Agenda

• Overview of UpToDate and recent enhancements
• Review how to earn and redeem CME and MOC
  • Joanna Beiter, UpToDate Product Specialist
• Overview of UpToDate Advanced
  • Pathways - Anne Travis, MD
  • Lab Interpretation - Jean Mulder, MD

Additional Wolters Kluwer Attendees:
Faye Kramer, Major and Strategic Accounts Manager – Federal Government
A brief introduction to UpToDate

<table>
<thead>
<tr>
<th>25 specialties</th>
<th>12,000+ topics</th>
<th>9,5k+ graded recommendations</th>
<th>50 MDs on staff</th>
<th>7,3k+ expert contributors</th>
<th>425 journals reviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trusted by 87k+ registered users at the VA</td>
<td>153k+ CMEs redeemed by VA users</td>
<td>Used across the entire VA system</td>
<td>7.6+ million topic views FY21 by VA users</td>
<td>Access to topics available on mobile</td>
<td></td>
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</tbody>
</table>
We are committed to innovation and to adding value – year over year – since our origins.
UpToDate Anywhere benefits

Remote and mobile access, including mobile app

Earn continuing medical education (CME) credits and Maintenance of Certification (MOC), including MOC for most boards
  - Redeem CME from mobile
  - Electronically submit credits from mobile devices to multiple boards

Personalization
  - Bookmarks
  - History
  - Content most viewed

EMR integration

Usage reports

Customer Success support
Consistent user experience across all devices.
UpToDate CME: An accreditation leader

- Accredited Provider of *AMA PRA Category 1* credits to physicians
- Accreditation Council requires documentation of 3 steps:
  1. The clinical question or search
  2. Review of clinical content
  3. Reflection on how the information is used in physician practice
- More than 15 million reflections on impact of UpToDate on physician practice*

Meets American Nurses Credentialing Center (ANCC) renewal requirements
Approved as provider of nurse practitioner education by AANP
Conveniently track and redeem CME credits across all devices.
UpToDate Supports Your MOC/CC Efforts

- American Board of Allergy and Immunology
- American Board of Anesthesiology *
- American Board of Colon and Rectal Surgery
- American Board of Dermatology
- American Board of Family Medicine
- American Board of Internal Medicine *
- American Board of Ophthalmology *
- American Board of Otolaryngology – Head and Neck Surgery *
- American Board of Pathology *
- American Board of Physical Medicine and Rehabilitation
- American Board of Preventive Medicine
- American Board of Psychiatry and Neurology
- American Board of Thoracic Surgery
- American Board of Surgery
- National Board of Physicians and Surgeons

*Electronic submittal available from web and mobile app
IN THE LAST YEAR, UPTODATE ADDED NEW VALUE...

Answers and Clarity in critical or emerging topics
- Added +340 new clinical topics, including COVID-19
- Enhanced renal dosing information

Decision alignment across care team members
- Harmonization of content for physicians, pharmacists and patients
- Emmi patient education videos embedded in UpToDate
- Formulink integration

Innovation
- Voice-enabled search, including on mobile app
- Search in Your Own Language expansion
- Direct MOC submission to more specialty boards
- Real-time CME reflection

NEXT, WE ARE FOCUSED ON...

Answers and clarity in critical or emerging topics
- Enhanced bariatric dosing information

Decision alignment across care team members
- Continued editorial focus on harmonization of topics and content

Innovation
- Expanded options for Single Sign-On (SOS)
Live demonstration of UpToDate
Expanding content to reflect emerging and critical needs
COVID-19 topics; expanded renal dosing

Faster access to answers
Powered by clinician-centered design; voice search on mobile devices

Enhancing professional development
Real-time CME reflection
Expanded MOC e-submissions
COVID-19: Evidence-based response as evidence plays out in real-time

More than 17M views of COVID-related content
Faster access to answers at the point of care

Direct access to drug information from main search box

Overview of hypertension in adults

...mixed systolic/diastolic hypertension. In clinical practice, patients who are taking medications for hypertension are usually defined as having hypertension, specifically “treated hypertension,” regardless ...

Hypertension

Summary and recommendations

☐ Treatment of hypertension in adults

 Diagnosis of hypertension in adults

Icons help to catch clinician’s eye for quick awareness that graphic is available.

Hover over hyperlink to reveal graphic thumbnail.
UpToDate CME & MOC enhancements

Real-time CME reflection

Direct submission of CME for MOC
Components of UpToDate Advanced

Lab Interpretation (March 2019)

Concise monographs that help clinicians interpret and evaluate abnormal lab test results

UpToDate Pathways (June 2018)

Interactive algorithms that guide clinicians when managing a specific patient
Why did we develop UpToDate Advanced?

- Waste in healthcare is a significant problem
- Unwarranted care variability is a major factor and contributes to poor patient outcomes

UpToDate Advanced aims to decrease unwarranted variability by creating resources that:

- Are evidence-based
- Are quick and easy to use
- Provide patient-specific guidance at the point-of-care
Lab Interpretation at the point-of-care

How is it being used?

Who is using it?
Lab Interpretation

120 monographs with algorithms

- Common lab test searches
- Chemistry
- Coagulation
- Endocrinology
- Hematology
- Immunology
- Infectious disease
Features of Lab–I monographs

- Content is **brief and action-oriented**
- **Differential diagnosis of most common conditions**
- **Next steps** in the evaluation
- **Algorithm** to highlight strategic decision points
- **See links** to UpToDate topics
- **Reference ranges**

![Algorithm for lab interpretation](image)
Lab Interpretation at the point of care
Lab Interpretation

Initial evaluation of low phosphorus in adults

Does the patient have any of the following?
- Symptomatic hypophosphatemia, including:
  - Muscle weakness (respiratory failure, dysphagia, ileus)
  - Hematologic dysfunction (hemolysis, mucosal bleeding)
  - Rhabdomyolysis
  - Necrolysis (fatty, corn,atrophied)
  - Severe hypophosphatemia (<1.0 mg/dL; 0.32 mM/L)

Yes → Provide hemodynamic support, if required

Review:
- CBC with differential and platelet count
- Electrolytes, BUN, creatinine, glucose, calcium, magnesium

Obtain:
- Repeat phosphorus, calcium
- Electrocardiogram
- Additional testing as indicated, based on clinical presentation

Identify and correct underlying cause, often evident from the history and basic lab:
- Repeat phosphorus
- Review electrolytes, BUN, creatinine, glucose, calcium, magnesium
- Review medications
- Review dietary history (eg, malnourished)

Is hypophosphatemia persistent?

Yes → Repeat phosphorus

No → Transient hypophosphatemia usually resolves within 6 to 12 hours if:
- Transient hypophosphatemia usually resolves within 6 to 12 hours if:
- No further evaluation of hypophosphatemia is required if there are no worrisome clinical findings

If cause unexplained, measure 24-hour urinary phosphate excretion or the FeNa:

- Urinary excretion <100 mg/24 hours
  (<3.33 mmol/24 hours) or FeNa <5%
- Urinary excretion ≥100 mg/24 hours
  (≥3.33 mmol/24 hours) or FeNa ≥5%

Appropriate renal response

Potential causes include:
- Increased intestinal absorption (eg, chronic diarrhea, chronic steroid therapy)
- Redistribution from extracellular to intracellular space (eg, during rhabdomyolysis, treatment of DMX, hypernatremia)

Inappropriate renal response

Potential causes include:
- Primary hyperparathyroidism
- Secondary hyperparathyroidism (eg, vitamin D deficiency)
- Primary renal phosphate wasting
- Successful renal transplantation
Lab Interpretation

**Topic Outline**

- **ALGORITHM**
- **IMMEDIATE ACTION**
- **INITIAL EVALUATION**
  - Transient hypophosphatemia
  - Persistent hypophosphatemia
- **REFERENCE RANGE**
- **CITATIONS**

**Graphics**

- View all

**Major causes of hypophosphatemia**

**Internal redistribution**
- Increased insulin secretion, particularly during refeeding
- Acute respiratory alkalosis
- Hungry bone syndrome

**Decreased intestinal absorption**
- Inadequate intake
- Inhibition of phosphate absorption (e.g., antacids, phosphate binders, micon)
- Steatorrhea and chronic diarrhea
- Vitamin D deficiency or resistance

**Increased urinary excretion**
- Primary and secondary hyperparathyroidism
- Vitamin D deficiency or resistance
- Hereditary hypophosphatemic rickets
- Oncogenic osteomalacia
- Fanconi syndrome
- Other - acetazolamide, tenofovir, IV iron, chemotherapeutic agents

**Removal by renal replacement therapies**
Lab Interpretation

**Immediate Action**
Identify patients with severe (<1.5 mg/dL; [0.32 mmol/L]) hypophosphatemia and/or symptomatic hypophosphatemia, including any of the following worrisome clinical findings (see "Hypophosphatemia: Clinical manifestations of phosphate deficiency"): 
- Fatigue/weakness (e.g., respiratory failure or difficulty wearing from the ventilator due to weakness of the diaphragm, dysphagia, or dyspnea) 
- Hematologic dysfunctions (e.g., hemolytic anemia, marasmus bleeding) 
- Rhabdomyolysis 
- Encephalopathy (e.g., delirium, coma, seizures) 
- Impaired myocardial contractility, arrhythmia 

Most symptomatic patients have a plasma phosphate concentration <1.0 mg/dL (0.32 mmol/L).

Provide broad-spectrum support, if indicated. Life-saving interventions should not be delayed while awaiting the results of diagnostic testing.

**Reference values available at this time of presentation:**
- Complete blood count (CBC) with differential and platelet count
- Electrolytes, blood urea nitrogen (BUN), creatinine, glucose, calcium, magnesium
- Albumin:
- Repeat phosphorus, calcium
- Electrophoresis

**Initial Evaluation**
Patients not requiring immediate action, require a timely evaluation to identify the underlying cause, which is usually apparent from the history (Note: 1) (see "Hypophosphatemia: Causes of hypophosphatemia").

**Citations**

- Initial evaluation of low phosphorus in adults
- Causes of hypophosphatemia
Lab Interpretation

Initial evaluation of low serum 25-hydroxyvitamin D*

<table>
<thead>
<tr>
<th>What is the serum 25(OH)D?</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;12 ng/mL (30 nmol/L)</td>
</tr>
<tr>
<td>12 to 20 ng/mL (30 to 50 nmol/L)</td>
</tr>
<tr>
<td>&gt;20 ng/mL (50 nmol/L)</td>
</tr>
</tbody>
</table>

- Obtain: Calcium, phosphorus, PTH, alkaline phosphatase, electrolytes, BUN, creatinine, TGF to assess for celiac disease, radiographs of affected sites if bone pain in pelvis or lower extremities.

- Obtain radiographs if bone pain.

- Obtain serum 25(OH)D 3 to 4 months after initiating supplementation.

- Obtain serum 25(OH)D 3 to 4 months after initiating supplementation.

- Assess for celiac disease (TGF, if not already performed) if no or minimal increase in vitamin D.

This algorithm is intended for use with additional UpToDate content on vitamin D.

25(OH)D: 25-hydroxyvitamin D; PTH: parathyroid hormone; BUN: blood urea nitrogen; TGF: tissue transglutaminase antibodies.

* The optimal 25(OH)D is controversial. The lower limit of normal is approximately 20 ng/mL (50 nmol/L).
Lab Interpretation

**ALGORITHM**

**INITIAL EVALUATION**

25-hydroxyvitamin D <12 ng/mL (30 nmol/L)
25-hydroxyvitamin D 12 to 20 ng/mL (30 to 50 nmol/L)
25-hydroxyvitamin D >20 ng/mL (50 nmol/L)

**REFERENCE RANGE**

**CITATIONS**

- **Initial evaluation of low serum 25(OH)D**
- **Causes of vitamin D deficiency**

**Guidelines**

**CAUSES OF VITAMIN D DEFICIENCY OR RESISTANCE**

<table>
<thead>
<tr>
<th>Deficient intake or absorption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary</td>
</tr>
<tr>
<td>Malabsorption</td>
</tr>
<tr>
<td>Gastric bypass (bariatric surgery, gastrectomy)</td>
</tr>
<tr>
<td>Small bowel disease</td>
</tr>
<tr>
<td>Pancreatic insufficiency</td>
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</tbody>
</table>

**Decreased skin synthesis**

- Inadequate sunlight exposure
- Full sunscreen use
- Darkest pigmented skin

**Defective 25-hydroxylation**

- Cirrhosis

**Increased catabolism of vitamin D to inactive metabolites**

- Anticonvulsants

**Loss of vitamin D binding protein**

- Nephrotic syndrome

**Defective 1-alpha 25-hydroxylation**

- Hypoparathyroidism
- Renal failure
- 1-alpha hydroxylase deficiency (vitamin D-dependent rickets, type I)

**Defective target organ response to calcitriol**

- Hereditary vitamin D-resistant rickets (vitamin D-dependent rickets, type 2)

**INITIAL EVALUATION**


- For patients with bone pain in the pelvis and lower extremities, obtain radiographs of affected sites to assess for stress fractures or Leaver zones (metaphyseal), findings that are suggestive of osteomalacia.

- Although serum creatinine (Cr) levels are elevated by dialysis response to anemia, they are not useful in the assessment of vitamin D deficiency in patients with osteomalacia related to vitamin D deficiency. (40) See "Vitamin D deficiency in adults: Definition, clinical manifestations, and treatment", section on "Causes of vitamin D deficiency: physiologic." Patients with low 25(OH)D levels require vitamin D supplementation regardless of the findings on Cr.

- For patients with chronic kidney disease (CKD), levels of vitamin D deficiency (25(OH)D deficiency) or 25-hydroxyvitamin D deficiency (25(OH)D deficiency) or 25-hydroxyvitamin D deficiency (25(OH)D deficiency) or 25-hydroxyvitamin D deficiency (25(OH)D deficiency).

- In patients with severe 25(OH)D deficiency and clinical manifestations of osteomalacia, vitamin D supplementation should be initiated. In patients with vitamin D deficiency and clinical manifestations of osteomalacia, vitamin D supplementation should be initiated. In patients with vitamin D deficiency and clinical manifestations of osteomalacia, vitamin D supplementation should be initiated. In patients with vitamin D deficiency and clinical manifestations of osteomalacia, vitamin D supplementation should be initiated.

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Lab Interpretation

**Topic Outline**

**ALGORITHM**

**INITIAL EVALUATION**
- Abnormal liver biochemical tests
- Normal liver biochemical tests
  - GGT or 5’NT elevated
  - GGT or 5’NT normal

**REFERENCE RANGE**

**CITATIONS**

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**Initial evaluation of elevated alkaline phosphatase in adults**

**Review:**
- Liver biochemical tests, usually available at time of diagnosis

Does the patient have abnormalities of other liver biochemical tests (e.g., bilirubin) in addition to elevated alkaline phosphatase?

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**Measures:**
- Repeat alkaline phosphatase
- GGT or 5’NT

Elevated alkaline phosphatase confirmed

Is the GGT or 5’NT elevated?

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**Hepatic origin**
- Review medications
- Perform right upper quadrant ultrasound
- Additional testing depends on initial findings (i.e., extrahepatic cholestasis versus other causes)
- Additional laboratory testing may include:
  - HBV, HCV serology

**Bone origin likely**
- Initial testing may include:
  - Bone-specific alkaline phosphatase
  - Serum calcium, phosphorous, PTH
  - 25-hydroxyvitamin D
  - TSH
  - Imaging if bone pain or metastatic disease suspected
UpToDate Pathways

76 Pathways

- 18 specialties
- 11 chronic conditions
- 11 infectious diseases
Pathway development

Identify important clinical questions

- Identify important questions:
  - Customer surveys and interviews
  - Top UpToDate searches
- Focus on:
  - Common medical conditions
  - Conditions with unwarranted variability in care

Leverage information from UpToDate and Lexicomp

- UpToDate:
  - Topics
  - Graphics
  - Lab Interpretation
  - Patient education
- Lexicomp:
  - Drug information

Create Pathways

- Rigorous editorial process that includes:
  - Content creation by:
    - UpToDate's expert authors
    - Pathway editors
    - Pharmacy review
    - Calculator review
    - Quality assurance review
    - Detailed technical review
    - Final proofing and publication
Pathway features

- Interactive algorithms
- Multiple options for navigation
- Decision support tailored to the clinician

- Calculators incorporated within the Pathway
- Patient-specific, including relevant comorbidities
- Recommendations are detailed, specific, and current
Pathways at the point-of-care

Who is using them?

How are they being used?
Clinician feedback

Clinicians like the visual algorithms

Pathways are straightforward

Pathways are quick to use

Pathways remind clinicians of things they may not have thought of

Pathways give clinicians confidence in their decision making
Why use Pathways if other resources are available?
UpToDate Advanced – Take home points

- Lab Interpretation and UpToDate Pathways provide **reliable, evidence-based information** to help **decrease unwarranted variability in care** and **improve patient outcomes**

- UpToDate Advanced is unique because:
  - It is built on the strong foundation of **core UpToDate** and **Lexicomp** content
  - It is created by UpToDate's **expert physician authors and editors**
  - It is updated as new information becomes available, so it is **always current**