A specific and sensitive detection of DOACs in urine by a point of care test may support rapid diagnosis in emergency medicine. Reduced renal function and urine colour may influence the performance of the DOAC Dipstick test.

 Methods and results

• The reagents are immobilized on the surface of the DOAC Dipstick pads.
• When the reagents react with urine, specific colours develop according to the action of factor Xa or thrombin on the release of a chromophore bound to a substrate.
• Chromophore release is negatively related to the amount of DOAC in urine and different chromophore colours indicate the absence or presence of factor Xa and thrombin inhibitors on the same test strip.
• Yellow indicates the absence of factor Xa inhibitors and white indicates the presence of factor Xa inhibitors.
• Ochrre indicates the absence of thrombin inhibitors and red indicates the presence of thrombin inhibitors.
• The pad colours can be visually identified as early as 10 min. after incubation of test strip with a urine sample. Pad colours are printed on the test tube for comparison (Fig. 1).

Creatinine (pad 1)
If the colour of pad 1 corresponds to the “normal” colour (“norm”) or is between the “norm” or “low” colours on the tube label, then creatinine in the urine is normal, indicating normal renal function (Fig. 2, examples A and B).

If the colour of pad 1 corresponds to the “low” colour or is lighter than the respective colour on the tube label, then creatinine in the urine is low, indicating renal insufficiency. The result of pad 3 may be false negative (Fig. 2, example C).

Thrombin (pad 4)
If the colour of pad 4 is ochre like the respective colour marked “neg.” on the tube label, then thrombin inhibitor is not present in the urine sample (Fig. 2 A).

If the colour of pad 4 is yellow like the respective colour marked “pos.” on the tube label, then a direct oral thrombin inhibitor is present in the urine (Fig. 2, example B).

Urine colour (pad 2)
If the pad colour is white like the respective colour marked “norm” on the tube label, then the colours of pads 1, 3, and 4 can be visually evaluated (Fig. 2, examples A, B, C, D).

If the colour of the pad is darker than the colour “norm” on the tube label, the colours of pads 1, 3, and 4 may be falsified (Fig. 3, example D).

Direct oral factor Xa inhibitors (pad 3)
The test pad detects all currently licensed direct oral factor Xa inhibitors, i.e. apixaban, edoxaban, and rivaroxaban. The different inhibitors cannot be distinguished.

If the pad colour is yellow like the colour marked “neg.” (negative) on the tube label, then direct oral factor Xa inhibitors are not present in the urine sample (Fig. 2 B).

If the pad colour is less yellow than the colour marked “pos.” (positive) on the tube label, then one direct oral factor Xa inhibitor is present in the urine (Fig. 2, example A).

Direct oral thrombin inhibitors (pad 4)
If the colour of test pad 4 is ochre like the respective colour marked “neg.” on the tube label, then a direct oral thrombin inhibitor is not present in the urine sample (Fig. 2 A).

If the colour of pad 4 is yellow like the respective colour marked “pos.” (positive) on the tube label, then a direct oral thrombin inhibitor is present in the urine (Fig. 2, example B).

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Conflict of interest / address

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