Comparative Visualization of Longitudinal 24-hour Ambulatory Blood Pressure Measurements in Pediatric Patients with Chronic Kidney Disease

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I. Introduction

- Chronic kidney disease (CKD) in pediatric patients is a serious condition characterized by gradual and irreversible loss of kidney function over time.
- Ambulatory blood pressure monitoring (ABPM) is crucial for treating CKD, but physicians face challenges due to the lack of normative data specific to pediatric CKD patients and the inconvenience of ABPM for some patients.
- To address these challenges, a visualization tool is needed to identify patterns and trends in 24-hour ABPM data and make more accurate diagnoses and treatment decisions for pediatric CKD patients while saving time and effort for clinicians.

II. Methodology

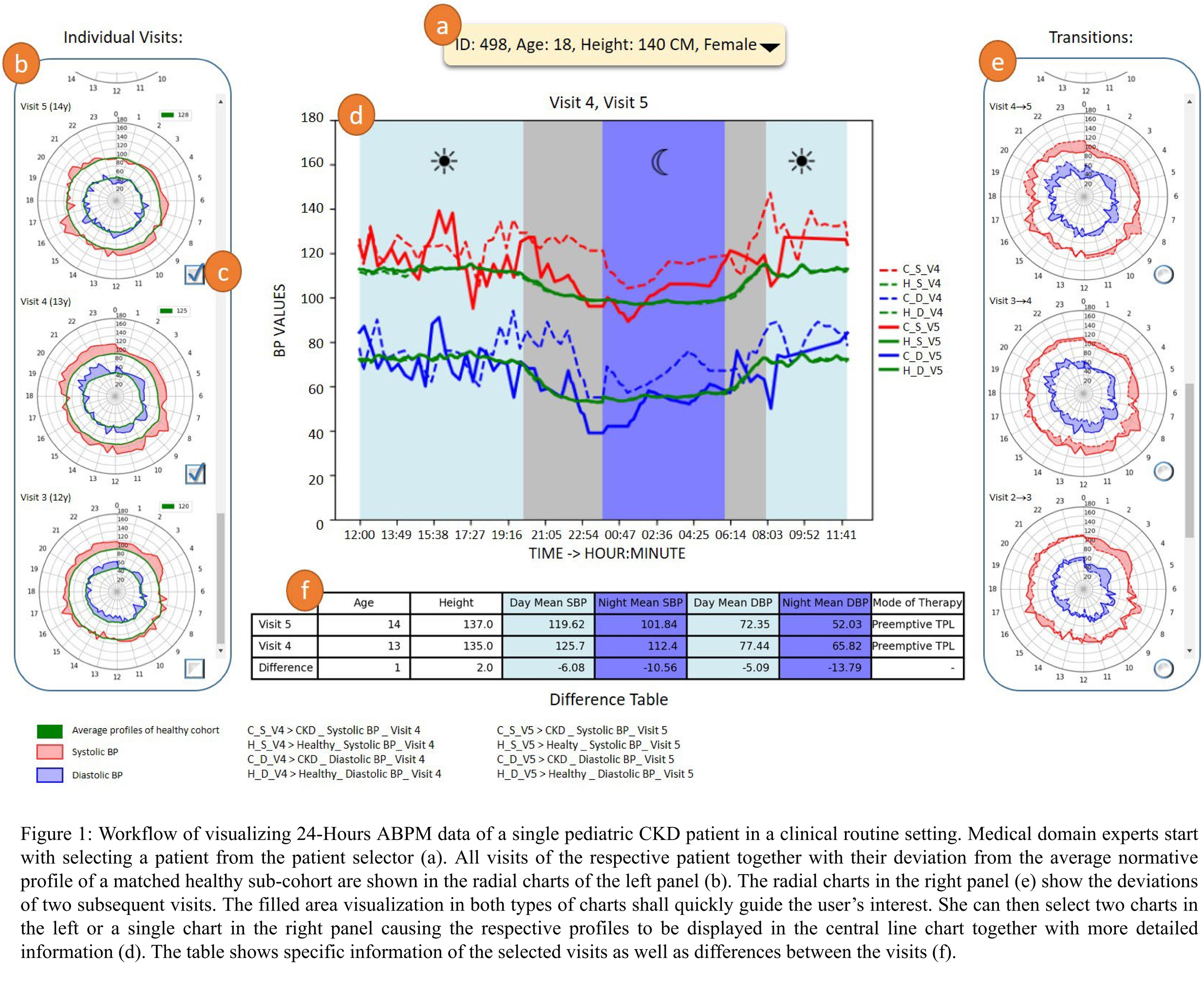
- We utilize radar charts to allow domain experts in comparing blood pressure (BP) values. Clinicians can compare the changes in BP values by looking at filled areas in radial chart.
- In the line chart, day and night time are emphasized since a nocturnal dipping of BP, for instance, is indicative for a normal profile.
- A table at the bottom of the dashboard shows some quantitative deviations between the visits with respect to a subset of study variables. The therapy mode provides crucial information that may explain changes in BP due a specific associated medication.

III. Case Study

- The study utilized our visualization tool to analyze 24-hour ABPM profiles of a female patient with mild-to-moderate-stage CKD who underwent kidney transplantation. The medical experts noticed a significant increase in BP in visit 4 due to immunosuppression drugs' side effects, which was normalized in visit 5 due to proper medications.
- Longitudinal visualization of ABPM data helped the clinicians identify the cause of the patient's high BP, leading to appropriate treatment decisions and maintaining the patient's normal BP.

V. Conclusion

- Our dashboard visualization provides an overview of deviations in ABPM data over multiple diagnostic visits, allows for comparison with reference data of healthy patients, and enables detailed intra-individual comparison of ABPM data between subsequent visits.
- Our case study demonstrates the usefulness of the tool in analyzing ABPM data, and the feedback of three experienced pediatric clinicians further underscores its potential for adoption in regular clinical practice.



	Age	Height	Day Mean SBP	Night Mean SBP	Day Mean DBP	Night Mean DBP	Mode of Therapy
Visit 5	14	137.0	119.62	101.84	72.35	52.03	Preemptive TPL
Visit 4	13	135.0	125.7	112.4	77.44	65.82	Preemptive TPL
Difference	1	2.0	-6.08	-10.56	-5.09	-13.79	-

Figure 1: Workflow of visualizing 24-Hours ABPM data of a single pediatric CKD patient in a clinical routine setting. Medical domain experts start with selecting a patient from the patient selector (a). All visits of the respective patient together with their deviation from the average normative profile of a matched healthy sub-cohort are shown in the radial charts of the left panel (b). The radial charts in the right panel (e) show the deviations of two subsequent visits. The filled area visualization in both types of charts shall quickly guide the user's interest. She can then select two charts in the left or a single chart in the right panel causing the respective profiles to be displayed in the central line chart together with more detailed information (d). The table shows specific information of the selected visits as well as differences between the visits (f).