Kidney Disease Toolkit Guideline v2.0

Instruments

Toolkit Purpose

A collection of measures to capture essential phenotypes associated with Kidney Disease-related biomedical research.

Guideline Description

The Kidney Disease toolkit can be used to collect essential phenotypes associated with Kidney Disease-related research including personal History of Kidney Failure, Kidney Function Assay and Blood Cell Count. This document establishes guidelines (particularly applicable in Africa) on using the toolkit and collecting detailed, relevant and harmonised phenotype and exposure data for research.

As listed below, the Kidney Disease toolkit consists of 3 Instruments, labelled Instruments 1 to 3:

Instrument	**Phenotypes**
1	Kidney Treatment Status
2	Kidney Function Assay
3	Complete Blood Cell Count

Important Notes

1. The toolkit employs branching logic. Therefore, we recommend that it is completed in order, as some variables may or may not appear OR accept input based on the input of previously listed variables.

2. Some branching logic (specifically related to date of birth/age and biological sex) affect the display of items relevant to adult or paediatric participants across multiple instruments.

3. Any addition or removal of variables may also affect branching logic so editing of variables should be carefully positioned so as not to interrupt branching logic conditions with related variables.

4. The toolkit is recommended to be used in conjunction with the Core Phenotypes toolkit (https://github.com/h3abionet/h3aphenstds).

5. Although not highlighted below, each instrument requires a collection date, which can be collected either manually or automatically.

6. Consistent codes are recommended to identify missing data, and these are incorporated into all Instruments discussed below. We recommend the use of 'Temporarily unavailable' for pending results in Instrument 2 and 3.

7. Codes for Missing Data are specified below:

Code	Value Label
-991	No information
-992	Asked but unknown
-993	Temporarily unavailable
-994	Not asked
-995	Refused
-998	Not applicable

8. We recommend that when a participant responds with an "I don't know" to a question that the interviewer firstly ensures that the participant understands the question clearly and secondly is gently encouraged to reconsider their response if possible. If "I don't know" is still the response we make use of the 'Asked but unknown' missing code. Questions where "I don't know" is a highly anticipated and valid response will have a checkbox for Unknown included - it should be noted that this will not be recognised as missing data in statistical software.

Recommendations

Instrument 1: Kidney Treatment Status

The instrument enables the retrospective collection of information related to a research participant's personal history of treatment, focusing specifically on renal dialysis (hemodialysis and peritoneal dialysis).

Questions	Is the participant currently on renal dialysis? **Response Options**: Yes; No If yes, what type of dialysis is the participant currently on? **Response Options**: Hemodialysis; Peritoneal dialysis
Notes	- **Renal Dialysis**: Treatment that filters and purifies the blood using a machine - **Hemodialysis**: A procedure where a dialysis machine and a special filter called an

	artificial kidney, or a dialyser, are used to clean your blood. To get your blood into the dialyser, the doctor needs to make an access, or entrance, into your blood vessels. This is done with minor surgery, usually to your arm. - **Peritoneal Dialysis**: A type of dialysis which uses the peritoneum in a person's abdomen as the membrane through which fluid and dissolved substances are exchanged with the blood. It is used to remove excess fluid, correct electrolyte problems, and remove toxins in those with kidney failure.
Questions	If currently on hemodialysis, how often does the participant get dialysis? **Response Options**: Once a week; Twice a week; Three times a week; Four or more times a week If currently on hemodialysis, how long is the participant's typical session? **Response Options**: Less than or equal to 2 hours per session; More than 2 hours but less than or equal to 3 hours per session; More than 3 hours but less than or equal to 4 hours per session; More than 4 hours per session. If currently on hemodialysis, how many sessions does the participant usually miss per month? **Response Options**: 0 sessions per month; 1 or 2 sessions a month; 3 or 4 sessions a month; More than 4 sessions a month.
Notes	- The above questions are strictly related to hemodialysis.
Questions	If currently on peritoneal dialysis, how many daytime exchanges does the participant typically have? **Response Options**: A night time cycler with one long daytime exchange; Three or less daytime exchanges; Four daytime exchanges; More than four daytime exchanges If currently on peritoneal dialysis, how much liter in volume per dwell period does the participant typically exchange? **Response Options**: Less than or equal to 1 liter in volume per dwell period; More than 1 liter but less than or equal to 2 liters in volume per dwell period; More than 2 liters but less than or equal to 2.5 liters in volume per dwell period; More than 2.5 liters but less than or equal to 3 liters in volume per dwell period; More than 3 liters in volume per dwell period What type of dialysis accesses does the participant currently have? **Response Options**: None; Venous catheter; Arteriovenous graft; Arteriovenous fistula; Peritoneal catheter What was the reason for starting dialysis (current or past)? **Response Options**: Congestive heart failure; Build-up of uremic (kidney) toxins; Result of a procedure; Other

	If Other, specify reason:

Notes	- The above questions are strictly related to peritoneal dialysis.
	- **Dwell Period**: The time the solution remains in the abdomen between exchanges.
	- Dialysis Accesses:
	  - **Venous catheter**: a tube that doctors place in a large vein in the neck, chest, groin, or arm.
	  - **Arteriovenous graft**: a looped, plastic tube that connects an artery to a vein.
	  - **Arteriovenous fistula**: a surgical connection made between an artery and a vein.
	  - **Peritoneal catheter**: a small plastic tube that is implanted under the skin to provide a painless way of withdrawing excess fluid from or the abdominal or peritoneal cavity.
	- **Congestive heart failure** (CHF) - Failure of the heart to pump a sufficient amount of blood to meet the needs of the body tissues, resulting in tissue congestion and edema. Signs and symptoms include shortness of breath, pitting edema, enlarged tender liver, engorged neck veins, and pulmonary rales.
	- **Uremic toxins:** toxins that are usually cleared by kidneys into the urine, but they end up in the blood when kidneys are damaged. These include creatinine and urea.

Instrument 2: Kidney Function Assay

This instrument enables the recording of a research participant's laboratory results with regards to Kidney Function. The information recorded in this Instrument must be gained from qualified medical laboratory facilities with trained and qualified laboratory staff.

Questions	Urinary Microalbumin Serum Albumin Serum Creatinine Serum Urea Estimated Glomerular Filtration Rate (eGFR) Serum Sodium Serum Potassium Serum Chloride Serum Glucose Serum Bicarbonate
Notes	- Dates should be collected in the following format - DD-MM-YYYY - All results should be collected from a qualified medical laboratory facility. - **Albumin** - the main protein in blood plasma. Low serum levels occur in conditions associated with malnutrition, inflammation and liver and kidney diseases. - **Creatinine** - The breakdown product of creatine, a constituent of muscle tissue, that is excreted by the kidney and whose serum level is used to evaluate kidney function.

	- **Urea** - the chief nitrogenous endproduct of protein metabolism, in serum, the clear liquid that separates from blood after it has clotted completely, i.e. blood plasma from which fibrinogen has been removed. - **eGFR** - Measurement of the flow rate of filtered fluid through the kidney, calculated either by comparative measurements of substances in the blood and urine, or estimated from a blood test. - **Serum Sodium** - A quantitative measurement of the amount of sodium present in a sample of serum. - **Serum Potassium** - A quantitative measurement of the amount of potassium present in a sample of serum. - **Serum Chloride** - A quantitative measurement of the amount of chloride present in a sample of serum. - **Serum Glucose** - A quantitative measurement of the amount of glucose present in a sample of serum. - **Serum Bicarbonate** - A quantitative measurement of the amount of bicarbonate present in a sample of serum.

Instrument 3: Complete Blood Cell Count

This instrument enables the recording of a research participant's laboratory results with regards to Blood Cell Counts. Notably, the same Instrument recurs in the HIV toolkit. The information recorded in this Instrument needs to be gained from qualified medical laboratory facilities with trained and qualified laboratory staff.

Questions	Red blood cell count (RBC) White blood cell count (WBC) Partial Pressure of Carbon Dioxide (pCO2) Hematocrit (HCT) Haemoglobin Mean cell haemoglobin Mean Cell Hb Concentration (MCHC) Mean cell volume Red cell distribution width (RDW) Eosinophils (Absolute Value) Basophils (Absolute Value) Neutrophils (Absolute Value) Monocytes (Absolute Value) Lymphocytes (Absolute value)
Notes	- Dates should be collected in the following format - DD-MM-YYYY - All results should be collected from a qualified medical laboratory facility. - **RBC** - The determination of the number of erythrocytes in a biospecimen. - **WBC** - The determination of the number of leukocytes in a biospecimen - **pCO2** - the partial pressure of carbon dioxide dissolved in a solution. - **HCT** - The volume of packed RED BLOOD CELLS in a blood specimen. The volume is measured by centrifugation in a tube with graduated markings, or

	with automated blood cell counters. It is an indicator of erythrocyte status in disease. - **Haemoglobin** - The red respiratory protein of erythrocytes, which transports oxygen from the lungs to the tissues where the oxygen is readily released. - **Mean cell volume** - the average volume of erythrocytes in a specimen - **Mean cell haemoglobin** - the average concentration of hemoglobin in a population of erythrocytes - **MCHC** - The amount of hemoglobin in a given volume of packed red blood cells and is often calculated by dividing the hemoglobin concentration by the hematocrit. - **RDW** - Red blood cell distribution width is a measure of the range of variation of RBC volume that is reported as part of a standard complete blood count. - **Eosinophils, Basophils, Neutrophils, Monocytes, and Lymphocytes** - five white blood cell types that protect your body from infections or respond to intruders like parasites, fungi and cancer cells

Abbreviations

CHF: Congestive Heart Failure
HCT: Hematocrit
eGFR: Estimated Glomerular Filtration Rate
MCHC: Mean Cell Hb Concentration
pCO2: Partial Pressure of Carbon Dioxide
RBC: Red Blood Cells
RDW: Red cell distribution width
WBC: White Blood Cells

Administration

Mode of Administration

	Instruments		
	1	2	3
Interview OR Self-administered questionnaire	X		
Clinical assessment			
Bioassay/Lab-based assessment		X	X

Life Stage

	Instruments		
	1	2	3

Infancy (0 - 12 months)		x	x
Toddler (13 - 24 months)		x	x
Childhood (2-11 years)	x	x	x
Adolescence (12 - 18 years)	x	x	x
Adult (18 and older)	x	x	x

Personnel and Training Required

Instruments 1 may be implemented as either self-reported questionnaires or interviewer-administered questionnaires. If interviewer-administered, interviews should be conducted by trained or study coordinators or data collectors who speak the native/local language of the target population. The information recorded in **Instrument 2 and 3** must be gained from qualified medical laboratory facilities with trained and qualified laboratory staff.

References

The Kidney Disease toolkit is based on and aligned with several existing standards to facilitate data harmonisation. These resources are listed below:

1. Kumuthini J, van Woerden C, Mallett A, et al. Proposed minimum information guideline for kidney disease—research and clinical data reporting: a cross-sectional study, BMJ Open 2019;9:e029539. DOI: 10.1136/bmjopen-2019-029539
2. Instrument - Personal History of Kidney Failure (https://www.phenxtoolkit.org/protocols/view/140601)
3. Instrument - Complete Blood Count (CBC) (https://www.phenxtoolkit.org/protocols/view/220501)
4. Sickle In Africa Core Data Elements (https://www.sickleinafrica.org/SIA_data_elements)

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Contact Us

For queries related to this standard and guideline, users can log a ticket to the Phenotypes Standards queue in the H3ABioNet Helpdesk. User feedback and improvements on the current toolkit are welcome and encouraged. These can also be submitted through the Helpdesk, or on our GitHub Issues page.