

Urinalysis

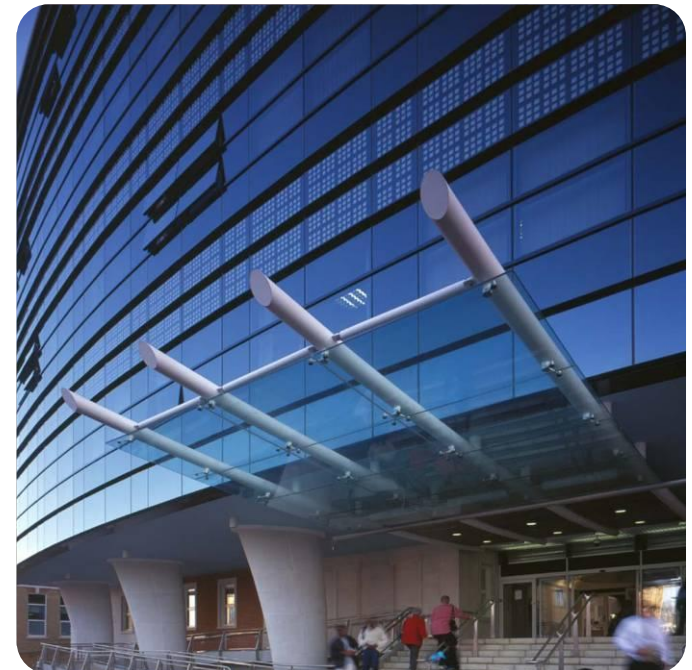
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Learning aims

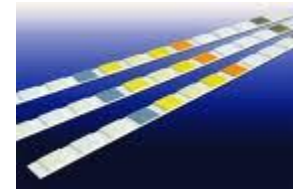
For this session

- To provide an overview of routine urinalysis
 - How to interpret the results
 - Gaining clinical competency
-
- ***Reading list supplied.***

Key words

1. Interpretation of urinalysis
2. Screening
3. Diagnosis
4. Patient management
5. Reagent strips

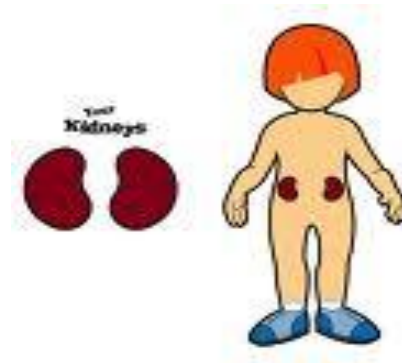
Introduction



- Dr Carl Gartner in 1797 identified the need for an easier way of testing urine to exclude the presence of disease.
- Interestingly enough it wasn't until the 1950's that urine testing strips were commercially made and became available in healthcare settings.



How the kidneys work!



- The kidneys are a pair of vital organs that perform fundamental functions so that the human body can remain healthy and chemically balanced.
- Urine is formed by the kidneys, and is the medium by which water and solutes in excess of body requirements are excreted, together with end products of metabolism, foreign substances including drugs.

Urinalysis

- Urinalysis is considered a fundamental component of the holistic and symptom assessment of any individual in poor health.
- The procedure is relatively straightforward both due to usually the effortless way in which a urine specimen can be collected and the availability of reagent testing strips in clinical healthcare settings.
- Urinalysis subsequently provides information not available in any other manner and certainly not obtained as quickly.

Urinalysis

- Not only are changes in the composition of urine sometimes the first and only indication of genuine or imminent renal disease, but also urinalysis may be the only feasible means of making a diagnosis of a metabolic disorder or drug overdose.



Three main components

- Routine urinalysis may be performed for several reasons, as urine may undergo several changes as an individual becomes unwell.

Screening

For disease, both renal and systemic

Diagnosis

To confirm or exclude a suspected disease process especially in the renal and urinary tract

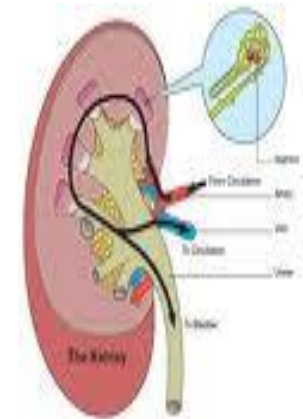
Management

To monitor the progress of an established disease either by health care professional or patient themselves

Urinalysis to diagnose specific disorders

Examples

- Renal disease
- Biliary disease
- Renal stones
- Glomerulonephritis
- Pyelonephritis
- Cystitis / UTI
- Liver disease / failure
- Diabetes Mellitus
- Hypertension
- Pre-eclampsia
- Malignancy
- Osteoporosis



Urine specimens

- *A first-morning specimen*
- The reliability of urine analysis is dependent on the quality of the specimen which is best collected at the beginning of the day and should always be fresh.
- *Others to consider*
- *MSU*
- *CSU*
- *24 hour collection*
- *Pregnancy test*
- *Patient brought!*
- An evidence-based FACT



Drugs and food can influence the colour of urine

<p>Red coloured urine</p> <p>By a patient consuming beetroot, by taking anticoagulant medication and by menstruating ladies</p>	<p>Orange coloured urine</p> <p>Patient taking Rifampicin medication, or consuming Paprika and rhubarb or simply being dehydrated.</p>	<p>Yellow coloured urine</p> <p>Consuming carrots or by medication such as; nitrofurantoin, senna, sulphonamides</p>
<p>Excessive consumption of cranberry juice can turn urine red and a leg bag red if the person is catheterised.</p>	<p>Smelly urine</p> <p>UTI suspected!</p> <p>Fishy smell – person may have eaten fish!</p>	<p>Consider – fresh urine does not smell! It is when it is left to linger that a smell occurs!</p>

I pose the question?

- “Urinalysis is relatively simple to do, but do we know how to interpret the findings?”
- Wells (2007) advocates *“urine should not be tested indiscriminately, but within the context of a patient’s illness or as a screening procedure”*
- Several authors *indicate that abnormal urinalysis results are often overlooked by medical personnel!*

Routine urinalysis

- Consists of three testing groups.
 1. Physical characteristics
 2. Biochemical tests
 3. Microscopic evaluation undertaken in the laboratory



Physical characteristics

Colour

Normally urine should be straw coloured the colour is due to urochrome a pigment derived from the destruction of haemoglobin in the body.

Odour

Fresh urine does not smell strong. Urine left can gain an ammonia smell. Anorexic patients can have a sweet smelling urine.

Clarity

Cloudiness and debris may indicate the presence of disease. Vaginal discharge also clouds urine.

Volume

Dependent on the persons physical health and fluid intake.

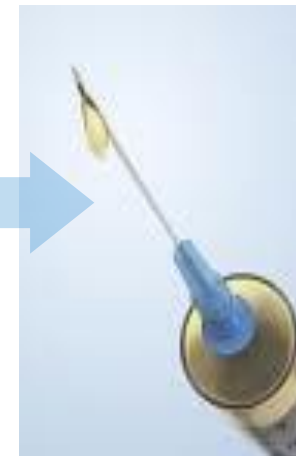
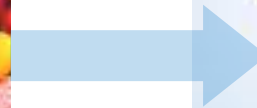
Biochemical tests

- 10 components on a dipstick

<p>Ph</p> <p>Acid / alkaline Status of the urine</p> <p>Normal range 5.0 – 9.0</p>	<p>SG</p> <p>Measures the concentration of dissolved substances in the urine.</p>	<p>Blood</p> <p>Can be either macroscopic – obvious to the naked eye OR microscopic – detected by chemical tests</p>	<p>Glucose</p> <p>Presence in urine occurs when renal absorption is compromised</p>	<p>Ketones</p> <p>Present indicates starving or excessive dieting</p>
<p>Bilirubin</p> <p>Found in those with obstructive jaundice</p>	<p>Urobilinogen</p> <p>Presence indicates blood disorders – sickle cell</p>	<p>Protein</p> <p>Presence = contaminated sample</p> <p>Can indicate advanced kidney problems</p>	<p>Nitrites</p> <p>May indicate bacteria present in significant numbers</p>	<p>Leukocytes</p> <p>Presence of white cells indicating infection.</p>

Microscopic evaluation undertaken in the laboratory

- Urine specimens may also be examined under a microscope to determine whether it contains blood cells, crystals or small pieces of fibrous material known as casts.
- Recommendations for antibiotic use may be recommended after laboratory testing.



Competency

- *The healthcare professional needs to demonstrate clinical competency when undertaking a urinalysis and interpreting the results.*
- These competencies include:
- Safe handling and storage of product
- Maintaining privacy and dignity / cultural attitudes
- Obtain, dipstick, interpret, document, act upon and dispose of the urine specimen appropriately.
- Prevent cross infection
- Clear protocols and onward referral for abnormal results
- Identify clear rationale for repeat urine testing
- Safe pathways of care for those self monitoring. ETC ETC

WEE TEST

When were urine testing strips commercially made?



1950's

Where is urine formed?



kidneys

Can urinalysis detect drug overdose?



Yes

What are the three main components of urinalysis?



1. Screening
2. Diagnosis
3. Management

List 2 specific disorders urinalysis may detect?



When is the best time to take a urine specimen?



Urine specimens

- *A first-morning specimen*
- The reliability of urine analysis is dependent on the quality of the specimen which is best collected at the beginning of the day and should always be fresh.
- *Others to consider*
- *MSU*
- *CSU*
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What turns urine red in colour?



- Beetroot
- Anticoagulant medication
- Menstruation in ladies

What turns urine yellow coloured?



Drugs and food can influence the colour of urine

<p>Red coloured urine</p> <p>By a patient consuming beetroot, by taking anticoagulant medication and by menstruating ladies</p>	<p>Orange coloured urine</p> <p>Patient taking Rifampicin medication, or consuming Paprika and rhubarb or simply being dehydrated.</p>	<p>Yellow coloured urine</p> <p>Consuming carrots or by medication such as; nitrofurantoin, senna, sulphonamides</p>
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What is the normal colour of urine?



Physical characteristics

Colour

Normally urine should be straw coloured the colour is due to urochrome a pigment derived from the destruction of haemoglobin in the body.

Odour

Fresh urine does not smell strong. Urine left can gain an ammonia smell. Anorexic patients can have a sweet smelling urine.

Clarity

Cloudiness and debris may indicate the presence of disease. Vaginal discharge also clouds urine.

Volume

Dependent on the persons physical health and fluid intake.

What does the presence of nitrates in urine indicate?



Biochemical tests

- 10 components on a dipstick

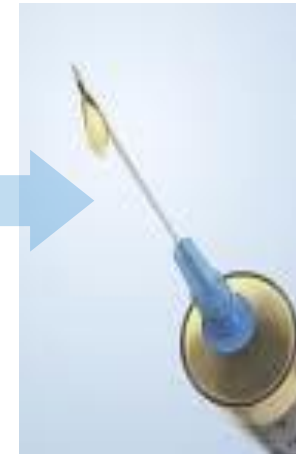
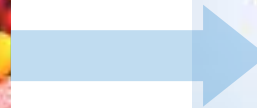
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After what tests would antibiotic use be recommended for UTI?



Microscopic evaluation undertaken in the laboratory

- Urine specimens may also be examined under a microscope to determine whether it contains blood cells, crystals or small pieces of fibrous material known as casts.
- Recommendations for antibiotic use may be recommended after laboratory testing.



List 2 clinical competencies required for urinalysis?



Competency

- *The healthcare professional needs to demonstrate clinical competency when undertaking a urinalysis and interpreting the results.*
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Suggested reading

- Foxley S (2010) Urinalysis Interpretation. **Journal of Renal Nursing** 2, 3: 137-140
- Higgins D (2008) Patient Assessment – urinalysis. **Nursing Times** 104, 12: 24-25
- Wells M (2007) Urine Testing – www.nursingtimes.net
- Getliffe K, Dolman M (2003) Normal and abnormal bladder function. In Getliffe K, Dolman M, **Promoting Continence A Clinical and Research Resource**. Bailliere Tindall, London p21-52

Take home message

- ***It may well be easy to do BUT ensure you can interpret the results and act upon them accordingly.***

Thank you