there is no unanimous decision, a third member of the Eurotransplant Kidney Advisory committee will be consulted for a final decision. Only after approval the urgency HU will be granted and the urgency will be changed in ENIS.

A remote center cannot assign urgency HU in ENIS. However, the transplant center should place the recipient in any lower urgency other than HU if the status of a recipient improves or remove the candidate from the waiting list if he
deteriorates beyond transplantability. Recipients in HU status who become (temporarily) not transplantable have to be reported as NT. If these recipients become transplantable again a new HU request has to be sent to Eurotransplant.

No further stratification is made with regard to the %PRA level.
Please Note: the required HLA mismatch criteria is not taken into account when the recipient has the HU status

4.1.1.2.1 Deviant national regulations

Germany
All requests will be evaluated by two members of the Eurotransplant Kidney Advisory committee. In case there is no unanimous decision, a third member of the Eurotransplant Kidney Advisory committee will be consulted for a final decision. Only after approval the urgency HU will be granted and the urgency will be changed in ENIS.

4.1.2 Highly Immunized (HI)

These are recipients with an end-stage renal disease who are transplantable and who have a PRA range of $\geq$ 85%.

4.1.3 Immunized (I)

These are recipients with an end-stage renal disease who are transplantable and who have a PRA range of $\geq$ 6% to < 85%.

4.1.4 Transplantable (T)

These are recipients with an end-stage renal disease who are transplantable and who have a PRA range of <6%.

4.1.5 Not Transplantable (NT)

Recipients temporarily not transplantable should be placed in urgency NT.

4.2 ETKAS - general

4.2.1 Point score system

The selection of potential recipients is based on medical urgency, %PRA level, HLA-A, -B, -DR matching between donor and recipient, AB0 blood group rules, waiting time and donor region.

Selected potential recipients are ranked with the help of a point score system. The point score is calculated for all recipients, including 000-mismatched recipients. The recipient with the highest point score is ranked on top and receives the first offer. All following offers, firm or back up, are made in descending order.

Combined transplantations of a kidney and a non-renal organ have priority over all categories of kidney-only transplantations, i.e. these combined transplantations precede transplant candidates from the AM and ESP programs and/or those with a 000 HLA-A, B, DR mismatch.
In case of a HLA fully homozygous donor (see 4.2.2.1.3), 000 HLA-A, B, DR mismatch recipients are ranked from fully homozygous to fully heterozygous. Within each group, recipients are ranked according to their point score.

4.2.2 Scoring factors

4.2.2.1 HLA-Typing

The HLA match program only concerns the HLA-A, -B and -DR loci.

The HLA-C and -DQ antigens, as well as the public antigens of the HLA-B and -DR loci are disregarded in HLA mismatch calculation program.

4.2.2.1.1 Conversion of HLA-A and -B typing

The HLA-A and -B typing of the donor and the recipients is converted to a match HLA-typing by the HLA broad match phenotype reduction program (see table 4.4.1).

If present, split HLA-antigens are converted to their respective broad HLA antigen.

4.2.2.1.2 Conversion of HLA-DR typing

- If a donor with HLA-DR broad antigens is reported to ET without splits, recipients will be selected on broad antigen level;
- If a donor with HLA-DR split antigens is reported to ET, recipients will be selected on split antigen level. The only exclusion to this rule concerns split antigens DR17/DR18, because they are difficult to distinguish. If a donor has HLA-DR 17 or 18, he will be matched on broad DR3 antigen level.

4.2.2.1.3 Calculation of HLA mismatches

The *HLA mismatch program* calculates HLA-antigen mismatches for HLA-A and -B based on broad antigens only, i.e. HLA-mismatches are not calculated on split HLA-antigens. HLA-antigen mismatches for HLA-DR are calculated based on split HLA

antigens. Mismatches are defined as donor HLA-antigens that are different from the recipient's own HLA-antigens.

The converted HLA-typing is only accepted by the HLA-mismatch calculation program in the presence of at least 1 HLA-antigen on each of the three HLA-loci (HLA-A, HLA-B and HLA-DR)

In case only 1 HLA-antigen is identified, the donor or the recipient is assumed to be 'homozygous' for that locus (i.e. homologous chromosomes are presumed to code for identical antigens at that locus). Therefore, in case the donor has only 1 HLA-antigen on an HLA-locus, only 1 mismatch can occur on that locus.

In case there are 2 identical broad HLA-A or –B or split HLA-DR antigens on one locus, the presence of only 1 HLA-antigen will be assumed for the calculation; therefore, only 1 mismatch can occur on that locus.

4.2.2.1.4 Point assignment

The number of mismatches on the loci HLA-A, HLA-B and HLA-DR is added according to the following formula:

= 400 x [1- (Σ broad HLA-A, -B, split HLA-DR mismatches / 6)]

Number of HLA-A, -B, -DR mismatches	**Number of points**
0	400.00
1	333.33
2	266.67
3	200.00
4	133.33
5	66.67
6	0.00

4.2.2.1.5 HLA-bonus for paediatric recipients

For pediatric transplant candidates (see § 4.2.2.4), the points for HLA-antigen mismatch are doubled.

4.2.2.2 Mismatch Probability (MMP)

Mismatch Probability is a calculation of the probability of receiving a kidney offer with 0 and 1 *broad* HLA-A, -B or -DR mismatch based on 1000 kidneys offered, taking into account AB0 blood group rules and PRA screening.

4.2.2.2.1 MMP for 0 or 1 HLA mismatch

The *broad/split* HLA-antigen frequencies, necessary for the calculation of the 0 and 1 HLA MMP, have been calculated on the ETRL Database (see table 4.4.2).

The MMP for 0 and 1 HLA is determined at the moment of listing on the kidney waiting list. The lower the calculated value for 0 + 1 HLA-MMP (MMP0 + MMP1), the higher the chance of finding a donor with 0 or 1 HLA-mismatches within the Eurotransplant pool.

4.2.2.2.2 AB0 blood group

AB0 blood group frequencies have been calculated on the CTS Database for a Caucasian donor population in the period 1988-1995 (see table 4.4.3).

4.2.2.2.3 PRA screening

The %PRA screening is the most recently entered in ENIS and must not be out-dated (see § 4.2.2.2.3.1). Screenings should be updated every 3 months.

A higher %PRA indicates a lower chance of finding a donor with a negative cross-match.

In the event of a possible sensitization between regular %PRA screening dates, additional %PRA screenings should be performed according to the ETRL guidelines.

4.2.2.2.3.1 Outdated screening

Outdated screenings are those with a sample date older than 150 days (i.e. $\geq$5 months) at time of matching. **Recipients with outdated screening are not selected in matching procedures.**

4.2.2.2.4 MMP formulas

All variables are equal to the **broad** HLA-A and –B and **split** HLA-DR frequencies in table 4.4.2.

$$MMP=100 \times (1-(\text{AB0-match frequency} \times (1-(\%PRA/100)) \times (MMP0 + MMP1)))^{1000}$$

$$MMP0 = (a1+a2)^2 * (b1+b2)^2 * (dr1+dr2)^2$$

$$MMP1 = MMP0 \times ((((2*(a1+a2)*(1 - a1 - a2)) - a1^2 - a2^2 + \Sigma(\text{all HLA-A Ag frequencies}^2)) / ((a1+a2)^2)) + (((2*(b1+b2)*(1 - b1 - b2)) - b1^2 - b2^2 + \Sigma(\text{all HLA-B Ag frequencies}^2)) / ((b1+b2)^2)) + (((2*(dr1+dr2)*(1 - dr1 - dr2)) - dr1^2 - dr2^2 + \Sigma(\text{all HLA-DR Ag frequencies}^2)) / ((dr1+dr2)^2)))$$

Parameter	Frequency of
a1	1st HLA-A antigen
a2	2nd HLA-A antigen
b1	1st HLA-B antigen
b2	2nd HLA-B antigen
dr1	1st HLA-DR antigen
dr2	2nd HLA-DR antigen

Parameters a1 - dr2 are derived from the match HLA-typing used for the calculation of the HLA-mismatches.

4.2.2.3 Waiting time

Upon registration on the kidney waiting list, the recipient's date of onset of maintenance dialysis[2] or date of re-institution of maintenance dialysis after a previous kidney transplantation is counted as the first day for the calculation of the waiting time.

[2] Maintenance dialysis is defined as dialysis not being interrupted for more than 3 months (i.e. 91 days)

In eligible cases, waiting time includes the waiting time accumulated before transplantation of a kidney graft that failed within 90 days after transplantation. (see 4.2.3).

The points for waiting time equal 33.3 per year waiting time (i.e. 0.091 points per day waiting).

There is no limit on the time accumulated on the waiting list, thus, waiting time points can be accrued unrestrictedly.

4.2.2.3.1 Pre-emptive transplant candidates

Pre-emptive transplant candidates can be registered on the kidney waiting list in an active urgency but receive no points for waiting time, as they have not yet started their dialysis.

4.2.2.4 Pediatric bonus

A transplant candidate is defined pediatric if:
1. dialysis started before the 16th birthday or
2. registration on the waiting list was before the 16th birthday and dialysis started before the 17th birthday or
3. Recipient is proven to be in maturation

Each paediatric transplant candidate is assigned a pediatric bonus of 100 points:

For pediatric transplant candidates the points for HLA-antigen mismatch are doubled.

4.2.2.4.1 Delivering and auditing proof of maturation

A transplant center must send a completed Kidney extended pediatric status request form (see Forms at www.eurotransplant.org) including a report from a competent radiologist or pediatric endocrinologist on an X-ray of the left hand; not older than 3 months (calculated from date of onset of maintenance dialysis or, in case of pre-emptive listing calculated from date of registration on the waiting list). The request will be evaluated by two members of the Eurotransplant Kidney Advisory committee. In case there is no unanimous decision, a third member of the Eurotransplant kidney Advisory committee will be consulted for a final decision. Proof of maturation should be only delivered when the onset of maintenance dialysis is after the 17th birthday or the recipient is registered on the kidney waiting list after the 16th birthday while not being on dialysis yet.
After the proof of maturation has been accepted the pediatric status is granted:
- Until the first successful transplant in case the recipient is on maintenance dialysis or
- for 1 year calculated from date of registration on the waiting list in case the recipient is not on maintenance dialysis. If maintenance dialysis starts within the first year after registration on the waiting list, the pediatric status will be extended until the first successful transplant.
  When maintenance dialysis does not start within one year after registration, the pediatric status will be lost, but can be re-installed when the recipient is still proven to be in maturation at time of onset of maintenance dialysis. The pediatric status will then be granted until the first successful transplant.

4.2.2.5 Distance between donor center and transplant center.

	Austria	Belgium / Luxemburg	Croatia	Germany	The Netherlands	Slovenia
Local and equivalent	200	200				100
Regional				200		100
National	100	100	300	100	300	100

Local Recipients from the same center as the donor receive a bonus. Equivalent to a local status are recipients from collaborating transplant programs (regional or national).

Regional One or more transplant centers in the same region of the donor center. Such a region can consist of one or more transplant programs. In Germany the seven regions are consistent with the seven donor regions defined by the organ procurement organization Deutsche Stiftung Organtransplantation (DSO).

National All transplant programs in the same country (but outside the region) of the donor center.

International All transplant programs outside the country of the donor center.

4.2.2.6 National Kidney Exchange Balance

Once every day, for the period of the immediate previous 365 days, the difference between the number of kidneys procured, exchanged between each ET country[3] and transplanted, is calculated.

* *Export*, i.e. a negative balance, is defined as:
  kidneys procured in a country > kidneys transplanted in that country.
* *Import*, i.e. a positive balance, is defined as:
  kidneys procured in a country < kidneys transplanted in that country.

No immediate compensation exists for exchanging kidneys together with non-renal organ(s) from one donor for transplantation into one recipient, however the calculation of kidneys exchanged includes kidneys exchanged together with non-renal organs.

The point assignment depends on the range of national balance values and is assigned only to resident transplant candidates.

National Balance Points = (highest import balance – recipient country balance) x 10

4.2.2.7 Regional Kidney Exchange Balance (Austria only)

In addition to the National Kidney Exchange Balance, the difference between the number of kidneys procured and exchanged for transplantation between each Austrian

[3] Belgium and Luxemburg are considered as one country

center/region and all other (including Austrian) ET centers/regions over the preceding 365 days is calculated once every day.
In case of an Austrian donor resident recipients from the Austrian centers/regions receive additional balance points according to the following formula:

Regional Balance Points[4] = 0.25xAustrian National Balance - Regional Balance

4.2.2.8 High Urgency

Transplant candidates with urgency code HU receive a bonus of 500 points.

4.2.2.9 Kidney after liver transplant

In addition to the option of performing a simultaneous liver-kidney transplant the option of transplanting first the liver and the kidney at a later time (i.e. a kidney-after-liver transplant) is possible in selected cases. In particular this option is preferred in case of a hepatorenal syndrome.
In case of a kidney-after-liver transplant. the recipient gets 500 extra points in the kidney allocation system (ETKAS) during the period of 90 to 360 days after the liver-only transplant, provided that:

1. the recipient was registered (active or NT) on the kidney waiting list at time of the liver transplant
2. the creatinine clearance is <15ml/min (sample date between 87 and 360 days after the liver transplant)

This bonus (i.e. 500 points) expires either at time of the kidney transplant or at the end of the bonus period (i.e. 360 days after the liver transplant).

4.2.3 Return of waiting time

A recipient who is re-registered for a kidney transplant with one or more immediate previous kidney transplantations having failed, requiring maintenance dialysis within 3 months after the transplantation is eligible for the return of waiting time.

This return of waiting time will automatically be calculated

The amount of waiting time returned equals the number of days accumulated from the date of:

- start of dialysis and **no** previous transplant, *or*
- re-institution of dialysis after the last successful transplant, i.e. graft function >90 days.

4.2.3.1 Deviant national regulations
Austria, Croatia, Luxembourg, The Netherlands, Slovenia
A recipient who is re-registered for a kidney transplant with one or more immediate previous living donor kidney transplantations having failed, requiring maintenance dialysis, is eligible for the return of waiting time.

The amount of waiting time returned equals the number of days accumulated from the date of

- start of dialysis and **no** previous transplant, *or*
- re-institution of dialysis after the last successful transplant, i.e. graft function >90 days.

until the living donor transplant

[4] Please note the Regional Balance Points can be negative, which means a deduction of the total pointscore

4.2.4 AB0 blood group rules

AB0-incompatible kidney transplants from post mortem donors are not allowed.

4.2.4.1 AM program

Donor blood group	Eligible recipients
A	A and AB
B	B and AB
AB	AB
O	A, B, AB and O

4.2.4.2 ESP, ESDP, ETKAS

Donor blood group	**Eligible recipients**
A	**A**
B	**B**
AB	**AB**
O	**O**

4.2.5 Prospective cross-match

4.2.5.1 Prospective preliminary cross-match

Donor tissue typing laboratories are obliged to perform cross-matches as ordered by either ET (non-German) countries or the DSO (Germany).
In case of a positive preliminary cross-match, no kidney offer will be made to a recipient or the conditional offer is withdrawn.

4.2.5.2 No serum available for preliminary cross-match

If a preliminary cross-match cannot be performed because no serum is available, no kidney offer will be made to a recipient, or the conditional offer is withdrawn.

4.2.6 Acceptable Mismatch (AM) program

The Acceptable Mismatch (AM) program aims at allocating organs to recipients who are immunological compromised because of current and/or historical HLA-sensitization.

The program identifies HLA-A, -B, -DR mismatches not resulting in a positive cross match by checking against which HLA-A, -B, -DR antigens the recipient has not yet reacted with allo-antibodies.

Recipients selected by this program have priority over ETKAS-selected recipients. Within the AM program, recipients awaiting a combined kidney-non renal transplant have priority over kidney only candidate recipients.

4.2.6.1 Inclusion criteria

These criteria can be found in Chapter 10 Histocompatibility (§ 10.3).

4.2.6.2 Minimum requirements for organ offers

The AM program is run for every post-mortem kidney donor with a known HLA typing to select potentially cross-match negative AM recipients.

4.2.6.3 Contact with immunologist from the ETRL

All eligible AM-recipients are presented to and discussed with an ETRL immunologist prior to a kidney offer.

4.2.6.3.1 Effect of judgment by ETRL immunologist

In case a recipient is selected through:
- the AM program, then the judgment of the ETRL immunologist is binding. If the judgment is negative, then **no** offer is made for this recipient. If the judgement is positive, an offer is made for this recipient. No prospective cross match is performed.
- ETKAS, then the judgment of the ETRL immunologist is not binding. If the judgment is negative, then this will be communicated to the recipient center leaving the decision to accept or decline the offer to the responsible transplant physician.

4.2.7 Eurotransplant Senior Program (ESP/ESDP)

The Eurotransplant Senior Program (ESP) allocates kidneys from post-mortem donors ≥65 years old to recipients ≥65 years without the use of a donor HLA typing. The ESP aims at a cold ischaemic period (CIP) that is as short as possible.

4.2.7.1 No allocation via ESP possible

Kidneys from an ESP donor that cannot be allocated locally or regionally are allocated through the regular kidney allocation (ETKAS) after reporting of the HLA typing.

4.2.7.2 National allocation rules

4.2.7.2.1 Austria, Belgium/Luxembourg

In Austria, Belgium/Luxembourg and Slovenia, kidneys from ESP donors are allocated to ESP recipients from the reporting center's local waiting list.

4.2.7.2.2 Germany

In Germany, kidneys from ESP donors are allocated to ESP recipients from the corresponding region (see 4.2.2.5) as defined by the organ procurement organization Deutsche Stiftung Organtransplantation (DSO). Kidneys from ESP donors are first allocated to ESP recipients registered within the same sub-region as the donor and then to ESP recipients registered within the other subregions

4.2.7.2.2.1 Choice of allocation scheme

In Germany recipients aged 65 years or older have to choose for either being included in the ESP/ESDP or the ETKAS program. These programs are mutually exclusive.

4.2.7.2.3 The Netherlands, Croatia, Slovenia

In the Netherlands, Croatia and Slovenia, kidneys from ESP donors are allocated to ESP recipients according to the national waiting list.

In the Netherlands, ESP donor kidneys are only allocated to never-immunized recipients awaiting a first kidney transplant.

4.2.7.3 The ESDP study protocol

In conjunction with the ESDP study protocol, one kidney from an ESP donor is allocated to an ESP recipient with a 0 HLA DR mismatch while the other donor kidney is allocated irrespective of the HLA matching (see the ESP study protocol at www.eurotransplant.org)

4.2.8 Non-heart-beating donor (NHBD) kidneys

Kidneys from non-heart-beating donors (NHBDs) are allocated according to the same allocation algorithm as for post-mortem heart-beating kidney donors.

4.2.8.1 Deviant national regulations

4.2.8.1.1 Germany, Croatia

According to the German law on transplantation, organs from non-heart-beating donors (NHBD) must not be procured and/or transplanted in Germany. Consequently, NHBD organs from outside Germany must neither be allocated nor transplanted in Germany. In addition NHBD organs will not be procured and/or transplanted in Croatia.

4.2.8.1.2 The Netherlands

NHBD kidneys may only be allocated through ET after the cardiac arrest has occurred.

4.2.9 Donors <5 years and en-bloc procurement[5]

Transplant coordinators (TC) are advised to contact ET as soon as possible if they have a donor younger than 5 years. The donor procedure should be discussed together with the ET medical officer.

4.2.9.1 Donors <2 years

From donors under the age of 2 years the kidneys **mus**t be procured en-bloc.

4.2.9.2 Donors between 2 and 5 years

From donors between 2 and 5 years of age it is recommended to procure the kidneys en-bloc.

In this case the final decision is up to the accepting transplant center. The TC should seek the earliest possible contact with the accepting center to evaluate whether

[5] Discussed and confirmed by the ET Kidney Advisory Committee (ETKAC) in December 2004.

particular needs with regard to the potential recipient are requested. This includes e.g. anatomical variances, need for en-bloc, additional vessels and length of vessels/urethers. The TC will also check which team will procure the kidneys and whether they have the expertise. When no recipient is found within Eurotransplant, ET will, upon request, contact other European Organ Exchange Organizations (OEO) to ask whether suitable recipients are available.

4.2.10 75/75 rule

In case a donor is 75 years of age or older or the calculated creatinine clearance is 75 ml/min or below and both kidneys are still available, the transplant center can decide to accept both kidneys for transplantation into one recipient.

4.3 ETKAS – allocation algorithms

4.3.1 Donors < 16 years of age

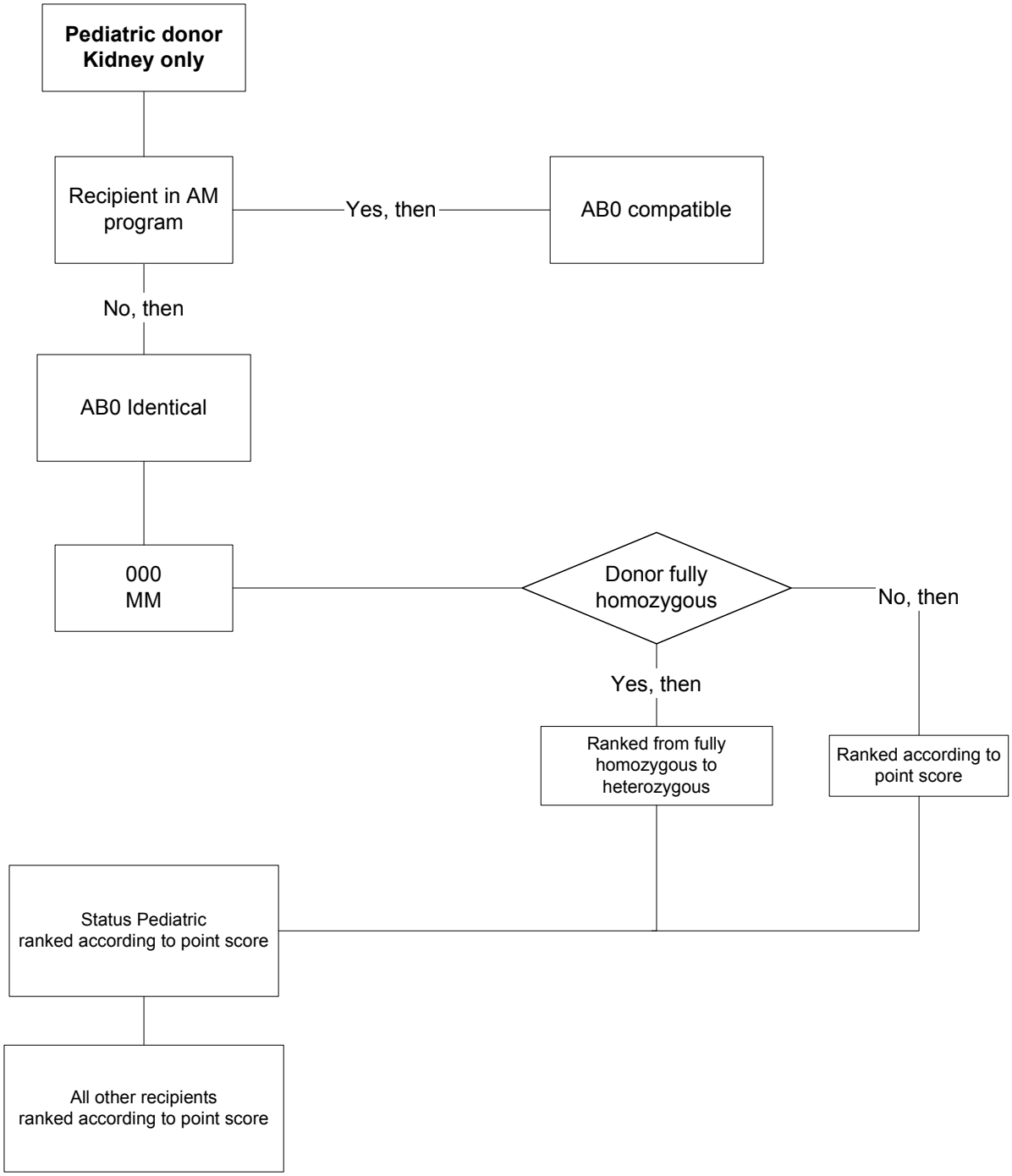
First, to AM program recipients (pediatric & adult)

then, to zero (000) HLA-A, -B and -DR mismatch recipients (pediatric & adult), in case of a HLA fully homozygous donor (see 4.2.2.1.3) recipients are ranked from fully homozygous to fully heterozygous. Within each group recipients are ranked according to their point score.

then, to recipients having the pediatric status, ranked according to their point score.

then, to all other HI, I, T and HU recipients ranked according to their point score.

4.3.1.1 Flowchart 1 – Donor < 16 years



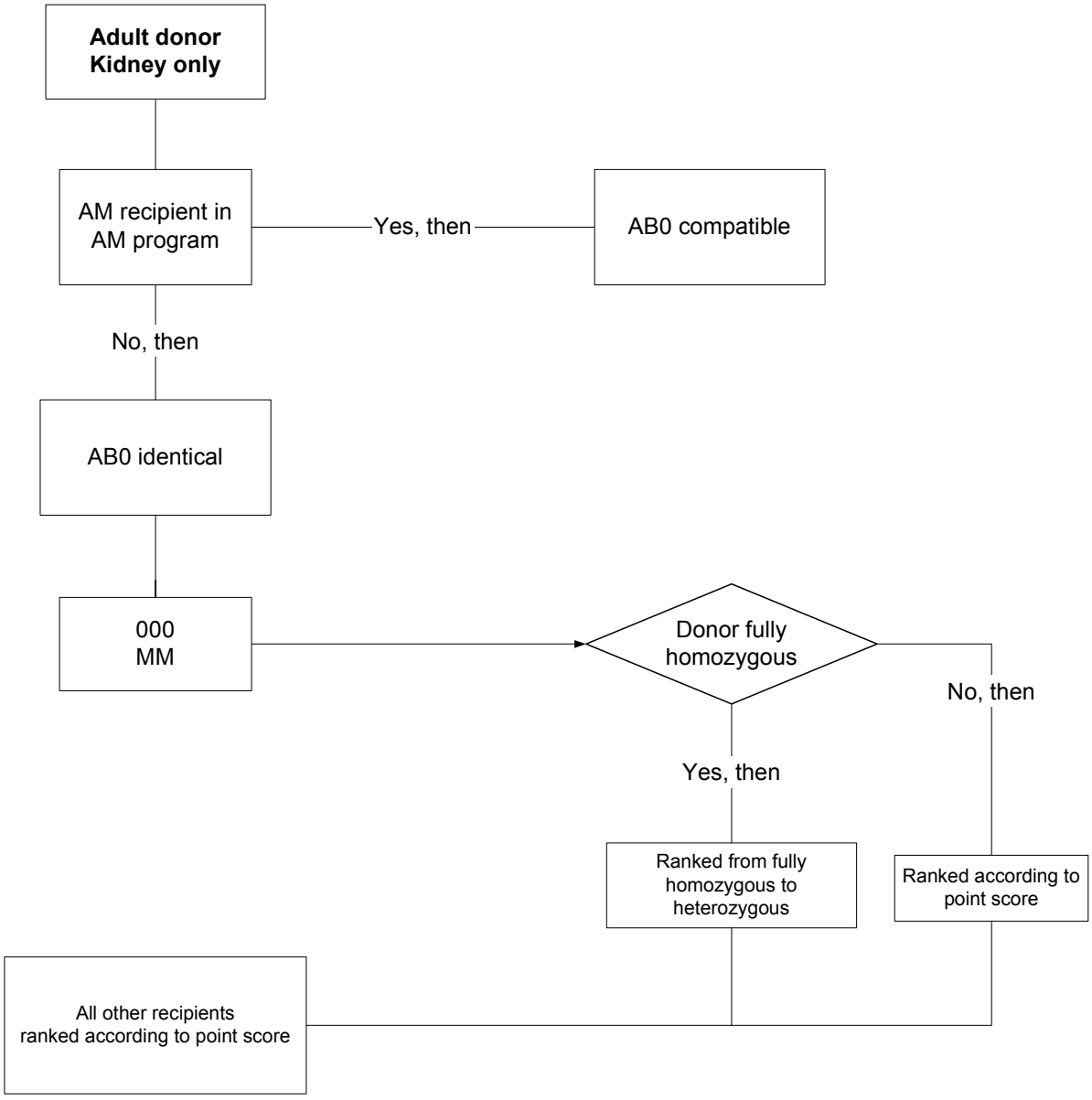
4.3.2 Donors ≥ 16 years and < 65 years of age

First, to AM program recipients

then, to zero (000) HLA-A, -B and -DR mismatch recipients
in case of a HLA fully homozygous donor (see 4.2.2.1.3): recipients are ranked from fully homozygous to fully heterozygous. Within each group recipients are ranked according to their point score.

then, to HI, I, T and HU recipients ranked according to their point score.

4.3.2.1 Flowchart 2 – Donor ≥ 16 years and < 65 years



4.3.3 Donor aged ≥ 65 years (ESP)

First to recipients aged ≥ 65 years:

locally	in Austria, Belgium/Luxembourg, center offer.
regionally	in Germany first in the sub-region of the donor; recipient-oriented (first HU then elective), then in all other sub-regions, recipient oriented (first HU then elective).
nationally	in the Netherlands Croatia and Slovenia recipient-oriented (first HU then elective)

then, according to the ETKAS scheme (see § 4.3.2)

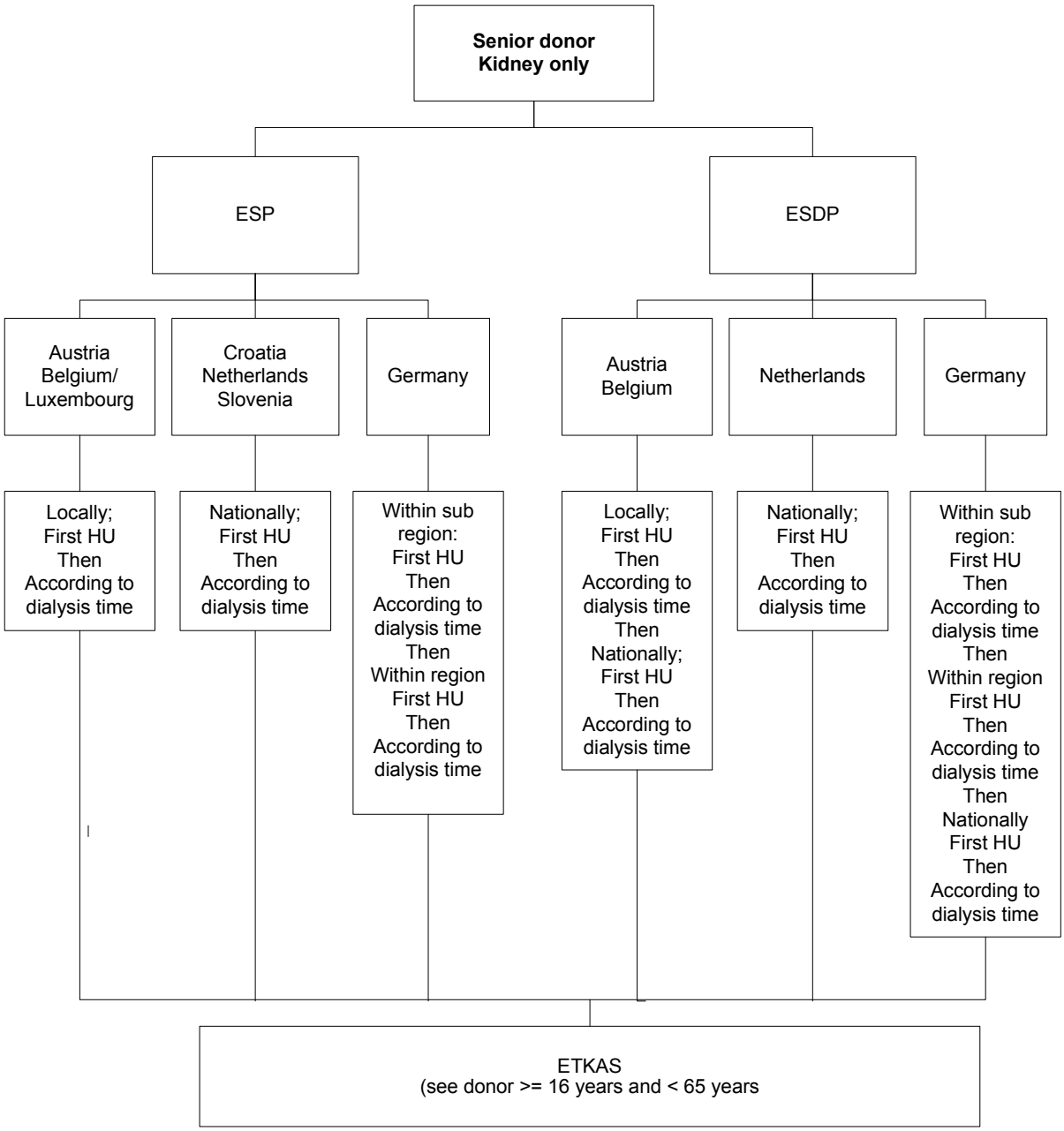
4.3.4 Donor aged ≥ 65 years (ESDP)

First to recipients aged ≥ 65 years:

locally	in Austria, Belgium; center offer. Then nationally (first HU then elective)
regionally	in Germany in the sub-region of the donor; recipient-oriented (first HU then elective), then in all other sub-regions, recipient oriented (first HU then elective), then nationally (first HU then elective)
nationally	in the Netherlands: recipient-oriented (first HU then elective), then nationally (first HU then elective)

then, according to the ETKAS scheme (see § 4.3.2)

4.3.4.1 Flowchart 3 – Donor ≥ 65 years



Tables

4.3.5 Conversion of *split* HLA-antigen to *broad* HLA-antigen

Conversion of *split* HLA-antigen to *broad* HLA-antigen, as used in the HLA broad match phenotype reduction program					
A23 • A9	B51 • B5	B39 • B16	DR15 • DR2	Cw9 • Cw3	DQ5 • DQ1
A24 • A9	B52 • B5	B57 • B17	DR16 • DR2	Cw10 • Cw3	DQ6 • DQ1
A2403 • A9	B44 • B12	B58 • B17	DR17 • DR3		DQ7 • DQ3
A25 • A10	B45 • B12	B49 • B21	DR18 • DR3		DQ8 • DQ3
A26 • A10	B64 • B14	B50 • B21	DR11 • DR5		DQ9 • DQ3
A34 • A10	B65 • B14	B54 • B22	DR12 • DR5		
A66 • A10	B62 • B15	B55 • B22	DR13 • DR6		
A29 • A19	B63 • B15	B56 • B22	DR14 • DR6		
A30 • A19	B75 • B15	B60 • B40			
A31 • A19	B76 • B15	B61 • B40			
A32 • A19	B77 • B15	B71 • B70			
A33 • A19	B38 • B16	B72 • B70			
A74 • A19					
A68 • A28					
A69 • A28					

4.3.6 HLA antigen frequency

HLA antigen frequencies									
HLA-A		HLA-B		HLA-B		HLA-DR *broad*		HLA-DR *split*	
A1	0.1581	B5	0.0697	B41	0.0089	DR1	0.1139	DR1	0.1139
A2	0.2992	B7	0.1340	B42	0.0004	DR2	0.1677		
A3	0.1622	B8	0.1090	B46	0.0002			DR15	0.1443
A9	0.1197	B12	0.1302	B47	0.0029			DR16	0.0186
A10	0.0556	B13	0.0308	B48	0.0002	DR3	0.1142		
A11	0.0525	B14	0.0234	B53	0.0033	DR4	0.1426	DR4	0.1426
A19	0.1269	B15	0.0869	B59	0.0001	DR5	0.1423		
A28	0.0444	B16	0.0429	B67	0.0001			DR11	0.1219
A36	0.0002	B17	0.0434	B70	0.0031			DR12	0.0203
A43	0.0001	B18	0.0531	B73	0.0003	DR6	0.1663		
A203	0.0001	B21	0.0217	B703	0.0001			DR13	0.1353
A210	0.0001	B22	0.0254	B78	0.0001			DR14	0.0285
A80	0.0001	B27	0.0442	B81	0.0001	DR7	0.1225	DR7	0.1225
		B35	0.0972	B2708	0.0001	DR8	0.0354	DR8	0.0354
		B37	0.0154	B82	0.0001	DR9	0.0110	DR9	0.0110
		B40	0.0723	B83	0.0001	DR10	0.0082	DR10	0.0082

4.3.7 AB0 blood group frequency

AB0 blood group frequencies	
Recipient's blood group	Frequency
AB0-0	0.440
AB0-A	0.423
AB0-B	0.102
AB0-AB	0.036

4.3.8 German ESP (sub)regions

|DSO region	ESP sub region	Transplant centers	ET center code
GBWOR	OZ Stuttgart	Heidelberg Mannheim Stuttgart Tübingen Ulm	GHBTP GMATP GSTTP GTUTP GULTP
	OS Freiburg	Freiburg	GFRTP
GBYOR	OZ München	Augsburg München, Rechts d. Isar München, Grosshadern Regensburg	GAUTP GMHTP GMLTP GRBTP
	OS Erlangen	Erlangen Nürnberg Würzburg	GERTP GNBTP GWZTP
GMIOR	OZ Mainz	Frankfurt a.M. Mainz	GFMTP GMZTP
	OS Homburg	Homburg-Saar Kaiserslautern	GHSTP GKSTP
	OS Marburg	Fulda Giessen Marburg	GFDTP GGITP GMRTP
GNDOR	OZ Hannover	Bremen Göttingen Hannover Hannoversch-Münden	GBMTP GGOTP GHOTP GHMTP
	OS Hamburg	Hamburg Kiel Lübeck	GHGTP GKITP GLUTP
GNOOR	OZ Berlin	Berlin, UK B.-Franklin Berlin, Charité	GBETP GBCTP
	OS Rostock	Rostock	GROTP
GNWOR	OZ Düsseldorf	Bochum Düsseldorf Essen	GBBTP GDUTP GESTP
	OS Köln-Bonn	Aachen Bonn Köln, Lindenthal Köln, Merheim	GAKTP GBOTP GKLTP GKMTP
	OS Münster	Münster	GMNTP
GOSOR	OZ Leipzig	Dresden Halle Jena Leipzig	GDRTP GHATP GJETP GLPTP

4.4 Forms

All forms can be found and downloaded from the section 'Forms' of the Library of the member site at www.eurotransplant.org.