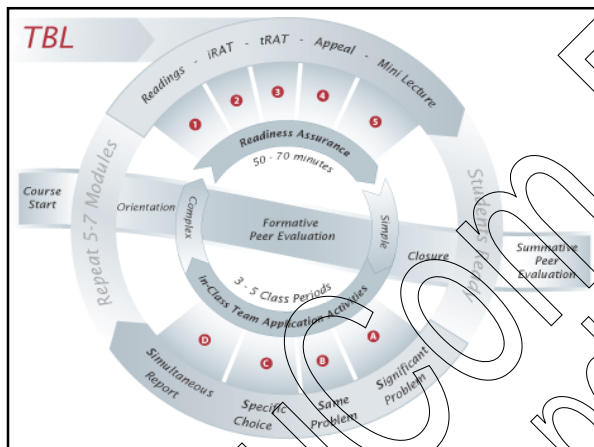


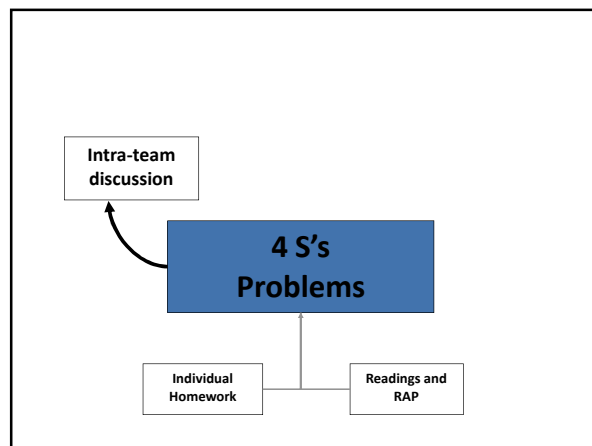
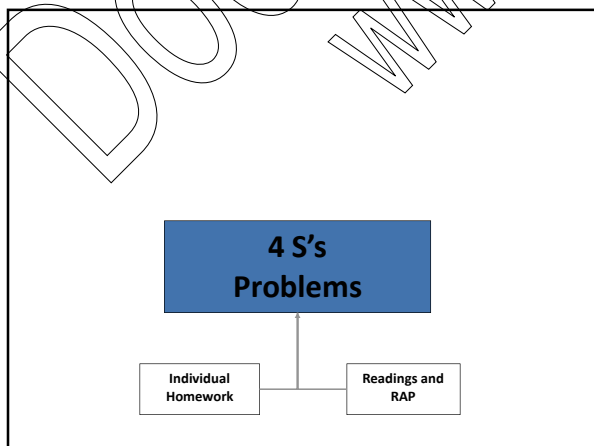
## Creating Good TBL Questions and Using MedEdPortal and TBL-Collaborative Resources

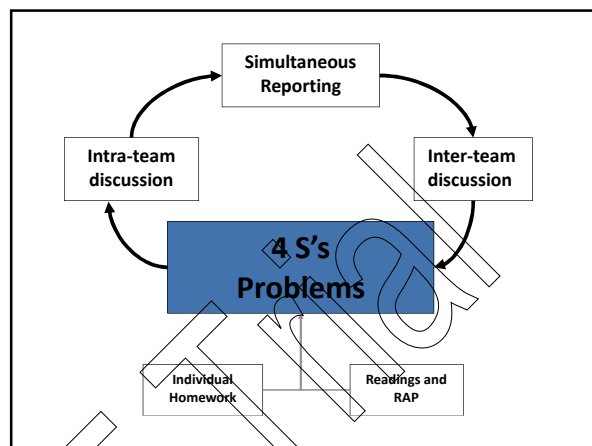
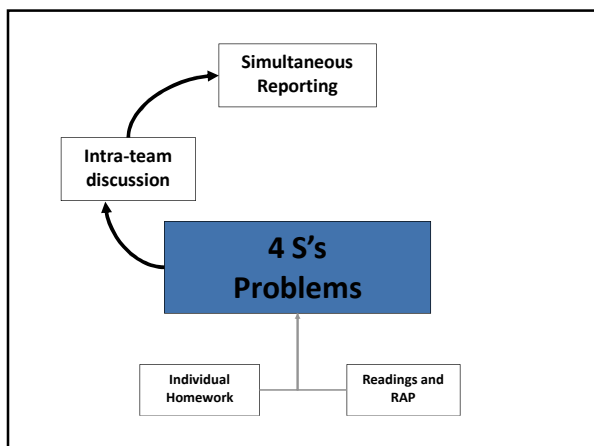
Jim Sibley, Director  
 Centre for instructional Support  
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## What are good questions for TBL?



- **Significant Problem** – authentic, relevant problems that capture students interest
- **Same Problem** – teams work on the same problem, case or question
- **Specific Choice** - use course concepts to make a specific choice
- **Simultaneous Report** - report their choices simultaneously





A patient with a *Brain Stem Stroke* has collapsed a lung from intractable hiccups and feed-tube aspirates. He was admitted to intensive care to deal with pneumonia. A few weeks later a *PRN* order for *Baclofen* has expired. The patient has begun to hiccup again and is growing increasingly distressed that nothing is being done. It appears to be a doctor oversight that the prescription was not renewed. It is Friday night of a long weekend and the doctor on call is not returning their page.

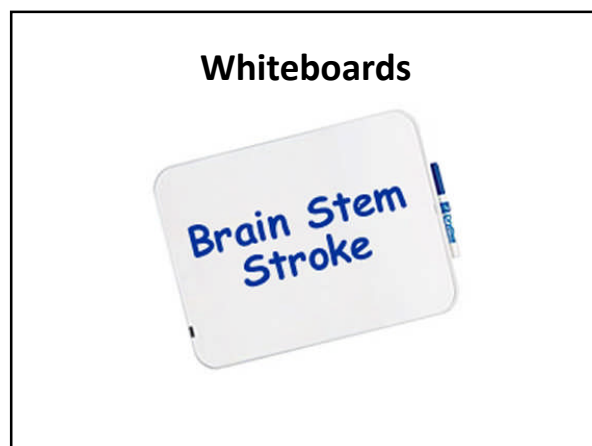
**As the Charge Nurse, you should:**

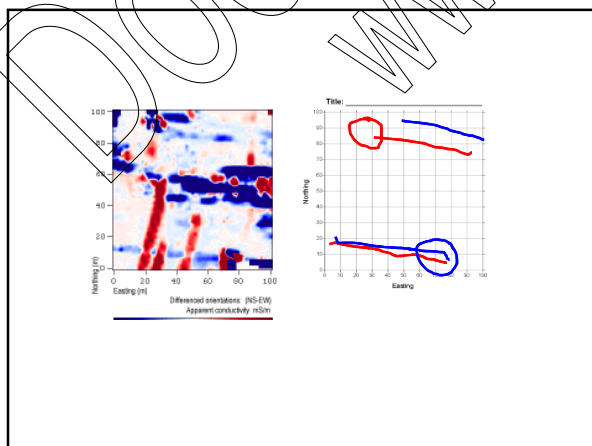
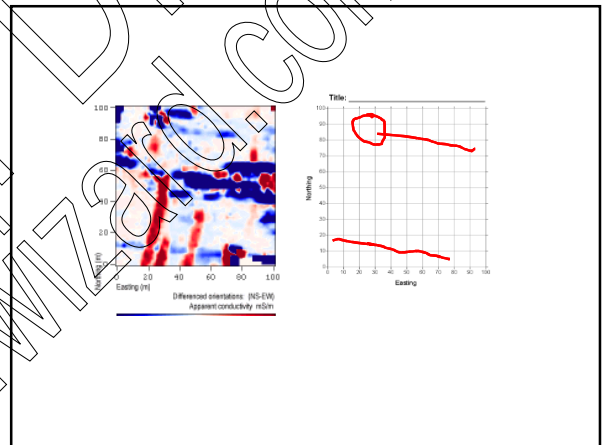
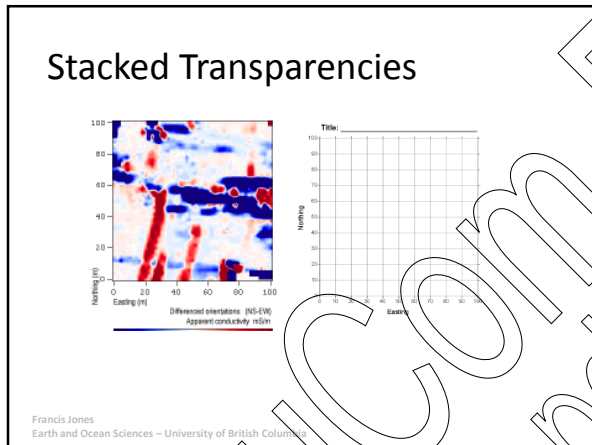
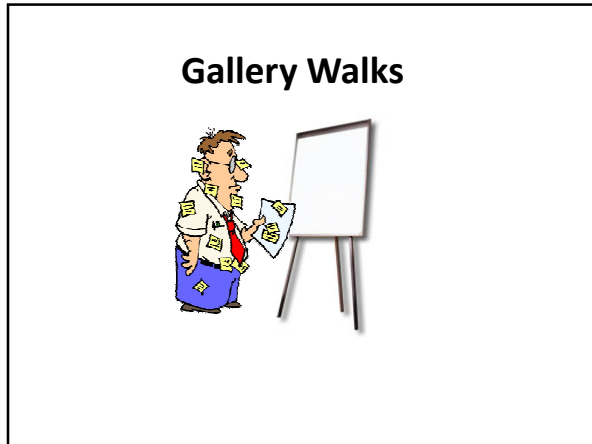
1. Do nothing, but continue to attempt to contact the doctor
2. Give the patient the pill and note it in the chart
3. Give the pill, chart it, and continue calling the doctor
4. Mark a pill as spoiled and leave it with the patient

Significant Question  
Specific Question  
Specific Choice

A patient with the following symptoms has been admitted to ER. What imaging test would you order first?

Write your response on the whiteboard.





Mr. M is a 42-year-old African American man in your office with newly detected blood pressure elevation. He states he feels well and considers himself healthy. The nurse at the plant where he works picked this up on a routine occupational health annual check. She has checked him two additional times in the last month and each time his BP has been elevated. He was referred to you.

His past medical history is remarkable for a hernia repair in 1988, and a kidney stone in 1995. He was a football player in high school and had multiple musculoskeletal traumas and now has arthritis in his knees and shoulder. He has NKDA, is up to date on immunizations, and denies major adult illnesses.

Medications include Advil or Nuprin 3-4 times a day for arthritis, high-dose multivitamins, and health food store supplements. His dad is deceased of a MI (age 62), his mother is living and in good health. One brother is AW without health problems. Social: married with 2 children, he and his wife are in the process of divorcing, smoked 1 ppd x 5 years, quit 15 years ago, drinks "with the boys" after work and on weekends, quantifies as "a couple of shooters and beers."

On the answer sheet, cross out the ROS categories that ARE NOT pertinent to the evaluation of this patient.

Here are the physical exam results already performed. What additional physical exam maneuvers would you like to perform on this patient to evaluate hypertension? Put your answers on the answer sheet being specific about what you are looking for or examining.

HR 82 RR 14 BP 168/92 RA sitting  
**General:** moderately obese black male sitting comfortably in the chair  
**Heart:** Quiet precordium, no palpable heaves or thrills, PMI 5<sup>th</sup> ICS in MCL, RRR no murmurs, Normal S1, S2. No S3, S4, JVP 2 cm measured from the sternal angle  
**Chest:** no deformities or visible vasculature, CTA with no adventitious sounds  
**Abdomen:** soft, BS x 4, no distention. Rounded protuberant abdomen, Liver 10 cm in MCL. Spleen not palpable. No masses, No bruits at the aortic, renal or femoral arteries, Aorta of expected size and no masses

Raise your folder to receive results of 1 and 2 Texas Tech

Vaso-occlusive ischemic pain experienced by this patient is triggered by which correct pairing of HbS fiber bundle orientation to red cell configuration?

HbS Fiber Bundle Orientation	RBC Configuration
1. Long axis orientation	Target cell
2. Long axis orientation	Sickle cell
3. Radial axis orientation	Sickle cell
4. Projection along each axis	Sickle cell formation
5. Projection along each axis	Holly leaf formation

Wright State

A patient with a Brain Stem Stroke has collapsed a Code of Ethics  
intractable hiccups and feed-tube aspirat Patient Intimidation  
intensive care to deal with the subsequent Doctor/Nurse Relationship  
weeks later the PRN order for Hospital Policy  
has begun to hiccup again and is growing increasing  
that nothing is being done. It appears to be a doctor  
that it was not renewed. It is Friday night of a  
the doctor on call is not returning the  
Doing the "Right Thing"

As the Charge Nurse, you should:

- Charting Requirements
1. Do nothing, but continue to attend to the patient
  2. Give the patient the pill and note it in the chart
  3. Give the pill, chart it, and continue calling the doctor
  4. Mark a pill as spoiled and leave it with the patient ✓

So, you would like to include TBLs into your course.  
Where do you start?

Ed McKee, Indiana University School of Medicine – South Bend  
[edemckee@iupui.edu](mailto:edemckee@iupui.edu)

## Find Out What Is Already Available!

1. Identify educational objectives. What should the students be able to do upon completion of TBL? Courses have many educational objectives. One way to start is to see what might already be available that correlates with objectives for your course.

MedEdPortal (~22 at present)

<http://services.aamc.org/30/mededportal/servlet/segment/mededportal/login/>

Team-Based Learning Collaborative (27 in the Health Disciplines at present)

<http://teambasedlearning.apsc.ubc.ca/tblc/wp-login.php>

## TBLs on MedEdPortal – Basic Science Courses (Oct, 2010)

- **Biochemistry**
  - Nutrition and Metabolism: "The Hunger Strike"
  - Mechanisms of Sickle Cell Anemia
  - Protein Structure – (Folding of Prions and Insulin, Accepted)
  - Enzymes, pH, and Thermodynamics (Accepted)
- **Endocrinology, Physiology (Pathophysiology)**
  - Precocious Pubic Hair Development: A Team Based Learning Review of the Hypothalamic-Pituitary- Adrenal Axis and Puberty (Adrenal anatomy, biochemistry, and physiology)
  - Team Based Learning - Endocrine Hypertension
  - Team Based Learning - Pituitary Disease
- **Neuroanatomy-Neuroscience**
  - Neurologic Localizations
- **Immunology**
  - Immunology Team-Based Learning: Receptor Diversity & Antigen Presentation
  - Immunology Team-Based Learning: Innate Immunity & Recognition of Antigen
  - Immunology Team-Based Learning: Basic Concepts in Immunology
- **Pathology (Mechanisms of Disease)**
  - Coagulation Team Based Learning Exercise

## TBLs on MedEdPortal - Integrated

- Neurological Disorder Case for First Year Medical Students (Cell Biology, histology, physiology, and genetics)
- A Case of Mysterious Poisoning (Histology, physiology, and neuroscience)
- Cardiopulmonary Clinical Case Scenario (Embryology, anatomy, physiology, and pathology)
- A Case of Congenital Heart Defect for First Year Medical Students (Anatomy, physiology, embryology, cardiology, ethics, and human behavior)
- Cystic Fibrosis Case for First Year Medical students (Cell Biology, biochemistry, genetics, and physiology)
- Inflammation and Blood Clotting Case for First Year Medical Students (Biochemistry/cell biology, genetics, histology, and immunology)
- Infective Endocarditis: A Multidisciplinary Interactive Team-Based Learning Exercise (cardiology, microbiology, physical diagnosis, infectious disease)

### TBLs on MedEdPortal Clerkships

- Approach to Cough: A Team-Based Learning Exercise (ambulatory)
- Psychiatry: Personality Disorder - Team-based learning module (Psychiatry)
- Anxiety, Dissociative, and Somatoform Disorders: Team Based Learning Module (Psychiatry)
- Pelvic Relaxation and Urinary Incontinence/ Endometriosis/ Benign Disease of the Uterus/Menopause Team-Based Learning Module (Ob-Gyn)
- Gynecologic-Oncology Team-Based Learning Session for Third-Year Ob/GYN Medical Student Clerkship

### TBL-Collaborative Basic Medical Science

- **Histology and Physiology (G. Onady, Wright State)**
  - Muscular Dystrophy Case
  - Phagocytic Leukodeficiency
  - Acid-Base Disorders
  - GI Response to a Meal (Histology and Physiology)
  - Malabsorption (Histology and Physiology)
- **Pharmacology (K. McMahon, Texas Tech)**
  - Introduction to Autonomic Pharmacology
  - Geriatric Pharmacology
- **Neuroscience**
  - Locate That Lesion (ppt, R. Philpot, South Univ)

### TBL-Collaborative - Clerkships

- **Psychiatry (R. Levine, UTMB)**
  - Psychosis Case
  - Personality Disorders
  - Children & Adolescents
  - Mood Disorders and Psychopharmacology
  - Cognitive Disorders
  - Substance Abuse
  - Emergency Psychiatry
- Rheumatology (Multiple RATs and Applications, T. Drehmer, Wright State)
- Arthritis (K. O'Rourke, Wake Forest)
- Asthma Case (Designed for Physician assistants, G. Schneider MD Anderson)
- Cardiology Module for Physical Diagnosis (Designed for Physician assistants, G. Schneider MD Anderson)

### TBL-Collaborative

- **Behavioral Medicine**
  - Individualized Decision Making (M. White, Wright State)
  - Breaking Bad News (P. Haidet, Penn State, Hershey)
  - Health Care Systems (D. Mayer, Albany Medical Ctr)

### Adapting Other Materials for TBL

- MedEdPortal contains ~ 60 exercises for Problem based learning.
- MedEdPortal contains ~ 20 Case Studies.
- Many may have Case Studies that are already part of your course.
  - These materials can provide clinical scenarios, with laboratory data that can be adapted for Application exercises.
  - Case Reports in the Primary Literature
  - This allows you to concentrate on writing challenging questions.

### Preparing Your Own TBL Exercise

- Identify educational objectives. What should the students be able to do upon completion of TBL?
- Backwards Design. Prepare Application first.
  - Keep the 4S's in mind.
  - Be challenging.
  - Questions can follow a single case from presentation through diagnosis to treatment.
  - Or, questions can be individual clinical, laboratory , or experimental vignettes.

## Application Scenario Starvation - The Hunger Strike

Author: Edward E. McKee, Ph. D., Indiana University  
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Marshall Anderson, Ph. D, Indiana University School of  
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George Knowles, MD, Indiana University School of  
Medicine – South Bend

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## Objectives

- To be able to apply and integrate facts and concepts of nutrition and metabolism.
- To be able to calculate calories in a diet.
- To be able to calculate BMR and energy expenditure.
- To be able to calculate calorie balance and weight gain or loss.
- To be able to calculate protein metabolism from protein intake and urea nitrogen levels.
- To be able to know the interpretation of respiratory quotient values.
- To be able to identify, describe, and compare and contrast, the kwashiorkor and marasmus syndromes.
- To be able to describe the role of insulin and glucagon in the fed and fasted state.
- To be able to describe the ethical principals involved in a physician's obligation to a patient who chooses starvation.

Dan, John, and Ted are members of PETA (People for the Ethical Treatment of Animals). An animal testing laboratory has decided to build in their locality and have requested a zoning variance from the community Zoning Board. Dan, John and Ted are against animal research and are hoping to promote a negative decision by the board. They have decided to bring attention to their cause with a hunger strike. Dan and Ted vow not to eat anything, but only to take water with electrolyte supplements, while John will drink only fruit juice and water. The men are in their middle twenties and have no health problems. Before beginning their hunger strike, they are checked by Dr. Doolittle a physician who is also a member of PETA. He takes blood samples and has them analyzed in his clinic.

	Dan	John	Ted
Weight	72.7 kg	70.0 kg	120.0 kg
Height	175 cm	178 cm	180 cm
Albumin	4.2 g/dl	3.8 g/dl	4.0 g/dl
Transferrin	252 µg/dl	249 µg/dl	254 µg/dl
Lymphocytes	3200/µl	3000/µl	2950 /µl
Glucose	102 mg/dl	95 mg/dl	105 mg/dl
Lactate	0.50 mM	0.60 mM	0.45 mM
Acetoacetate	40 µM	37 µM	40 µM
β-OH butyrate	34 µM	30 µM	28 µM
Fatty Acids	0.1 mM	0.12 mM	0.11 mM
Insulin	19 µU/ml	21 µU/ml	40 µU/ml
Glucagon	52 pg/ml	47 pg/ml	55 pg/ml
RQ*	0.97	0.96	0.97

\* Respiratory quotient determined on exhaled breath. All these values are within normal limits.

Questions 1-3

1. The blood was drawn from the men in the fed state. Which one of the statements below provides the best support for their being in the fed state?

- Glucagon levels in the men are too high to indicate the fasted state.
- Glucose levels in the men are the strongest indicators of the fed state.
- The observed levels of liver synthesized plasma proteins albumin and transferrin are diagnostic for the fed state.
- Low levels of free fatty acids and ketone bodies (acetoacetate and β-OH butyrate) coupled with relatively high levels of insulin suggest the fed state.
- The RQ near 1 rules out vigorous exercise and must be related to the fed state.

2. Calculate Ted's expected weight loss over the next 8 weeks using the BMR calculation for an average 70 kg man. Assume that to conserve energy, the men have been fairly sedentary during this period (just 10% of BMR).

- 7.2 kg
- 10.0 kg
- 12.7 kg
- 14.0 kg
- 17.5 kg
- 20.8 kg (10 pts)
- 23.0 kg (6 pts)
- 25.5

- Both Dan and John were becoming fairly weak, while Ted was still holding his own and feeling pretty well. John has begun to notice swelling in his ankles in the evening. Dr. Doolittle takes blood samples from Dan and John and has them analyzed in his clinic and collects a 24 hr urine sample.

	Dan	John
Weight	59.9 kg (-12.8 Kg)	64.0 kg (-6.0 Kg)
Albumin	3.9 g/dl	2.4 g/dl
Transferrin	231 µg/dl	111 µg/dl
Lymphocytes	2800/µl	1400/µl
Glucose	45 mg/dl	101 mg/dl
Acetoacetate	1 mM	40 µM
β-OH butyrate	5 mM	60 µM
Fatty acids	1 mM	0.2 mM
Insulin	7 µU/ml	21 µU/ml
Glucagon	100 pg/ml	51 pg/ml
24 Hr Urinary urea nitrogen	2.5 g	6.0 g
RQ	0.70	0.97

Questions 4-7

7. What accounts for the significant difference in blood metabolites between Dan and John.?

- A. Dan's higher level of glucagon results in over-stimulated fat metabolism and a fatty liver.
- B. Dan's lower level of insulin secretion interferes with his adaptation to starvation.
- C. John's carbohydrate intake results in improved liver function with lower fat metabolism compared to Dan.
- D. John's higher level of insulin secretion interferes with his adaptation to starvation.
- E. John's lower transferrin level interferes with iron metabolism decreasing John's ability for oxidative metabolism.

### Ethical Judgment and Moral Reasoning

- An alternative outcome of this scenario is that the Zoning board approves the zoning variance and the men continue their fast beyond 12 weeks. John is in the hospital being treated for pneumonia. John has informed you he intends to martyr himself to this cause and has refused a feeding tube. He begins to slip in and out of consciousness and can no longer speak for himself. His wife and parents beg you to insert a feeding tube. What should the response of health care workers be in this situation?

■ Question 11

### Ethical Judgment and Moral Reasoning

Answers by George Knowles, MD

11. In the face of voluntary starvation, the physician's obligation includes:

- A. Restraining the patient's hands after the necessary insertion of an oral or nasogastric feeding tube, because starvation is a fatal disease.
- B. Insert an oral or nasogastric feeding tube, because the deleterious effects of starvation on the brain render the protester incompetent to decide..
- C. Performing abdominal surgery to insert a gastric feeding tube, because the protester in the delirium of starvation may try to pull out an oral feeding tube.
- D. Contravening this patient's attempt at suicide by inserting an oral or nasogastric feeding tube.
- E. Respecting the autonomy of the individuals starving themselves, meanwhile providing comfort measures.
- F. Interviewing family members of the starving individual and following their wishes as soon as the starving individual lapses into coma.

### Preparing the IRAT/GRAT

- Once the application is completed, the IRAT is not that difficult to write.
  - Questions should be reasonably straight forward.
  - Be sure to include questions in which knowing the answers will prepare the student for the application questions.
  - If desired, questions can be included in the IRAT that cover a broader area of content than might be covered in the Application.

7. For a male of average build, a reasonable estimate of his basal metabolic rate would be:

- A. 10 kcal/kg weight/day
- B. 16 kcal/kg weight/day
- C. **24 kcal/kg weight/day**
- D. 34 kcal/kg weight/day
- E. 100 kcal/kg weight/day

### Determine and Assign Content for Student Preparation

- Content should provide the basis for understanding and solving the application questions.
- Content may be broader than what the application covers.
- Content can be provided many ways:
  - Instructor prepared notes
  - Text Book
  - Primary Literature
  - Lecture
  - Posted Power Point
  - Previously Recorded Lecture

## Resources

- Team-Based Learning: A Transformative Use of Small Groups (2002) L. K. Michaelsen, A. B. Knight, and L. D. Fink, Pareger Publishing, Westport, Ct.
- Team-Based Learning for Health Professions Education Michaelsen, et. al 2008, Stylus Publishing, Sterling VA
- Team Based Learning Collaborative  
<http://teambasedlearning.apsc.ubc.ca/>
- MedEdPortal  
<http://services.aamc.org/30/mededportal/servlet/segment/mededportal/login/>
- Association of Medical Biochemistry Course Directors (ABCD)  
<http://abcd.wildapricot.org/>

DocuCom PDF Trial  
www.pdfwizard.com