How Might We Prepare For the Faster Future of Information Explosion?

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Objectives

1. Describe the “Knowledge Doubling Curve” and how it affects medicine now.

2. Name 2 factors other than knowledge velocity which are pressing the pace of oncology practice.

3. Name steps that we might be able to take to better support our clinicians through the accelerating knowledge velocity.

Buckminster Fuller's "Knowledge Doubling Curve"

1. Until 1900, human knowledge doubled perhaps every century.
2. By 1945, the doubling time was more like every 25 years.
3. By 1982, the doubling was about every 12 years.

Current Indicators of Growth Rate in Medical Knowledge

1. In 1990, Pub Med showed 73 different sets of Clinical Guidelines

2. By 2021, there were thousands of different sets of Clinical Guidelines in Pub Med

Current Estimates of Medical Knowledge Doubling Curve (Based on numbers of medical publications)

1. Estimated doubling time for 1950: Every 15 years
2. Estimated doubling time for 1980: Every 7 years
3. Estimated doubling time for 2010: Every 3.5 years
4. Estimated doubling time for 2020: Every 0.2 years (every 75 days!)

Other Factors Than the Knowledge Curve Add to the Load on our Clinicians

1. The accelerating patient volumes because a majority of new patients from last year are still under chronic care with us as we take on the new patients from the coming year.

2. FDA approvals for new oncolytic agents are also accelerating.
   Last year (2023) there were 43 cancer approvals from FDA.
   More than 100 Monoclonal Antibodies are on the market, a majority of which are for hematology-oncology.

CONSIDERATION

Clearly, medical knowledge is expanding faster than the clinicians' ability to assimilate and apply it to care effectively.

- Does the cognitive load on our clinicians make them more prone to clinical errors?
- Patient Safety is paramount in every aspect of our care.
- Therefore any effort to improve it should be pursued.

Let’s Take Moment to Discuss

As you look at your practice now and in the near term with information doubling 5 times a year:

1. Do you have concerns for patient safety?

2. Do you have ideas, tools, resources, or strategies that you could share with us?

We Are Concerned and Have Looked for Tools and Strategies

For Nurses:
Smart Infusion Pump Gives Our Nurses Just-in-Time Drug Information at the Chairside.

- Infusion pump communicates with our server to display for each drug a read-out from our pre-built Drug Library.
- Shows drug-specific alerts with safety checks and monitoring parameters the time of infusion.
- The nurse can also access our Drug Resource Library which provides detailed information on how to handle various clinical situations that we have identified.

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IVENIX
INFUSION SYSTEM
FRESENIUS
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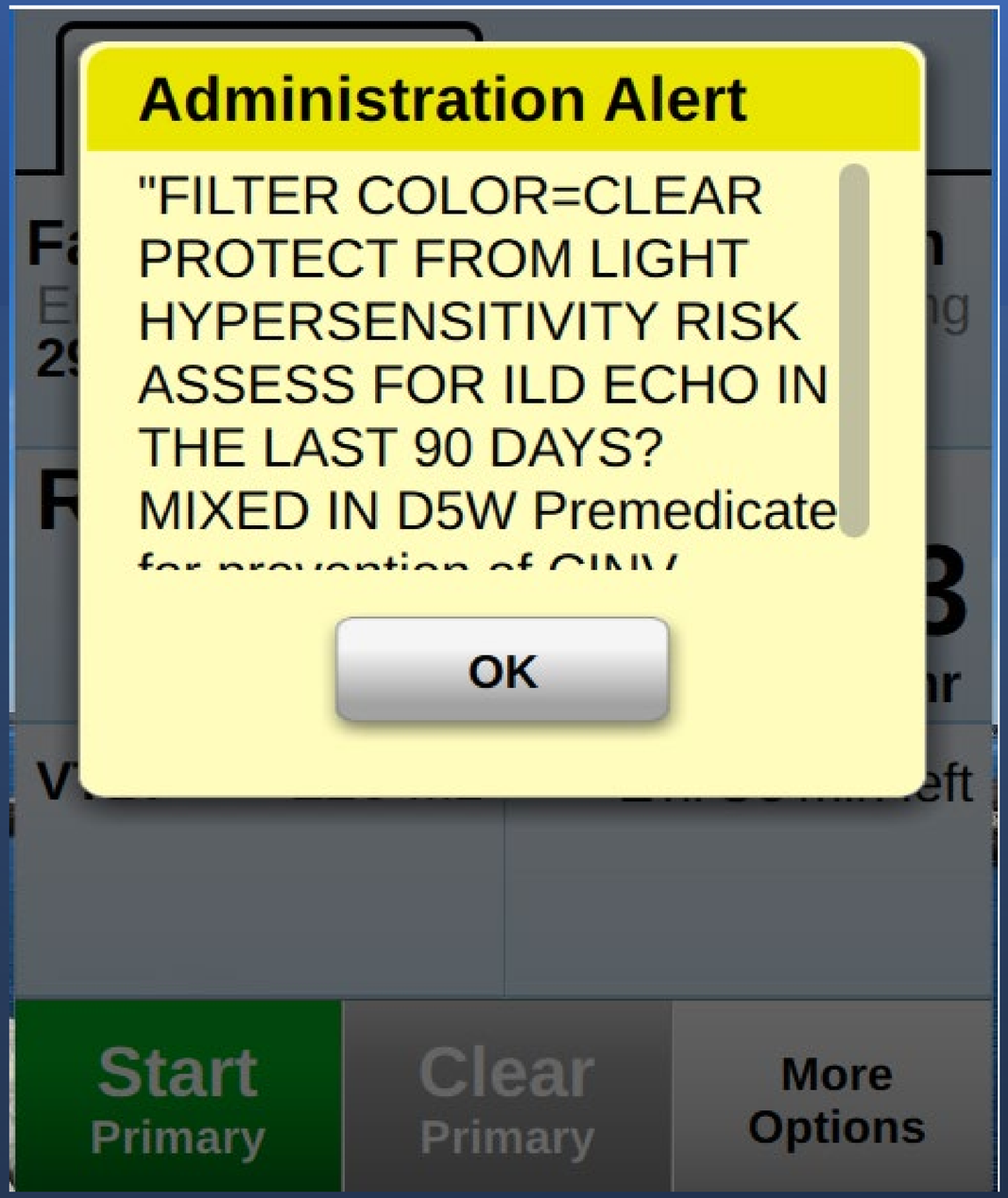
Administration Alert
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PROTECT FROM LIGHT
HYPERSENSITIVITY RISK
ASSESS FOR ILD ECHO IN
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MIXED IN D5W Premedicate
OK
Start
Primary
Clear
Primary
More
Options

PRE-INFUSION NURSING ASSESSMENT CHECKPOINT INHIBITORS

DERMATOLOGIC TOXICITY: Typically appears after 2nd cycle. Pruritis, New Rash or Redness, Skin Pain/Increased Sensitivity

GASTROINTESTINAL TOXICITY: (Diarrhea, Colitis) Typically appears 5-10 weeks after initiation of therapy. Soft or watery stools with increased frequency, Abdominal pain, Fever, Blood or mucus in stool, Nocturnal bowel movements.

HEPATIC TOXICITY: Appears 12-16 weeks after the initiation of therapy. Nausea/Vomiting, Abdominal pain, Dark Urine, Decreased Appetite, Bleeding or bruising more than normal, Fatigue/Malaise

PANCREATIC TOXICITY: Nausea/Vomiting, Abdominal pain, Elevated blood sugar, Hypotensive

ENDOCRINE TOXICITY: Appears 9 weeks after initiation of therapy. Rapid Heartbeat, Increased Sweating, Weight change, Hair loss, Feeling Cold, Constipation, Hoarseness, Dizziness, Changes in mood, Changes in menstrual cycle, Appetite Changes, Nausea Vomiting.

PULMONARY TOXICITY: appears 8-14 weeks after the initiation of therapy. Shortness of breath, Cough, Chest pain, Fever, Abnormal resting O2 saturation, Abnormal exertional O2 saturation.

RENAL TOXICITY: Appears 14-42 weeks after initiation of therapy. Change in urinary output, Electrolyte abnormalities, Azotemia, Elevated Creatinine.

CARDIAC TOXICITY: Appears 4-12 weeks after the initiation of therapy. Fatigue, Chest Pain, Shortness of Breath, Irregular heartbeat.

We Are Concerned and Have Looked for Tools and Strategies

For Physicians:

- Subspecialization is being pursued in the practice to the extent that it is feasible.
- However, we are then faced with potential on-call coverage of sarcoma patients by a breast cancer specialist. ☺

We Are Concerned and Have Looked for Tools and Strategies

For the Rest Us:

- We need more from our EHR such as interoperability with hospital EHRs and other systems in use.
- We need end-to-end bar coding to assure that the right person gets the right drug and dose.
- We need automated vital signs that are sent directly to the patient's HER so that we can stop the inaccurate keying of the vitals that define our dosing.
- EHR should pull all of the patient's current clinical information into a comprehensive pre-prepared place for each visit.

How Might We Prepare for the Faster Future?

- We are coping at present but I am afraid that we are like the boiling frogs. I'd like to notice before we are boiled completely.

- Technology could help us. I would like to know what AI is doing for medicine, in particular for oncology.

- Does anyone have end-to-end bar coding, AI improvements to the EHR, or interoperability among technologic systems?

- I understand that Epic is using AI to improve the physician experience of providing care. I would love to hear what it can do if it is available.

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