

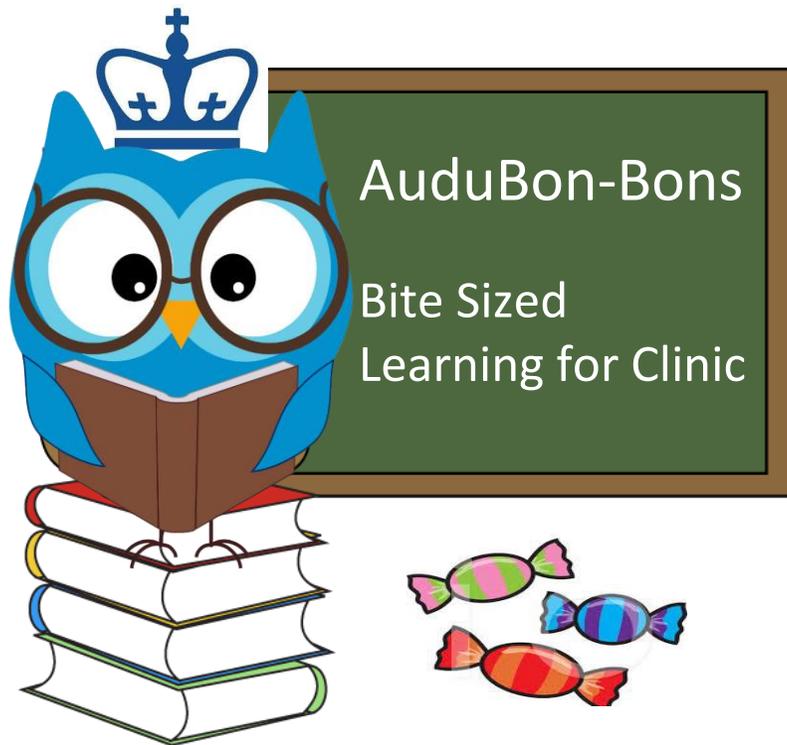
MEASLES IN PREGNANCY

Week 92

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Reading Assignment:

- University of Washington Consensus, *Measles & the MMR Vaccine: Recommendations Around Pregnancy, Including the Periconception and Postpartum Periods* (April 2019)
- *Dr. Chapa's ObGyn Pearls* Podcast: MEASLES!! ACOG Practice Advisory (April 27, 2019)



LEARNING OBJECTIVES



- Understand pertinent epidemiology, pathophysiology, and clinical management of pregnant patients at risk of measles infection



CASE VIGNETTE

- A 39 year old G6 P5005 woman @ 16 weeks by LMP presents to triage with a complaint of fever and cough of 2 days' duration, with onset of rash on the face and neck x 1 day.



FOCUSED HISTORY

- What elements of the patient's history are most important?
 - PMH: None
 - PSH: None
 - OBHx: 5 x FT NSVD
 - GynHx: neg
 - FH: neg
 - SH: No toxic habits; lives in Rockland County
 - Meds: PNV
 - All: NKDA



PERTINENT PHYSICAL EXAM FINDINGS

- *Vital Signs*: Temp 38.3, RR 18, HR 110, BP 110/70
- *General*: NAD
- *Integumentary*: diffuse erythematous rash over head, neck, and trunk, some confluent areas noted
- *HEENT*: injected conjunctivae; small white lesions with erythematous halo on oral mucosa
- *OB*: S=D, FHR 170s
- Rest of exam unremarkable



DIFFERENTIAL DIAGNOSIS

- Viral exanthem
 - Rubella, parvovirus, roseola, infectious mononucleosis, HIV
- Bacterial infections
 - Scarlet fever, Mycoplasma infection
- Autoimmune connective tissue disease
 - Juvenile idiopathic arthritis, Still disease, acute cutaneous lupus



Measles: Brief Overview

- Rubeola, a highly contagious airborne viral illness, of the *Morbillivirus* genus
 - Infects 9 out of 10 exposed
- Leading cause of mortality in children ≤ 5 years old worldwide
- Declared eradicated from the U.S. in 2000.
 - 2004: 37 cases
 - 2019: 704 and increasing, as of April 2019



STAGES OF INFECTION

Incubation period:

- 6-21 days
- Hematologic spread



Prodrome:

- 2-8 days
- Fever, malaise, anorexia then coryza, conjunctivitis, cough
- Koplik spots: 48 hours before exanthem



Exanthem:

- 2-4 days post fever onset (14 days after exposure)
- Maculopapular, blanching, erythematous rash, spreads cephalocaudally and centrifugally
- Early: blanching
- Later: non-blanching
- Other: lymphadenopathy, febrile, splenomegaly, URI symptoms



Recovery

- Clinical improvement 48 hours after rash onset
- ±Cough x 1-2 weeks
- Lifelong immunity post infection
- Impaired immunity with either humoral or cellular immunity disorders

****3 C's: Cough, Coryza, Conjunctivitis**

****Infectious 4 days BEFORE and 4 days AFTER rash onset**



Measles In Pregnancy

- At high risk of complications:
 - Maternal:
 - Hospitalization, pneumonia, death, encephalitis, diarrhea, elevated LFTs
 - Fetal:
 - Miscarriage (aRR 5.9), IUFD (aRR 9.0), low birthweight (RR 3.5), preterm delivery (25% vs 6.7%, $p < 0.05$)
 - Neonatal:
 - Hearing loss, encephalitis, death
 - No difference in congenital rates between measles-infected and non-infected neonates
 - Congenital measles (rash in 1st 10 days of life) and vertical transmission
 - Reported in neonates born to women within 10 days of delivery
 - Increased risk for mortality, subacute sclerosing panencephalitis



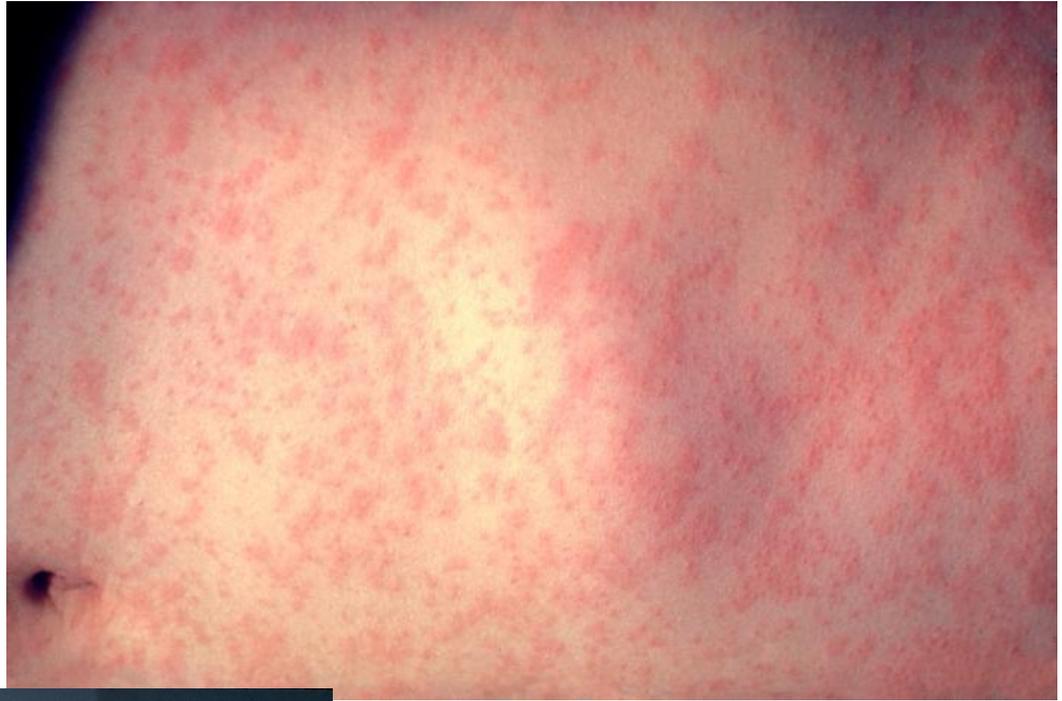
EVALUATION

- History and physical
- Serologic testing
 - Serum measles IgM antibody (WHO)
 - Rise in measles IgG titers
 - Viral culture
 - Viral RNA RT-PCR testing (nasopharyngeal swabs, urine, blood)
 - Appears 3 days after rash onset
- Diagnosis
 - Positive laboratory testing
 - **Clinically suspicious: Generalized rash $\geq 3d$, febrile ($T \geq 38.3^{\circ}C$), “3 C’s”**
 - **Fever + respiratory symptoms**
 - **Fever + rash**

Considered immune if:

1. Documentation of vaccination (1 dose if not high risk, 2 doses if high risk)
2. Lab evidence of either immunity or measles
3. Birth before 1957





MANAGEMENT

• Preconception

- Assess immunity status:
 - Serology
 - Vaccine history*
- Possible exposure:
 - Post-exposure prophylaxis with MMR within 72 hours of exposure
- MMR Vaccine
 - Wait 4 weeks before attempting pregnancy due to theoretical risks
 - Termination not recommended for those inadvertently exposed to MMR vaccine in early pregnancy

• Pregnant

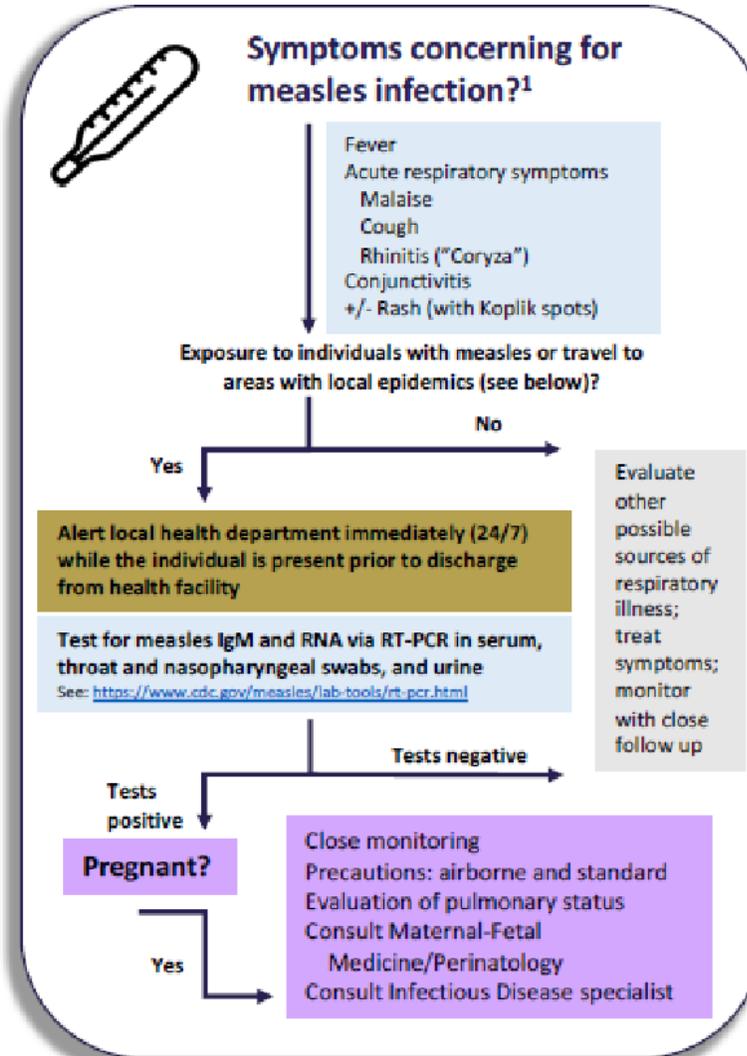
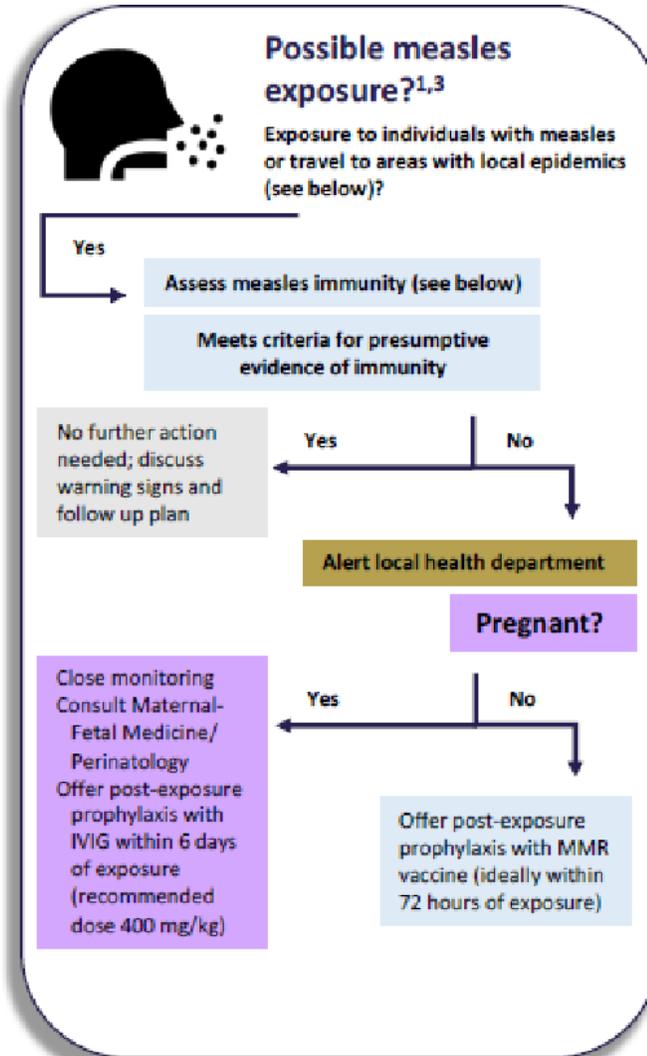
- Screen all women for immunity status
- Possible exposure if non-immune:
 - IVIG within 6 days (400 mg/kg)
 - MFM, ID consult
- Suspected infection:
 - Immediate airborne isolation (negative pressure room)
 - Immediately place a mask on the patient
 - Supportive therapy
 - MFM, ID consult

• Postpartum

- Non-immune
 - MMR vaccine



MANAGEMENT



COUNSELING

- Prenatal and postnatal counseling result in higher infant immunization rates
- 92-95% of individuals in a community need to be immunized to prevent ongoing transmission
- Those at highest risk of complications are pregnant women, children under 5 years of age, and the immunocompromised



Take Home Points

- 3 C's: cough, coryza, conjunctivitis
- Maculopapular rash spreads cephalocaudally
- Patients are infectious 4 days BEFORE and AFTER onset of rash
- IVIG within 6 days of exposure
- Supportive care for active infections
- Assess immunity at first prenatal visit
- Protect other at risk patients
- Consistent and early counseling of patients on the importance of vaccinations will improve vaccination rates



BILLING AND CODING

- Diagnoses:

- O98.519, Other viral diseases complicating pregnancy, unspecified trimester
- B05.9, Measles without complications
 - B05.1, Measles complicated by meningitis
 - B05.2, Measles complicated by pneumonia
 - B05.8, Measles with other complications

- CPT Code

- ED consult: bill as outpatient consult, 99241-5, depending on level of service; at least 99243

E/M Code	Medical Decision Making ¹	History ¹	Exam ¹	Counseling and/or Coordination of Care	Time Spent Face to Face (avg.)
99241	Straightforward	Problem focused	Problem focused	Consistent with problems and patient's or family's needs	15 min.
99242	Straightforward	Expanded problem focused	Expanded problem focused	Consistent with problems and patient's or family's needs	30 min.
99243	Low complexity	Detailed	Detailed	Consistent with problems and patient's or family's needs	40 min.
99244	Moderate complexity	Comprehensive	Comprehensive	Consistent with problems and patient's or family's needs	60 min.
99245	High complexity	Comprehensive	Comprehensive	Consistent with problems and patient's or family's needs	80 min.

¹ Key component. For office or other outpatient consultations, all three components (history, exam, and medical decision making) must be adequately documented in the medical record to substantiate the level of service reported and are crucial for selecting the correct code.

- In-hospital consult: bill as inpatient consult, 99251-5, at least 99253



EVIDENCE

- Kachikis A, Oler E, Shree RS, Waldorf KA, Hitti J, Eckert L. Measles and the MMR vaccine: recommendations around pregnancy, including the periconception and postpartum periods. Obstetric consensus statement. Seattle (WA): University of Washington; 2019. Available at: <https://www.uwmedicine.org/provider-resource/measles-mmr-vaccine-recommendations-around-pregnancy-including-periconception-and>. Accessed May 2019.
- ACOG. “Practice Advisory: Management of Pregnant and Reproductive-Aged Women during a Measles Outbreak.” *ACOG.org*, 24 Apr. 2019, www.acog.org/Clinical-Guidance-and-Publications/Practice-Advisories/Management-of-Pregnant-and-Reproductive-Age-Women-during-a-Measles-Outbreak. Accessed May 2019.
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- Gans H et al. Measles: epidemiology and transmission. Sullivan M ed. UpToDate. Waltham, MA: UpToDate, Inc. https://www.uptodate.com/contents/measles-epidemiology-and-transmission?search=measles&source=search_result&selectedTitle=3~150&usage_type=default&display_rank=3. Accessed May 2019.
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Appendix: Complications

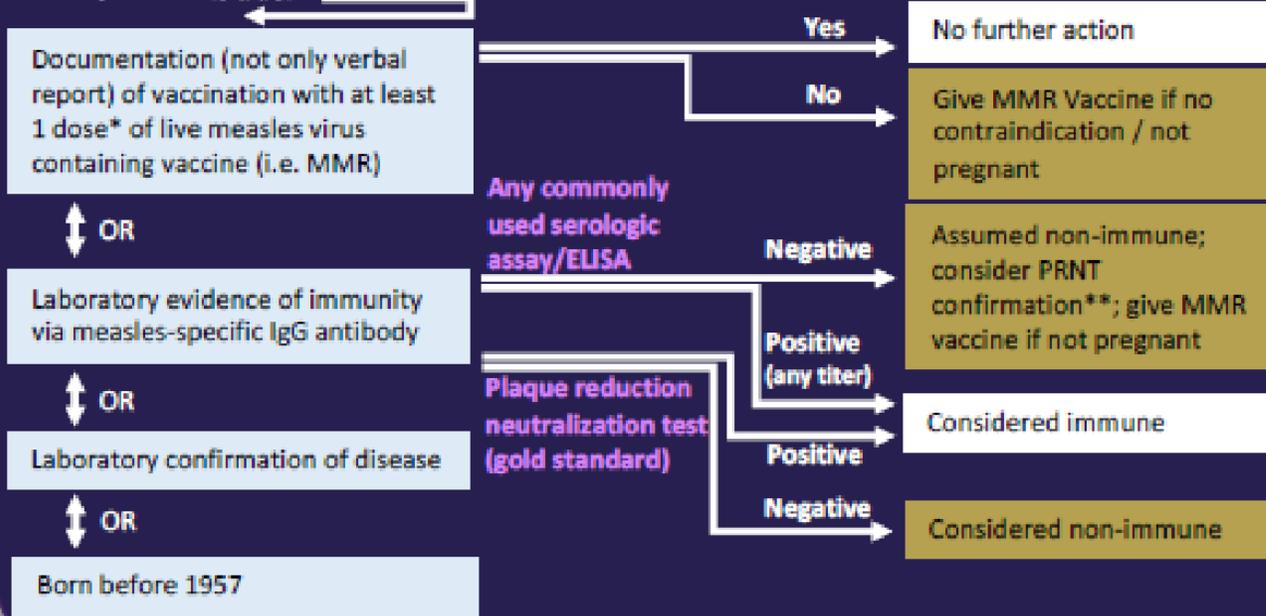
- Atypical measles: high fever + HA 7-14 days post exposure. Higher and more prolonged fever with rash starting on extremities, spreading centrifugally rather than cephalocaudally; more variable in rash form (petechiae, hemorrhagic, purpuric, vesicular)
 - Pneumonitis, dry cough, periph edema, HSG, paresthesias, Elev LFTs
 - Titers $<1:5$ before rash; day 10 $\geq 1:1280$
- Secondary infection (due to systemic immune suppression, i.e. T-cell and dendritic cell infection)[?] mortality up to 3 years post infection
- Diarrhea
- Pneumonia, croup, bronchiolitis, bronchiectasis, bacterial superinfection
- Encephalitis, acute disseminated encephalomyelitis, subacute sclerosing panencephalitis (SSPE = fatal progressive degenerative disease 7-10 years post infection)
- Myocarditis, pericarditis





Assessing measles immunity^{1,3}

Acceptable presumptive evidence of immunity to measles, if one of the following is true:



99201	99202	99203	99204	99205
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History	Focused	Expanded	Detailed	Comprehensive	Comprehensive
Chief Complaint	1	1	1	1	1
History of Present Illness Location, Quality, Severity, Timing, Duration, Context, Modifying Factors, Associated Symptoms.	1	1	4	4	4
Review of Systems (14 systems) <i>Symptoms NOT Diseases</i>		1	2	10	10
Past, Family, and Social History 3 areas: Past (Illness, injury, meds, surgery, allergy) / Family/ Social			1	3	3

99201	99202	99203	99204	99205
1 body part	1 body part	2 body parts	4 body parts	4 body parts

Exam	Focused	Expanded	Detailed	Comprehensive	Comprehensive
Bullets (see bullet counter)	1	6	12	30	30

	99201	99202	99203	99204	99205
Medical Decision Making (2 out of 3 Data, Diagnosis, Risk)	Straight Forward	Straight Forward	Low	Moderate	High
Data add points (# points) (2) Interpret Imaging (2) Review/Summary record and/or cub-Side and/or Translator and/or History from other (1) Order imaging or review report (1) Order lab or review report (1) order test (EMG, Vasc. Lab, PFT's etc.) or review report (1) Review with performing MD (1) Order old records	1	1	2	3	4
Diagnosis add points (# points) (1) Minor Problem (max of 2) (1) Established Problem—stable or better (each) (2) Estab. Prob.—worse (each) (3) New prob. no work up planned (max of 1) (4) New prob. work up planned (each)	1	1	2	3	4
Risk Management options selected, Diagnostic procedure ordered, Presenting problem	Rest Ace Wrap Lab Test <i>Minor (bug bite, cold)</i>	Rest Ace Wrap Lab Test <i>Minor (bug bite, cold)</i>	OTC PT X-ray Arterial punt. Biopsy (superficial) 1 problem	Prescription Med Injection (script) Aspiration Surgery Fracture/Dislocation (no manipulation) Biopsy (deep) MRI, CT, BS X-ray 2 area exacerbation 2 chronic probs	Surgery with risk Emergency Surgery Fracture/Dislocation (with manipulation) Neuro Loss Discography Myelography Arthrogram Toxic Rx monitoring Life or limb

New outpatient billing assessment (CMS)

Table 2: ESTABLISHED PATIENT (seen in practice with in 3 years) Minimum Documentation Requirements
Key Components: History, Exam, Medical Decision Making
 Only 2 of the 3 key components must be met (or exceeded) to qualify for a particular code level.
 The lower of the 2 components chosen determines code. (left-most column of 2 components chosen).
 Time is a stand alone contributing component in specific circumstances described below.
 (note: GPT code 99211 has no documentation requirements for the 3 key components.)

History	Focused	Expanded	Detailed	Comprehensive
Chief Complaint (CC on every note)	1	1	1	1
History of Present Illness Location, Quality, Severity, Duration, Timing, Context, Modifying Factors, Associated Symptoms	1	1	4	4
Review of Systems (14 systems) <i>Symptoms NOT Diseases</i>		1	2	10
Past, Family, and Social History 3 areas: Past (illness, injury, surgery, meds, allergy) Family/ Social			1	2
	99212	99213	99214	99215

Physical exam requirements in established patient encounters:
 99212: 1 “bullet”
 99213: EPF, 6 bullets
 99214: detailed, 12 bullets
 99215: comprehensive, 30 bullets
 *”bullets” for each body part pre-defined by CMS

Medical Decision Making (2 out of 3 Data, Diagnosis, Risk)	Straight Forward	Low	Moderate	High
Data add points (# points) (2) Interpret Imaging (2) Review/Summary record and/or curb–Side and/or Translator/ History from other (1) Order imaging or review report (1) Order lab or review report (1) order tests (EMG, Vasc. Lab, PFT’s etc.) or review report (1) Review with performing MD (1) Order old records	1	2	3	4
Diagnosis add points (# points) (1) Minor Problem (max of 2) (1) Established Problem—stable or better (each) (2) Estab. Prob.—worse (each) (3) New prob. no work up planned (max of 1) (4) New prob. work up planned (each)	1	2	3	4
Risk Management options selected, Diagnostic procedure ordered, Presenting problem	Rest Ace Wrap Lab Test Minor (bug bite, cold)	OTC PT X-ray Arterial punt. Biopsy (superficial) 1 problem	Prescription Med Injection (script) Aspiration Surgery Fracture/Dislocation (no manipulation) Biopsy (deep) MRI, CT, bone scan X-rays 2 area exacerbation 2 chronic probs	Surgery w risk Emergency Surgery Fracture/Dislocation (with manipulation) Neuro Loss Discography Myelography Arthrogram Toxic drug monitoring Life or limb
	99212	99213	99214	99215

Established patient encounters

Elements Required for Each Type of History

TYPE OF HISTORY	CC	HPI	ROS	PFSH
Problem Focused	Required	Brief	N/A	N/A
Expanded Problem Focused	Required	Brief	Problem Pertinent	N/A
Detailed	Required	Extended	Extended	Pertinent
Comprehensive	Required	Extended	Complete	Complete

General Multi-System Examination

TYPE OF EXAMINATION	DESCRIPTION
Problem Focused	Include performance and documentation of one to five elements identified by a bullet in one or more organ system(s) or body area(s).
Expanded Problem Focused	Include performance and documentation of at least six elements identified by a bullet in one or more organ system(s) or body area(s).
Detailed	Include at least six organ systems or body areas. For each system/area selected, performance and documentation of at least two elements identified by a bullet is expected. Alternatively, may include performance and documentation of at least twelve elements identified by a bullet in two or more organ systems or body areas.
Comprehensive	Include at least nine organ systems or body areas. For each system/area selected, all elements of the examination identified by a bullet should be performed, unless specific directions limit the content of the examination. For each area/system, documentation of at least two elements identified by bullet is expected.*

Single Organ System Examination

TYPE OF EXAMINATION	DESCRIPTION
Problem Focused	Include performance and documentation of one to five elements identified by a bullet, whether in a box with a shaded or unshaded border.
Expanded Problem Focused	Include performance and documentation of at least six elements identified by a bullet, whether in a box with a shaded or unshaded border.
Detailed	Examinations other than the eye and psychiatric examinations should include performance and documentation of at least twelve elements identified by a bullet, whether in a box with a shaded or unshaded border. Eye and psychiatric examinations include the performance and documentation of at least nine elements identified by a bullet, whether in a box with a shaded or unshaded border.
Comprehensive	Include performance of all elements identified by a bullet, whether in a shaded or unshaded box. Documentation of every element in each box with a shaded border and at least one element in a box with an unshaded border is expected.

Table of Risk

Level of Risk	Presenting Problem(s)	Diagnostic Procedure(s) Ordered	Management Options Selected
<i>Minimal</i>	One self-limited or minor problem, eg, cold, insect bite, tinea corporis	Laboratory tests requiring venipuncture Chest x-rays EKG/EEG Urinalysis Ultrasound, eg, echocardiography KOH prep	Rest Gargles Elastic bandages Superficial dressings
<i>Low</i>	Two or more self-limited or minor problems One stable chronic illness, eg, well controlled hypertension, non-insulin dependent diabetes, cataract, BPH Acute uncomplicated illness or injury, eg, cystitis, allergic rhinitis, simple sprain	Physiologic tests not under stress, eg, pulmonary function tests Non-cardiovascular imaging studies with contrast, eg, barium enema Superficial needle biopsies Clinical laboratory tests requiring arterial puncture Skin biopsies	Over-the-counter drugs Minor surgery with no identified risk factors Physical therapy Occupational therapy IV fluids without additives
<i>Moderate</i>	One or more chronic illnesses with mild exacerbation, progression, or side effects of treatment Two or more stable chronic illnesses Undiagnosed new problem with uncertain prognosis, eg, lump in breast Acute illness with systemic symptoms, eg, pyelonephritis, pneumonitis, colitis Acute complicated injury, eg, head injury with brief loss of consciousness	Physiologic tests under stress, eg, cardiac stress test, fetal contraction stress test Diagnostic endoscopies with no identified risk factors Deep needle or incisional biopsy Cardiovascular imaging studies with contrast and no identified risk factors, eg, arteriogram, cardiac catheterization Obtain fluid from body cavity, eg lumbar puncture, thoracentesis, culdocentesis	Minor surgery with identified risk factors Elective major surgery (open, percutaneous or endoscopic) with no identified risk factors Prescription drug management Therapeutic nuclear medicine IV fluids with additives Closed treatment of fracture or dislocation without manipulation
<i>High</i>	One or more chronic illnesses with severe exacerbation, progression, or side effects of treatment Acute or chronic illnesses or injuries that pose a threat to life or bodily function, eg, multiple trauma, acute MI, pulmonary embolus, severe respiratory distress, progressive severe rheumatoid arthritis, psychiatric illness with potential threat to self or others, peritonitis, acute renal failure An abrupt change in neurologic status, eg, seizure, TIA, weakness, sensory loss	Cardiovascular imaging studies with contrast with identified risk factors Cardiac electrophysiological tests Diagnostic Endoscopies with identified risk factors Discography	Elective major surgery (open, percutaneous or endoscopic) with identified risk factors Emergency major surgery (open, percutaneous or endoscopic) Parenteral controlled substances Drug therapy requiring intensive monitoring for toxicity Decision not to resuscitate or to de-escalate care because of poor prognosis

Elements for Each Level of Medical Decision Making

TYPE OF DECISION MAKING	NUMBER OF DIAGNOSES OR MANAGEMENT OPTIONS	AMOUNT AND/OR COMPLEXITY OF DATA TO BE REVIEWED	RISK OF SIGNIFICANT COMPLICATIONS, MORBIDITY, AND/OR MORTALITY
Straightforward	Minimal	Minimal or None	Minimal
Low Complexity	Limited	Limited	Low
Moderate Complexity	Multiple	Moderate	Moderate
High Complexity	Extensive	Extensive	High

Content and Documentation Requirements

<u>Level of Exam</u>	<u>Perform and Document:</u>
Problem Focused	One to five elements identified by a bullet.
Expanded Problem Focused	At least six elements identified by a bullet.
Detailed	At least twelve elements identified by a bullet.
Comprehensive	Perform all elements identified by a bullet; document every element in each box with a shaded border and at least one element in each box with an unshaded border.

System/Body Area	Elements of Examination
Constitutional	<ul style="list-style-type: none"> • Measurement of any three of the following seven vital signs: 1) sitting or standing blood pressure, 2) supine blood pressure, 3) pulse rate and regularity, 4) respiration, 5) temperature, 6) height, 7) weight (May be measured and recorded by ancillary staff) • General appearance of patient (eg, development, nutrition, body habitus, deformities, attention to grooming)
Head and Face	
Eyes	
Ears, Nose, Mouth and Throat	
Neck	<ul style="list-style-type: none"> • Examination of neck (eg, masses, overall appearance, symmetry, tracheal position, crepitus) • Examination of thyroid (eg, enlargement, tenderness, mass)
Respiratory	<ul style="list-style-type: none"> • Assessment of respiratory effort (eg, intercostal retractions, use of accessory muscles, diaphragmatic movement) • Auscultation of lungs (eg, breath sounds, adventitious sounds, rales)
Cardiovascular	<ul style="list-style-type: none"> • Auscultation of heart with notation of abnormal sounds and murmurs • Examination of peripheral vascular system by observation (eg, swelling, varicosities) and palpation (e.g. pulses, temperature, edema, tenderness)
Chest (Breasts)	[See genitourinary (female)]
Gastrointestinal (Abdomen)	<ul style="list-style-type: none"> • Examination of abdomen with notation of presence of masses or tenderness • Examination for presence or absence of hernia • Examination of liver and spleen • Obtain stool sample for occult blood when indicated

System/Body Area	Elements of Examination
Genitourinary (Cont'd)	<p>FEMALE:</p> <p>Includes at least seven of the following eleven elements identified by bullets:</p> <ul style="list-style-type: none"> • Inspection and palpation of breasts (eg, masses or lumps, tenderness, symmetry, nipple discharge) • Digital rectal examination including sphincter tone, presence of hemorrhoids, rectal masses <p>Pelvic examination (with or without specimen collection for smears and cultures) including:</p> <ul style="list-style-type: none"> • External genitalia (eg, general appearance, hair distribution, lesions) • Urethral meatus (eg, size, location, lesions, prolapse) • Urethra (eg, masses, tenderness, scarring) • Bladder (eg, fullness, masses, tenderness) • Vagina (eg, general appearance, estrogen effect, discharge, lesions, pelvic support, cystocele, rectocele) • Cervix (eg, general appearance, lesions, discharge) • Uterus (eg, size, contour, position, mobility, tenderness, consistency, descent or support) • Adnexa/parametria (eg, masses, tenderness, organomegaly, nodularity) • Anus and perineum
Lymphatic	<ul style="list-style-type: none"> • Palpation of lymph nodes in neck, axillae, groin and/or other location
Musculoskeletal	
Extremities	
Skin	<ul style="list-style-type: none"> • Inspection and/or palpation of skin and subcutaneous tissue (eg, rashes, lesions, ulcers)
Neurological/ Psychiatric	<p>Brief assessment of mental status including</p> <ul style="list-style-type: none"> • Orientation (eg, time, place and person) and • Mood and affect (eg, depression, anxiety, agitation)