# The Influence of Health Information Technology & Telehealth Communications on Medication Management

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A presentation for HealthTrust Members

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# Learning Objectives for Pharmacists, Nurses & Supply Chain Professionals

- **Recall strategies to help optimize medication management**

- **Identify how telepharmacy and telemedicine can be leveraged in medication management**

- **Recognize regulatory compliance guidelines pertinent to medication management**

# Learning Objectives for Pharmacy Technicians

- **Recall how pharmacy management technology can be used to promote efficiency in medication management**

- **Identify strategies where technology can be used to improve patient safety and prevent errors in medication management**

- **Recognize the role of pharmacy technicians in utilizing telepharmacy technology**
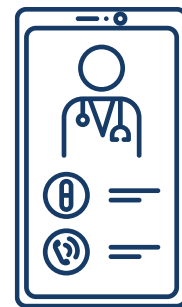
# HEALTH INFORMATION TECHNOLOGY

# Health Information Technology (HIT)

Refers to such systems that are used to process data, information, and knowledge in healthcare environments

**Electronic Health Records (EHR)**

**Clinical Decision Support Systems (CDSS)**

**Automation & Technology**

**Telehealth & Communications**

Haux, Reinhold. "Health information systems–past, present, future." International journal of medical informatics 75.3-4 (2006): 268-281.

# Computerized Provider Order Entry (CPOE)

Electronic processing that allows order entry for the treatment of patients who are under provider care in an acute/inpatient setting.

### Benefits

**Efficient Order Transmission**

**Resource Optimization**

**Compliance & Standardization**

**Reduced Medication Errors**

**Legibility & Documentation**

**Reduced Costs**

Bates, David W., et al. "Effect of computerized physician order entry and a team intervention on prevention of serious medication errors." Jama 280.15 (1998): 1311-1316.
Koppel R, Metlay JP, Cohen A, Abaluck B, Localdo AR, Kimmel SE, Strom BL. Role of computerized physician order entry systems in facilitating medication errors. Jama. 2005;293(10):1197–1203.
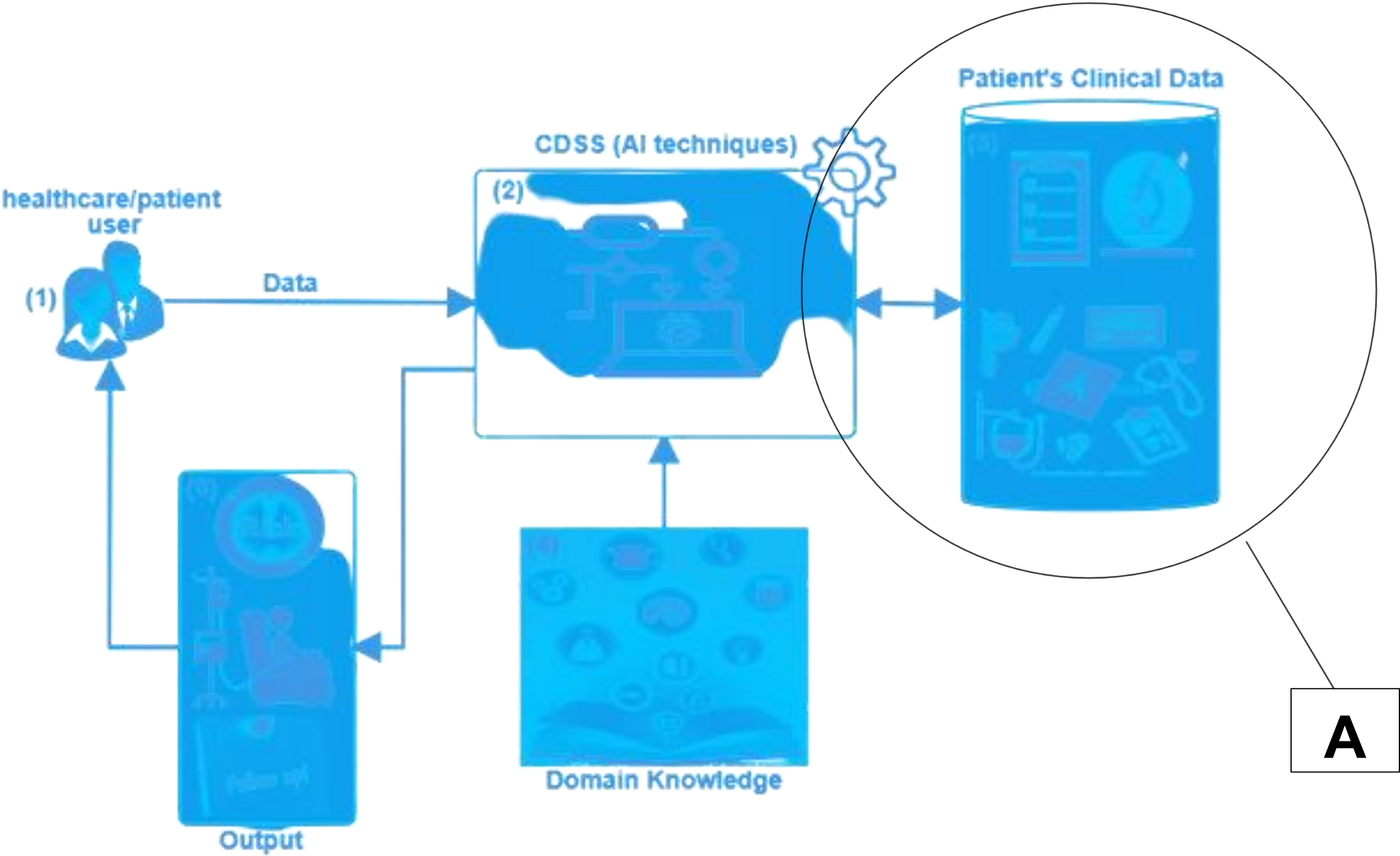
# Clinical Decision Support Systems (CDSS)

Provision of intelligently filtered, individualized information presented to providers at appropriate times to guide clinical treatment aimed to improve patients' health.
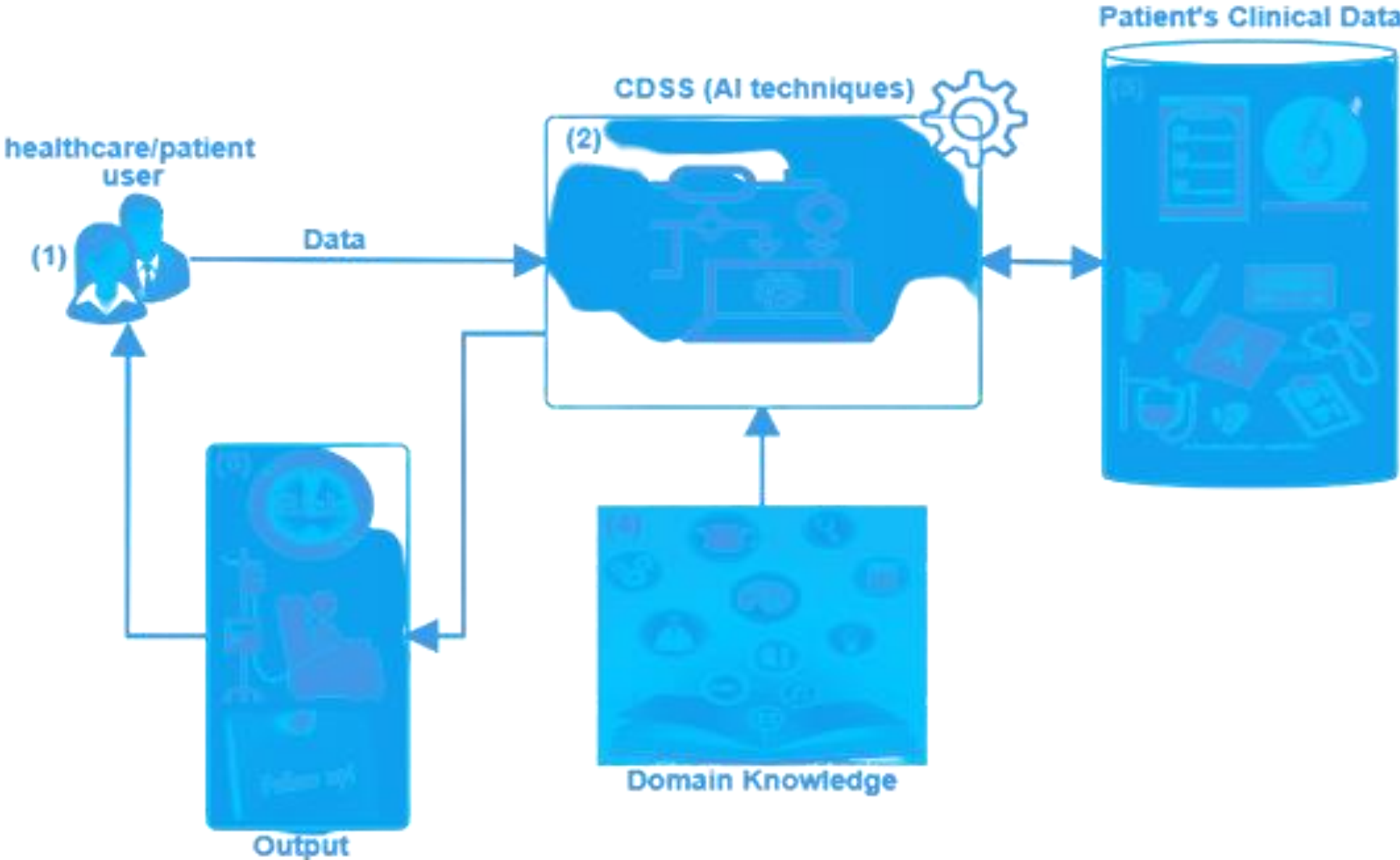


Mazo, C., Kearns, C., Mooney, C., & Gallagher, W. M. (2020). Clinical decision support systems in breast cancer: a systematic review. *Cancers, 12*(2), 369.

Osheroff JA, Teich JM, Middleton B, Steen EB, Wright A, Detmer DE. A roadmap for national action on clinical decision support. J Am Med Inform Assoc. 2007;14(2):141–5
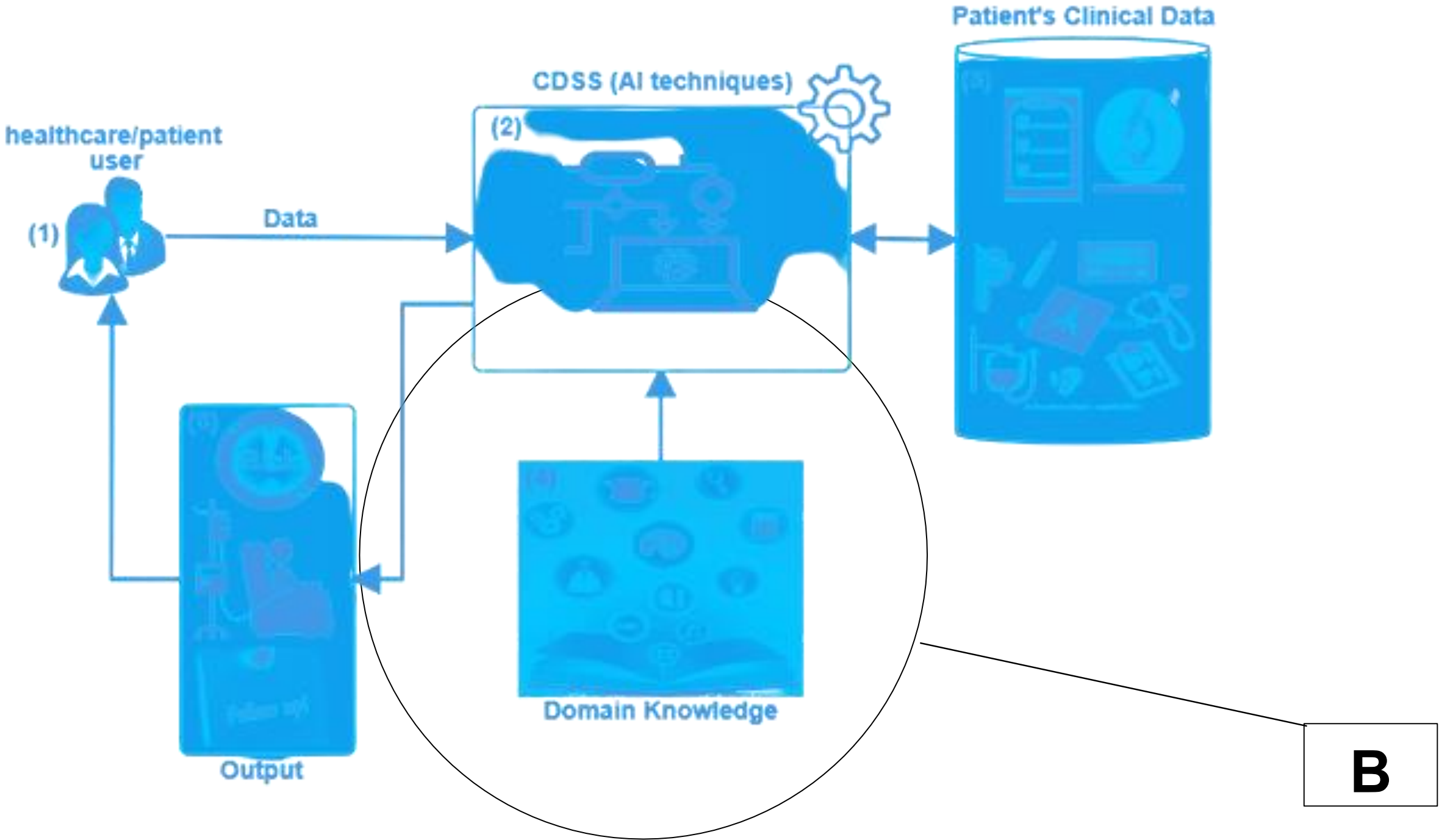
# Clinical Decision Support Systems (CDSS)

**A. Inference Engine**: Reasoning function: utilizes patient-specific information and available information

Mazo, C., Kearns, C., Mooney, C., & Gallagher, W. M. (2020). Clinical decision support systems in breast cancer: a systematic review. *Cancers*, *12*(2), 369.

Osheroff JA, Teich JM, Middleton B, Steen EB, Wright A, Detmer DE. A roadmap for national action on clinical decision support. J Am Med Inform Assoc. 2007;14(2):141–5

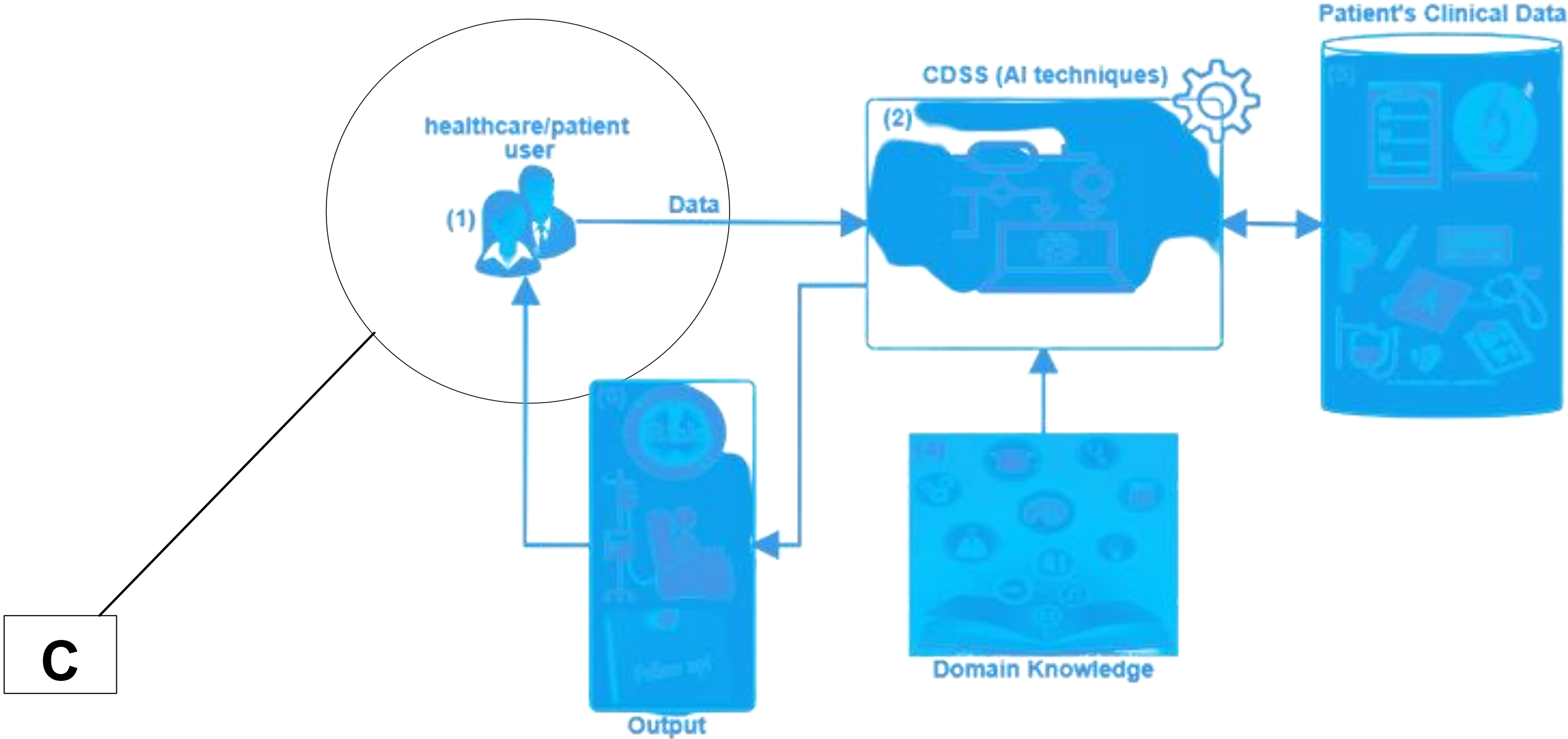# Clinical Decision Support Systems (CDSS)

**B. Knowledge Base:** Composed of clinical knowledge,

treatment guidelines, interaction databases



Mazo, C., Kearns, C., Mooney, C., & Gallagher, W. M. (2020). Clinical decision support systems in breast cancer: a systematic review. *Cancers, 12*(2), 369.

Osheroff JA, Teich JM, Middleton B, Steen EB, Wright A, Detmer DE. A roadmap for national action on clinical decision support. J Am Med Inform Assoc. 2007;14(2):141–5

# Clinical Decision Support Systems (CDSS)

C. **Communication Mechanism**: Accepts user inputs and delivers inference outcomes based on patient's relevant data, labs, past medical histories, etc
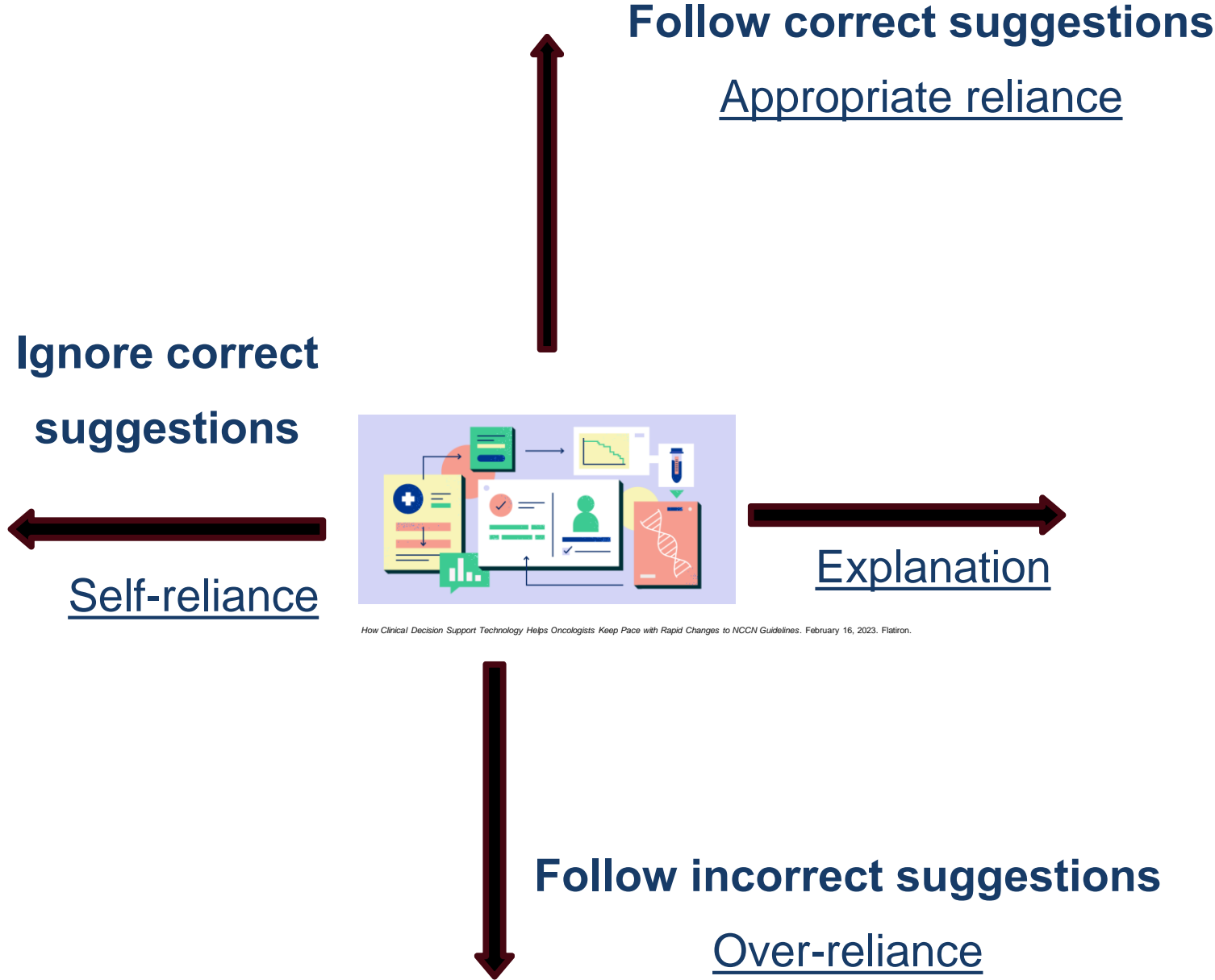


Mazo, C., Kearns, C., Mooney, C., & Gallagher, W. M. (2020). Clinical decision support systems in breast cancer: a systematic review. *Cancers, 12*(2), 369.

Osheroff  JA, Teich  JM, Middleton  B, Steen  EB, Wright  A, Detmer  DE. A roadmap for national action on clinical decision support. J Am Med Inform Assoc. 2007;14(2):141–5

# Clinical Decision Support Systems (CDSS)

## Benefits

- Avoids errors and adverse events
- Improves efficiency, reduces costs
- Evidence-based practice implementation
- Targeted screening of medical information

**Follow correct suggestions**

Appropriate reliance

**Ignore correct suggestions**

Self-reliance

Explanation

*How Clinical Decision Support Technology Helps Oncologists Keep Pace with Rapid Changes to NCCN Guidelines. February 16, 2023. Flatiron.*

**Follow incorrect suggestions**

Over-reliance

Osheroff JA, Teich JM, Middleton B, Steen EB, Wright A, Detmer DE. A roadmap for national action on clinical decision support. J Am Med Inform Assoc. 2007;14(2):141–5

# Benefits of CPOE and CDSS

Overhage  JMTierney  WMZhou  XHMcDonald  CJ. A randomized trial of "corollary orders" to prevent errors of omission.

**Study Description:**   Impact of faculty and physician reminders (using CPOE) on corollary orders for 2181 adult inpatients in a general medical ward at a public teaching hospital affiliated with the Indiana University School of Medicine

**Study Design:**   Level 1 (Randomized-controlled trial with physicians randomized to receive reminders or not)

**Study Outcomes:**   Level 2 and 3 (Errors of omission in corollary orders)

**Study Results:**   25% Improvement in ordering of corollary medications by faculty and residents (P<.001)

Overhage  JMTierney  WMZhou  XHMcDonald  CJ A randomized trial of "corollary orders" to prevent errors of omission.  J Am Med Inform Assoc. 1997;4364- 375

# Benefits of CPOE and CDSS

Bates DW Leape LLCullen DJ et al. Effect of computerized physician order entry and a team intervention on prevention of serious medication errors.

**Study Description:**   CPOE with CDSSs for 6,771 adult inpatients on medical, surgical, and intensive care wards at Brigham and Women's hospital

**Study Design:**   2 study designs; Levels 2 and 3

**Study Outcomes:**   Level 1 (Adverse Drug Event rates) and Level 2 (Serious Medication Errors)

**Study Results:**   55% decrease in non-intercepted medication errors (P=0.37)
17% decrease in preventable adverse drug events (P=0.37)

Bates DWLeape LLCullen DJ et al. Effect of computerized physician order entry and a team intervention on prevention of serious medication errors. JAMA. 1998;2801311- 1316

# Benefits of CPOE and CDSS

Chertow GMLee JKuperman GJ et al. Guided medication dosing for inpatients with renal insufficiency.

**Study Description:** CPOE with CDSSs to adjust drug dose and frequency in 7490 adult inpatients with renal insufficiency at Brigham Women's Hospital

**Study Design:** Level 1 (Randomized-controlled trial with a crossover design)

**Study Outcomes:** Level 2 (inappropriate drug dose and frequency)

**Study Results:** 13% decrease inappropriate dosing (P<0.001)
24% decrease in inappropriate frequency (P<0.001)

Chertow GMLee JKuperman GJ et al. Guided medication dosing for inpatients with renal insufficiency. JAMA. 2001;2862839- 2844

# HEALTH INFORMATION TECHNOLOGY

## Automation and Technology

# Carousel Dispensing Technology (CDT)

- Maintains perpetual inventory of stored medications

- Improves space efficiency

- Automated detection of expired medications

- Promotes safety and double-checks system

- Integrates with pharmacy purchasing software



Lopez B, PharmD, MS, MHA, BCPS. Choosing an Automated Medication Storage and Retrieval System. Pharmacy Purchasing Products

Temple, Jack, and Brad Ludwig. "Implementation and evaluation of carousel dispensing technology in a university medical center pharmacy." American Journal of Health-System Pharmacy 67.10 (2010): 821-829.

# Automated Dispensing Cabinets (ADC)

- Incorporates bar code scanning in both dispensing and replenishment

- Remote monitoring and event log recording

- Improve controlled substance accountability

- Streamlines workflow and integrated with the EHR



Photo courtesy of Omnicell, inc.

Grissinger M. Safeguards for Using and designing automated dispensing cabinets. P T. 2012;37(9):490-530.

# Effect of adding piperacillin–tazobactam to automated dispensing cabinets on promptness of first-dose antibiotics in hospitalized patients

- Retrospective pre–post analysis conducted at a 377-bed academic medical center
- Primary endpoint: Total time from prescribing to administration
- Significant reductions in order-to-administration time
- Reduced time constraints in hand-delivering medications delivered to patient care floors
- Enabled nurses to withdraw medications immediately

**Table:** Total Order-to-Administration Time for Piperacillin–Tazobactam Orders Before and After Implementation of ADC Use

| Variable | Pre-ADC* Group | | Post-ADC Group | | p |
| --- | --- | --- | --- | --- | --- |
| | n | Mean ± S.D. Time (min) | n | Mean ± S.D. Time (min) | |
| Patient location Ward | 37 | 302 ± 265 | 33 | 172 ± 128 | 0.013 |
| Intensive care unit | 15 | 236 ± 193 | 13 | 110 ± 84 | 0.039 |
| Step-down unit | 13 | 223 ± 228 | 10 | 247 ± 245 | 0.81 |
| Sepsis or concern for sepsis | 12 | 283 ± 283 | 28 | 128 ± 123 | 0.020 |
| Antibiotic other than piperacillin–tazobactam ordered concurrently | 30 | 285 ± 248 | 28 | 178 ± 147 | 0.054 |

Lo, Amy, et al. "Effect of adding piperacillin–to dispensing cabinets on promptness of first-dose antibiotics in hospitalized patients." American Journal of Health-System Pharmacy 71.19 (2014): 1662-1667. tazobactamautomated

# HEALTH INFORMATION TECHNOLOGY

**Use of Technological Advancements for Prescription & Administration**

# Smart Pumps

**Smart Pump:** Infusion pump medical device used to administer fluids, medications, nutrients, or other therapeutic substances to a patient in a controlled and precise manner

**Key features**:

- Patient-specific parameter dose calculations

- Pre-programmed drug library and database

- User authentication

- Incorporates CDSS and CPOE

- Streamlines workflow and integrated with the EHR



Patton Healthcare Consulting. Smart Infusion Pumps. June 8, 2021.

Ohashi K, Dykes P, McIntosh K, Buckley E, Wien M, Bates DW. Evaluation of intravenous medication errors with smart infusion pumps in an academic medical center. AMIA Annu Symp Proc. 2013;2013:1089-1098. Published 2013 Nov 16.

# Smart Pumps Advanced Features

## Drug Libraries

**Care Area Profiles**: Provide the ability to reflect specific patient care area practices.

**Clinical Advisories**: Alerts to prompt the clinician to stop and review relevant clinical information

**Soft Stop:** Overridable alerts indicating the pump programming is out of "normal" range, but can still be infused if applicable

**Hard Stop**: Non-overridable alerts indicating the programming is out of a safe range

**Data Tracking:** Log of pump activity, alerts, doses, clinician actions to help monitoring and continuous quality improvement activities

**Fentanyl Upper Hard Limit report displaying Bolus dose attempts exceeding 100 mcg—the initial upper hard limit**

| Drug Concentration | Infusion Dose Programmed | Bolus Dose Programmed | AP Location Address | Modified Location Address | Care Area |
|---|---|---|---|---|---|
| Fentanyl 10.0 mcg/mL | 300.0 mcg/hr | Hard limit exceeded: Bolus Dose - 200 mcg | AP: 00-18-84-05-d0-65 | AP: 00-18-84-05-d0-6 | Hospital A-2-11 |
| Fentanyl 10.0 mcg/mL | 400.0 mcg/hr | Hard limit exceeded: Bolus Dose - 200 mcg | AP: 00-18-84-07-1d-25 | AP: 00-18-84-07-1d-2 | Hospital A-2-15 |
| Fentanyl 10.0 mcg/mL | 150.0 mcg/hr | Hard limit exceeded: Bolus Dose - 200 mcg | AP: 00-18-84-07-1d-25 | AP: 00-18-84-07-1d-2 | Hospital A-2-15 |
| Fentanyl 10.0 mcg/mL | 300.0 mcg/hr | Hard limit exceeded: Bolus Dose - 150 mcg | AP: 00-18-84-07-1d-25 | AP: 00-18-84-07-1d-2 | Hospital A-2-15 |

Zolnierz M, MS, RPh. Use Smart Pump Data to Improve Medication Utilization. Pharmacy Purchasing & Products.

Bates DW et al. J Gen Intern Med. 1995;10(4):199-205. Institute for Safe Medication Practices. Proceedings from the ISMP summit on the use of SMART infusion pumps: guidelines for safe implementation and use. 2020

# Smart Pumps Advanced Features

## Wireless Connectivity

**Medication Specific Hard Stops**: Functionality that prevents providers from bypassing the smart pump for selected medications

**Default Rates**: Ability to set a default rate for specific medications that must be manually overridden with an override reason

**Data Extraction:** Ability to extract data while the pump is in use

**Bidirectional Interface to EMR**: Create nursing documentation for validation based on pump actions



Forni, A., Chu, H. T., & Fanikos, J. (2010). Technology utilization to prevent medication errors. *Current Drug Safety*, *5*(1), 13-18.

Bates DW et al. J Gen Intern Med. 1995;10(4):199-205. Institute for Safe Medication Practices. Proceedings from the ISMP summit on the use of SMART infusion pumps: guidelines for safe implementation and use. 2020

# Barcoded Medication Administration (BCMA)

Barcode on the medication is matched with the patient to ensure that the right medication is administered

- Reduces risk of medication errors
- Enhanced Record-Keeping
- Improves work efficiency
- Incorporates aspects of CDSS and CPOE



Massey L, RN, McClaskey D, RPh, BCPS. Using FMEA to Drive BCMA Improvements. Pharmacy Purchasing & Products.

Bonkowski J, Carnes C, Melucci J et al. Effect of barcode-assisted medication administration on emergency department medication errors. Acad Emerg Med. 2013; 20(8):801-6.

# Barcoded Medication Administration (BCMA)

## BCMA Workflow Integration

**01** — Open chart/scan patient wristband

**02** — Scan medication to be administered

**03** — Evaluate order information

**04** — Confirm and document any relevant information

**05** — User authentication and administer medication to patient

Bonkowski J, Carnes C, Melucci J et al. Effect of barcode-assisted medication administration on emergency department medication errors. Acad Emerg Med. 2013; 20(8):801-6.
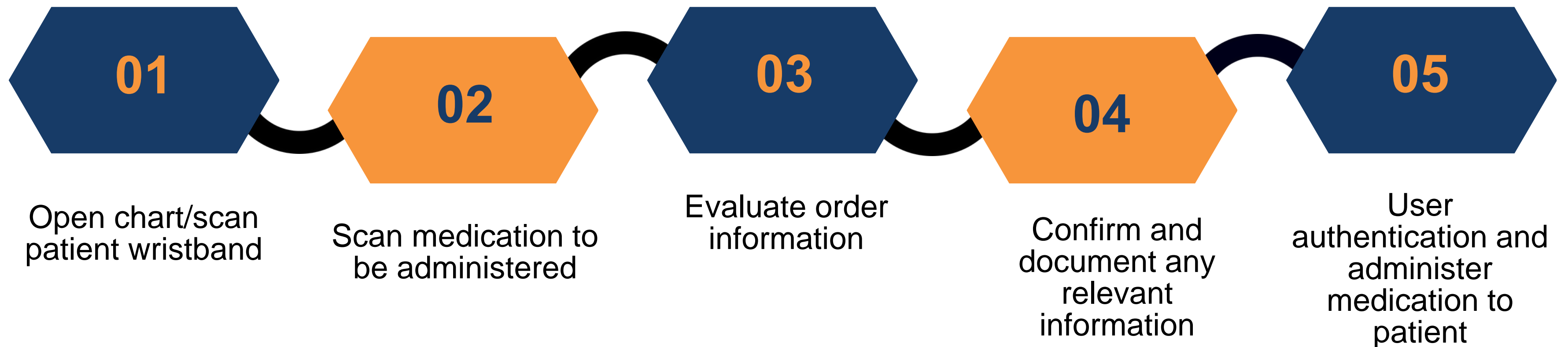
# Electronic Medication Administration Record (eMAR)

Digital system or record used in healthcare settings to electronically document and track the administration of medications to patients

Integrate with electronic health records to provide a comprehensive view of a patient's medication history and help reduce medication errors
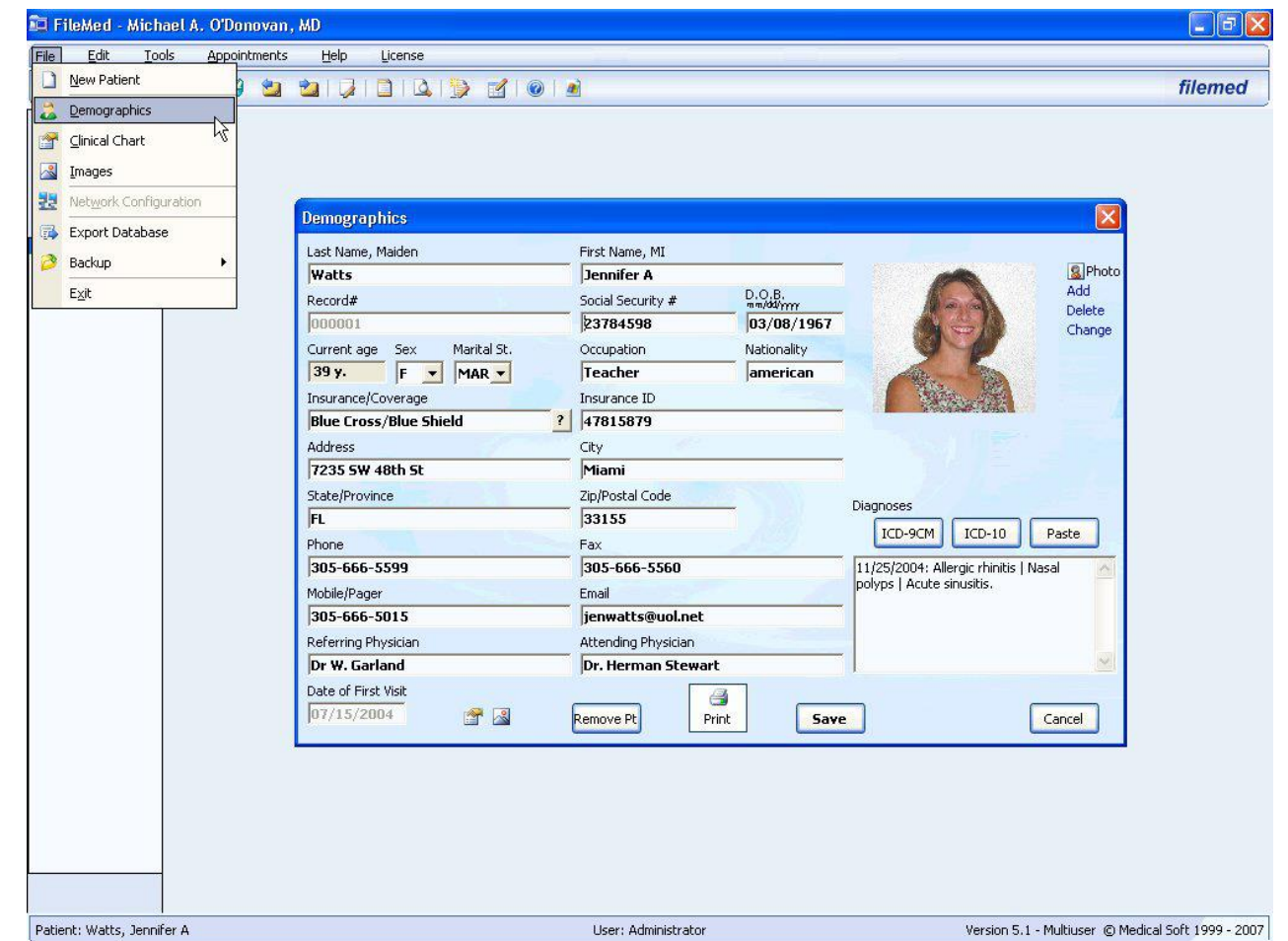


Whitacre B, Brooks L, Bray J. Electronic Medical Records: What are They. March 2017. CR-1013. Oklahoma State University.

Ammenwerth, Elske, et al. "The effect of electronic prescribing on medication errors and adverse drug events: a systematic review." Journal of the American Medical Informatics Association 15.5 (2008): 585-600.

# Electronic Medication Administration Record (eMAR)

**Integration of HIT**

**Computerized Provider Order Entry**
- Populates into eMAR when medication is ordered

# Electronic Medication Administration Record (eMAR)

**Computerized Provider Order Entry**
- Populates into eMAR when medication is ordered

**Automated Dispensing Cabinets**
- Retrieves patient medication information from CPOE and organizes it, allowing nurses to easily identify which medications to grab from ADC



PEKO Precision. Automated Dispensing Cabinet [screenshot of webpage]. [https://www.pekoprecision.com/casestudies/automated-dispensing-cabinet/]

# Electronic Medication Administration Record (eMAR)

**Computerized Provider Order Entry**
- Populates into eMAR when medication is ordered

**Automated Dispensing Cabinets**
- Retrieves patient medication information from CPOE and organizes it, allowing nurses to easily identify which medications to grab from ADC

**Bar-Coded Medication Administration**
- Matches bar code to ensure correct medication with patient

Both meds due at 0900 now have barcodes in front signifying they were properly scanned

# Electronic Medication Administration Record (eMAR)

**Computerized Provider Order Entry**
- Populates into eMAR when medication is ordered

**Automated Dispensing Cabinets**
- Retrieves patient medication information from CPOE and organizes it, allowing nurses to easily identify which medications to grab from ADC

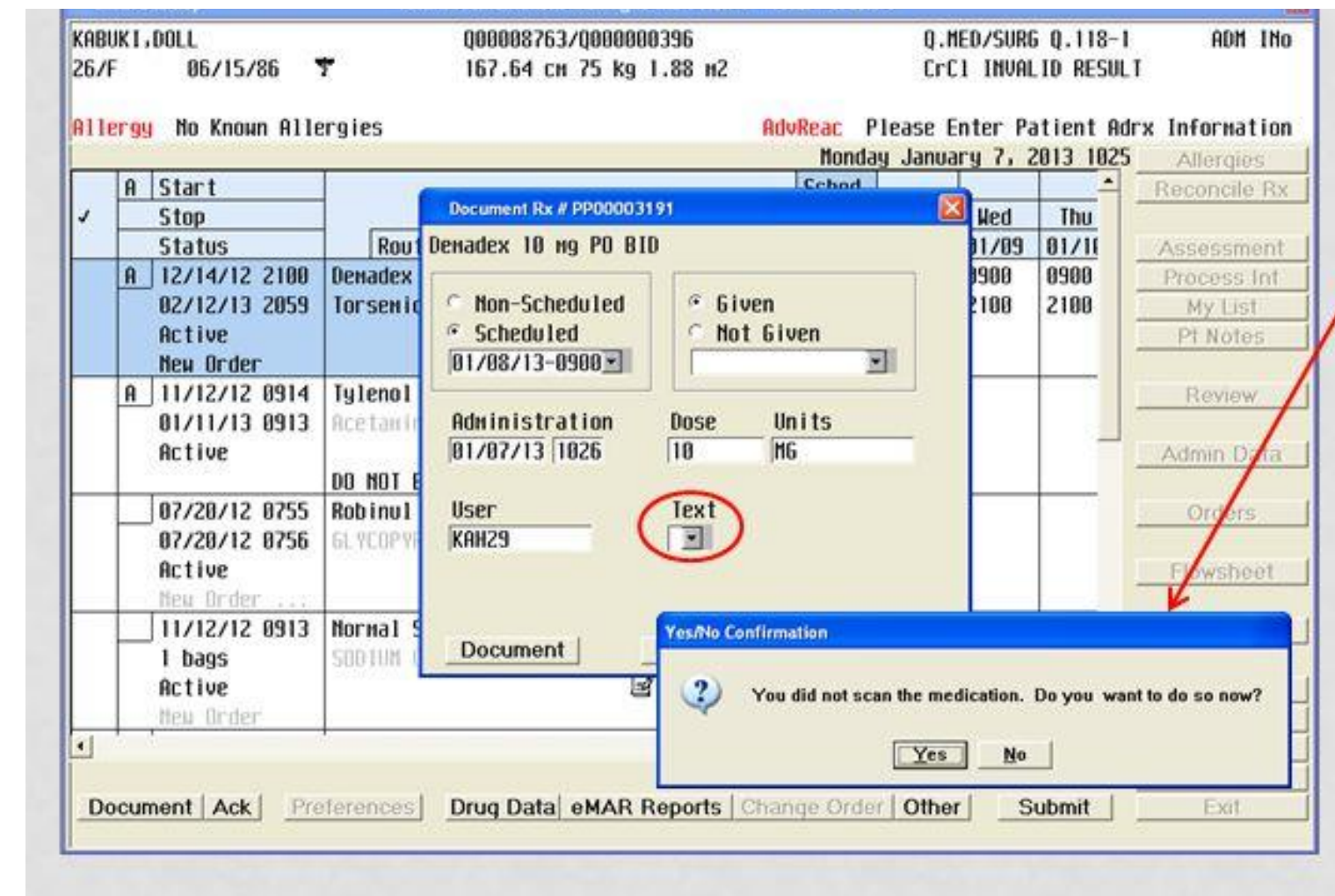**Bar-Coded Medication Administration**
- Matches bar code to ensure correct medication with patient

**Clinical Decision Support System**
- Alerts can be displayed based on patient information to prevent medication errors

You will see pop-up screen if you attempt to file documentation on a medication that has not been scanned properly

# HEALTH INFORMATION TECHNOLOGY

**Regulatory Guidelines**

# Legislation

**2009 American Recovery & Reinvestment Act (ARRA)**

- Authorized substantial financial and technical support for the adoption and use of EHRs and enhancing information privacy and security requirements

**2009 Health Information Technology for Economic & Clinical Health (HITECH) ACT**

- Provision of legislation that was enacted in the United States as part of the American Recovery and Reinvestment Act of 2009 (ARRA)

- Introduced penalties for noncompliance and healthcare providers who failed to adopt EHRs

**2016 21st Century Cures Act**

- Act included provisions to streamline the approval process for new drugs and medical devices

- Improved the flow and exchange of electronic health information by advancing interoperability

# Incentive Programs

**Centers for Medicare and Medicaid Services (CMS) - December 30, 2009**

- Addressed incentive payments to eligible professionals (EPs) and eligible hospitals participating in Medicare and Medicaid programs that adopt and meaningfully use certified EHR technology

- "Meaningful use" defined by CMS as the use of health information technology and electronic health records in a way that enhances patient care, safety, and quality

Medicare and Medicaid Programs: Electronic Health Record Incentive Program. Federal Register 75, January 13, 2010; p. 1844. The proposed regulations will be located mainly at new part 495 of title 42 of the Code of Federal Regulations. Amendments are also proposed for parts 412, 413, and 422 of title 42.
The American Recovery and Reinvestment Act of 2009 (ARRA), Public Law 111-5, 123 Stat 115 (February 17, 2009).
21st Century Cures Act, Pub. L. No. 114-255, 130 Stat. 1033 (2016).

# Breach Notification for Unsecured Protected Health Information

**Department of Health and Human Services (HHS) and Office for Civil Rights (OCR) - August 24, 2009**

- Authorized regulations that require covered entities under the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and their business associates to provide notification in the case of breaches of unsecured protected health information (PHI)

- Rule defined "breach" as unauthorized acquistion, access, use, or disclosure of unsecured PHI that compromises security, or privacy of that information

- Ensured individuals were informed when their health information was compromised

# Standards and Certification Criteria for EHRs

**Office of the National Coordinator for Health Information Technology (ONC) - February 12, 2010**

- Released an interim final regulation that established the criteria and standards that electronic health record (EHR) systems needed for providers and hospitals to meet to receive "meaningful use" payments

- The rule emphasized the importance of interoperability

Medicare and Medicaid Programs: Electronic Health Record Incentive Program. Federal Register 75, January 13, 2010; p. 1844. The proposed regulations will be located mainly at new part 495 of title 42 of the Code of Federal Regulations. Amendments are also proposed for parts 412, 413, and 422 of title 42.

Office of the National Coordinator for Health Information Technology, Department of Health and Human Services. Health information technology: initial set of standards, implementation specifications, and certification criteria for electronic health record technology. Interim final rule. Fed Regist. 2010;75(8):2013-2047.

# HEALTH INFORMATION TECHNOLOGY

## Telehealth Communications

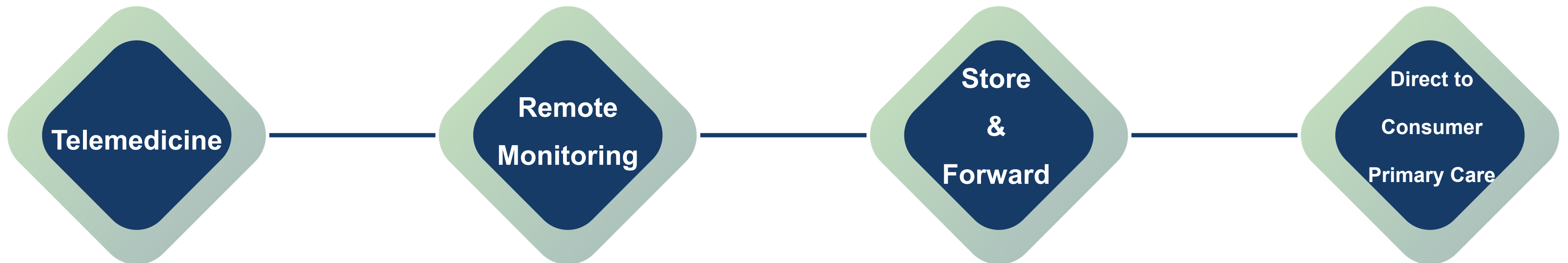Baker College. How to Find a Career in Telehealth. College of Health Science. July 15, 2022.

# TELEHEALTH

Delivery of healthcare services – including diagnosis, consultation, treatment, education, care management, and patient self-management – using real-time, two-way electronic communication technology

Manocchia A. Telehealth: Enhancing Care through Technology. R I Med J (2013). 2020;103(1):18-20. Published 2020 Feb 3.

# Examples of Telehealth

**Telemedicine**

**Remote Monitoring**

**Store & Forward**

**Direct to Consumer Primary Care**

Mechanic OJ, Persaud Y, Kimball AB. Telehealth Systems. In: StatPearls. Treasure Island (FL): StatPearls Publishing; September 12, 2022.

# Benefits of Telehealth: Remote Patient Monitoring

- The continuous monitoring of vital signs enables early detection of patient deterioration for a more realistic view.
- Improved patient education is facilitated by allowing patients to view their health status, providing a sense of control over their condition.
- The storage of patient data facilitates visualization of long-term health trends and assists in determining the most suitable course of treatment.
- Monitoring can increase patient confidence.
- Prompt and efficient communication is made possible by alerts.
- Telemonitoring is a useful tool for patients who are expected to take responsibility for their own care.

# Benefits of Telehealth: Store and Forward

- Store and forward technology platforms and applications are easy to use and maintain, as well as being inexpensive.
- Increased access to care and decreased wait times for patients to see specialists.
- Convenience, no traveling involved.
- Reports from made available within a few hours of the request.
- Encourages thorough data review
- Eliminates the need for physicians, specialists, and patients to speak the same language, thus, breaks down language and cultural barriers.

Serrano LP, Maita KC, Avila FR, et al. Benefits and Challenges of Remote Patient Monitoring as Perceived by Health Care Practitioners: A Systematic Review. Perm J. 2023;27(4):100-111. doi:10.7812/TPP/23.022
Store and Forward in Telehealth: A Model for Success." Medlink Staffing.

# Benefits of Telehealth:
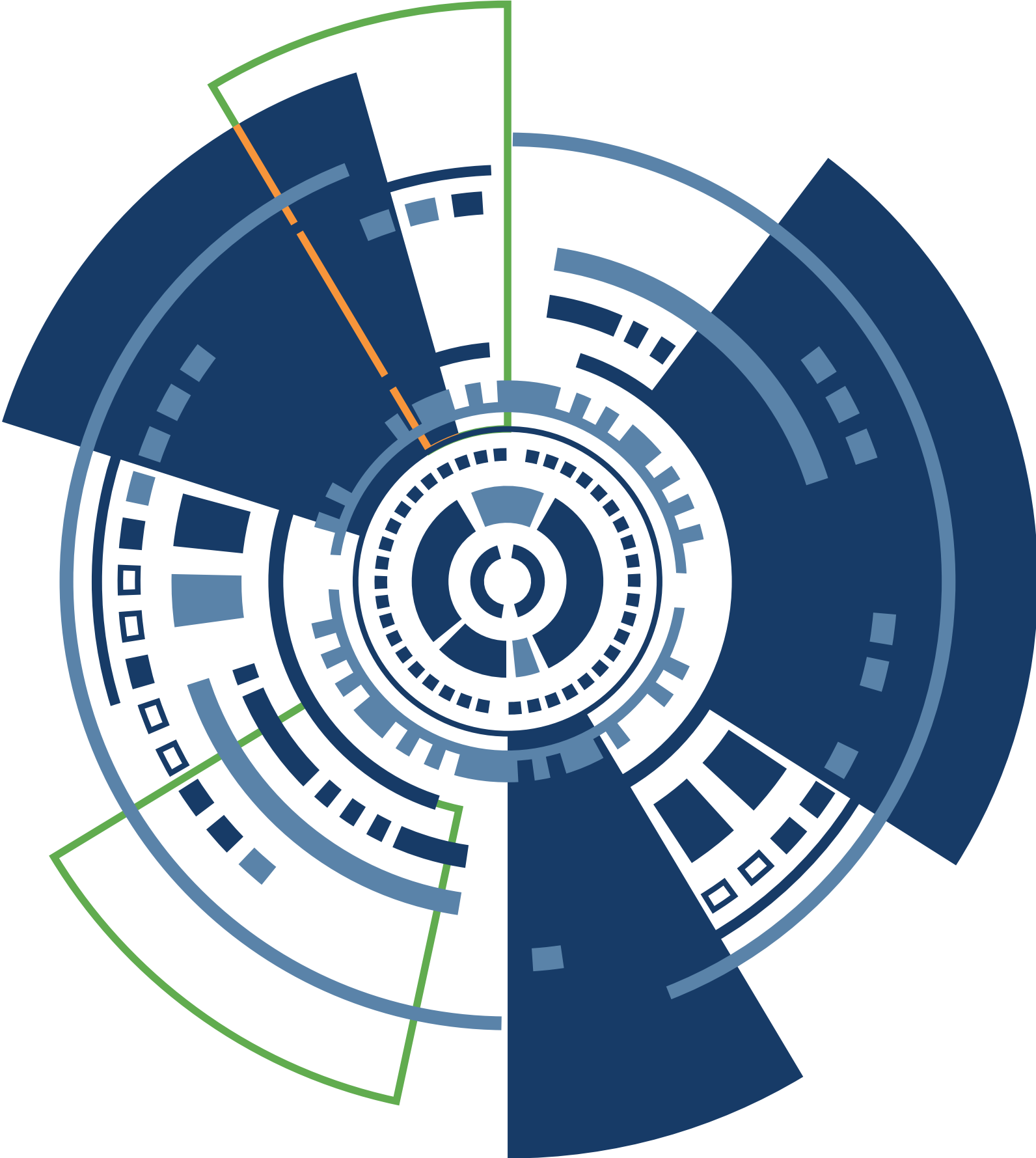# Direct-to-Consumer & Primary Care

- Obtaining a prescription without leaving the home.

- Endorses prescriptions for treating conditions some patients feel uncomfortable discussing.

- Provides the option of visiting a provider that they may no longer see again in the future is an advantage for some patients.

- Overhead costs like front-end staff, clinic space (rent), and utility bills are minimized.

# Remaining challenges

- Better data integration

- Incorporation of virtual health-related activities into daily workflows of healthcare providers

- Alignments of incentives for virtual health activities

Bestsennyy O, Gilbert G, Harris A, Ro J. Telehealth: A quarter-trillion-dollar post-COVID-19 reality? Published July 9, 2021.
Bollmeier SG, Stevenson E, Finnegan P, Griggs SK. Direct to Consumer Telemedicine: Is Healthcare From Home Best?. Mo Med. 2020;117(4):303-309.
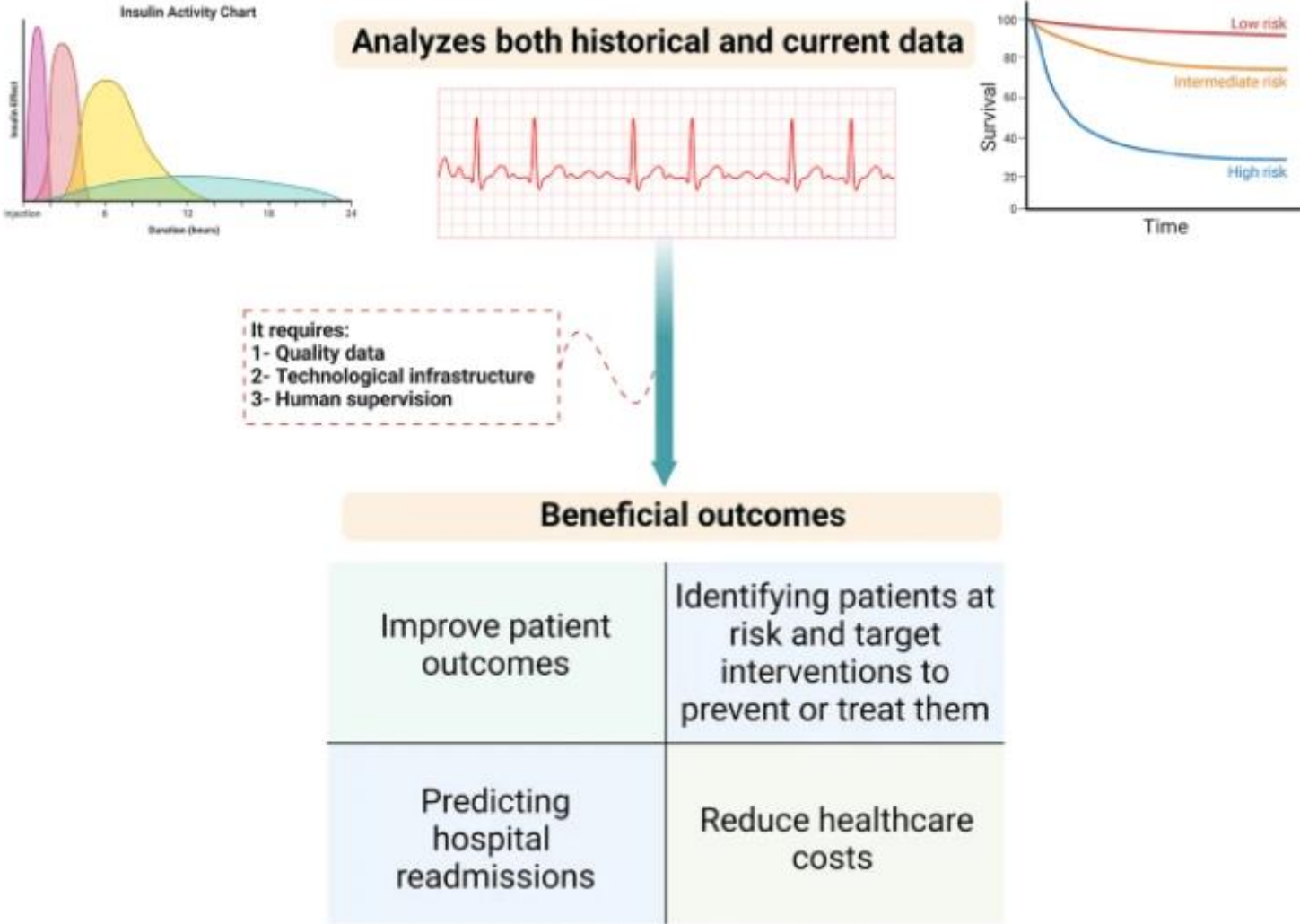
# ARTIFICIAL INTELLIGENCE

## The Future

# Artificial Intelligence (AI) in Healthcare

- Encompasses use of algorithms and software

- Approximate human cognition in the analysis, interpretation, and comprehension of complex medical and healthcare data

- Analyze relationships between prevention or treatment techniques and patient outcomes



Alowais, S. A., Alghamdi, S. S., Alsuhebany, N., Alqahtani, T., Alshaya, A. I., Almohareb, S. N., ... & Albekairy, A. M. (2023). Revolutionizing healthcare: the role of artificial intelligence in clinical practice. *BMC medical education*, *23*(1), 689.

# Drug Properties & Interactions: AI's Analytical Precision

**Machine Learning in Drug Property and Activity Prediction:**

- Machine learning techniques are used to evaluate important aspects of drug molecules such as biological activity and ADME characteristics.

**Advancements in Molecular Analysis:**

- AI-powered tools like Convolutional Neural Networks and MoleculeNet are capable of predicting various molecular properties and evaluating toxicity, respectively.

**Molecular Docking and Tools:**

- Software tools like AutoDock can provide better estimates of how tightly the drug molecule will bind to the target to preselect potential interactions
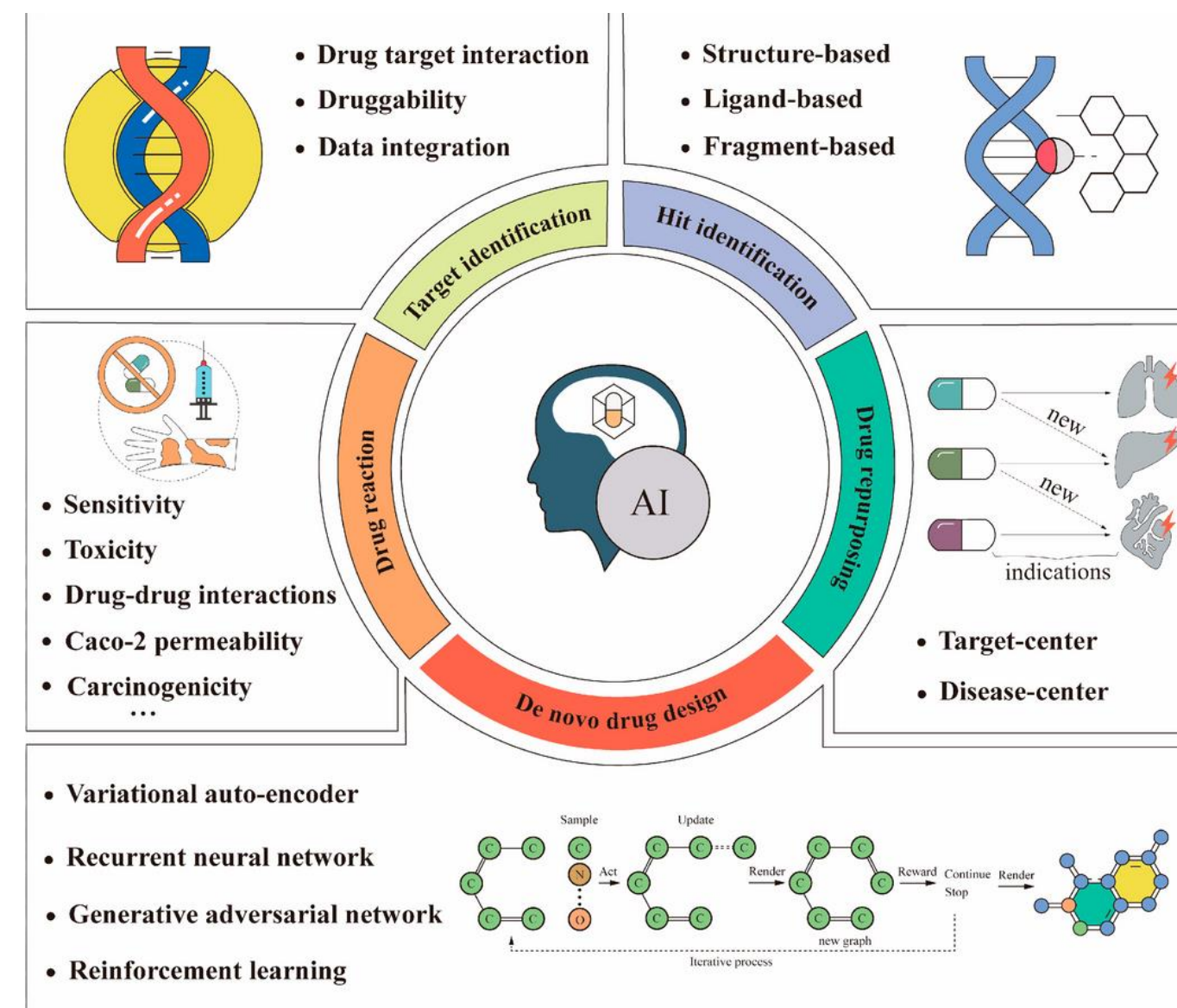


Qi, X., Zhao, Y., Qi, Z., Hou, S., & Chen, J. (2024). Machine Learning Empowering Drug Discovery: Applications, Opportunities and Challenges. Molecules, 29(4), 903.

Qi, X., Zhao, Y., Qi, Z., Hou, S., & Chen, J. (2024). Machine Learning Empowering Drug Discovery: Applications, Opportunities and Challenges. Molecules, 29(4), 903.

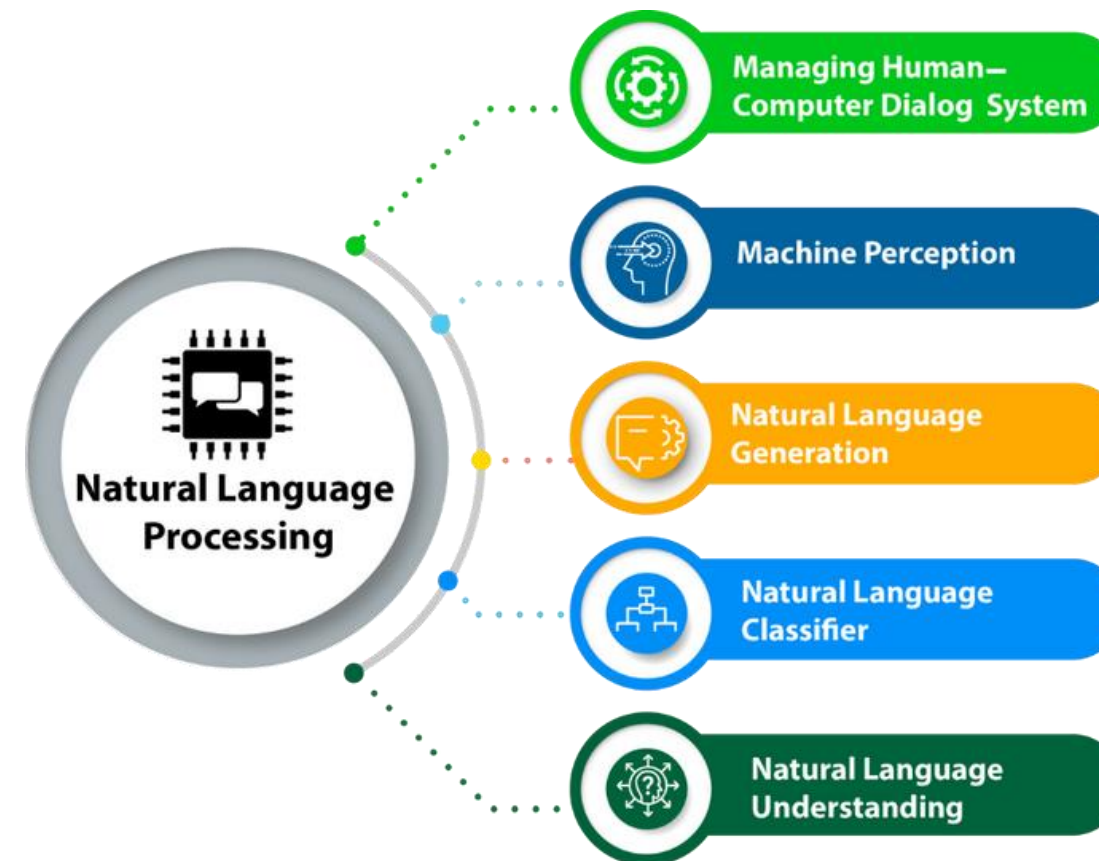# Natural Language Processing

**Semantic NLP**
- Based on machine learning to understand the meanings behind the words in a given text, rather than identifying patterns of speech or writing

**Statistical NLP**
- Rely on mathematical models to understand, interpret, and generate human language



Managing Human–Computer Dialog System

Machine Perception

Natural Language Generation

Natural Language Classifier

Natural Language Understanding

Extracting Data from Medical Notes

Categorizing Clinical Data

Summarizing Text

Enhancing Phenotyping Potential

Data Visualization for Chart Analysis

Identifying Patient Groups for Testing

Supporting Administrative Tasks

Improving Standard of Care

Coursesteach. Natural Language Processing (Part 1): What is Natural Language Processing (NLP). Medium. June 23, 2023.

# Natural Language Processing

**NLP in Disease Classification**: Utilizes medical notes and WHO's International Statistical Classification of Diseases (ICD) codes to classify diseases.
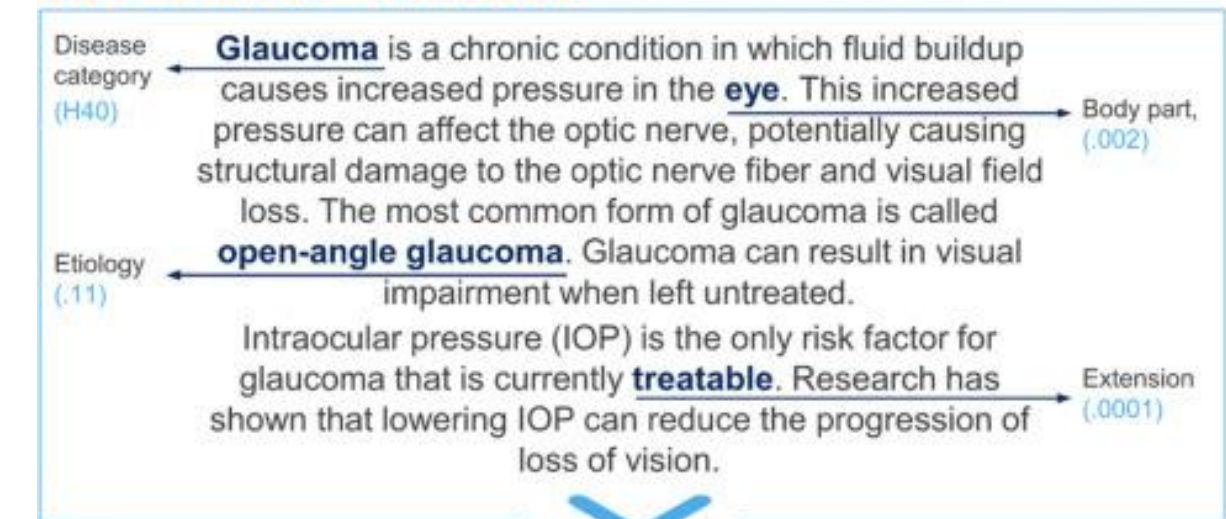
**ICD Overview**: Managed by WHO, ICD provides codes for diseases, symptoms, findings, circumstances, and disease causes.

**NLP Algorithm Process:**

- Extracts ICD codes from clinical guidelines.

- Organizes unstructured text into structured data by parsing relevant clauses.

- Classifies ICD-10 codes based on frequency.

- Runs at various thresholds to enhance accuracy.

- Aggregates data for final output.

**Illustrative example for identifying ICD-10 code "H40.1121"**  *XX  ICD-10 mapping*

Disease category (H40) → **Glaucoma** is a chronic condition in which fluid buildup causes increased pressure in the **eye**. This increased pressure can affect the optic nerve, potentially causing structural damage to the optic nerve fiber and visual field loss. The most common form of glaucoma is called → Body part, (.002)

Etiology (.11) → **open-angle glaucoma**. Glaucoma can result in visual impairment when left untreated.

Intraocular pressure (IOP) is the only risk factor for glaucoma that is currently **treatable**. Research has shown that lowering IOP can reduce the progression of loss of vision. → Extension (.0001)

| Text from clinical guidance extract | ICD-10 nomenclature | ICD-10 |
| --- | --- | --- |
| Glaucoma | Disease category | H40 |
| Open angle | Etiology | 0.11 |
| Eye | Body part | 0.002 |
| Treatable | Extension | 0.0001 |

= H40.1121 (Glaucoma/Primary open-angle/ Left eye/Mild stage)

Bohr A, Memarzadeh K. The rise of artificial intelligence in healthcare applications. Artificial Intelligence in Healthcare.

# Benefits of Natural Language Processing

**Efficient billing**: Retrieving information from the notes made by physicians and then assigning appropriate medical codes to facilitate the billing process.

**Authorization approval**: Using information from physician notes to prevent delays and administrative errors.

**Clinical decision support**: Facilitate decision-making for members of healthcare team upon need.

**Medical policy assessment**: Compiling clinical guidance and formulation appropriate guidelines for care.

Bohr A, Memarzadeh K. The rise of artificial intelligence in healthcare applications. Artificial Intelligence in Healthcare. 2020;25-60. doi:10.1016/B978-0-12-818438-7.00002-2

# Strategies for Pharmacies in Adopting AI Technologies

**Evaluation**: Conduct a needs assessment to identify areas where AI can enhance efficiency, accuracy, and patient care

**Implementation:** Start with pilot projects to test AI solutions in a controlled environment. Scale successful implementations across operations

**Vendor Selection:** Choose AI technology providers with proven expertise in healthcare and pharmacy applications

# Crafting Policies for AI Integration in Pharmacy

**AI Use Policies:** Develop comprehensive policies that outline the use of AI, focusing on ethical use, patient safety, and data security

**Regulatory Compliance:** Ensure AI solutions comply with healthcare regulations, including HIPAA in the U.S

**Oversight Committee:** Establish a governance committee to oversee AI initiatives, monitor outcomes, and ensure ethical standards are maintained

# Exploring AI's Future in Pharmacy Practice

**Personalized Medicine:** AI predicts individual responses to meds, improving treatment and reducing side effects in personalized medicine

**Digital Health Integration**: AI integration with digital health tools will offer real-time monitoring and personalized health insights, improving medication adherence and patient engagement

**Pharmacy Robotics:** Robotics in pharmacy tasks will increase, allowing pharmacists to dedicate more time to patient care

**AI in Drug Discovery and Development:** AI will streamline drug discovery processes, reducing time and costs associated with bringing new drugs to market

# Role of Pharmacists in Health Information Technology

- Enhancing data, information, and knowledge management within healthcare settings

- Promoting integration, interoperability, and information exchange

- Delivering drug information through cataloging and embedding knowledge into pharmacy workflow

- Establishing point-of-business analytic solutions for improving decision-making

- Applying user experiences, research, and theoretical informatics principles to improve clinical practice and usability

- Leading and participating in the procurement, development, management, and continuous improvement of clinical information systems

# Role of Pharmacy Technicians in Health Information Technology

- Able to oversee day-to-day operation and interface of telemedicine services' hardware/software by setting up, troubleshooting, or maintaining technology associated with patient communication

- Assist or lead in assessing the functions, benefits, and constraints of technology and automation systems for prescribing medications, order processing, clinical monitoring, and patient communication

- Provide patients with IT training prior to speaking with the pharmacist, along with ongoing technology support

- Responsible for collecting demographic information of the patient or mitigating billing at time of appointment

- Maintain open communication with end users and stakeholders to gather feedback on systems and opportunities for improvement, thereby becoming an integral part of the interprofessional team

ASHP statement on the pharmacy technician's role in pharmacy informatics. Am J Health Syst Pharm. 2014 Feb 1;71(3):247-50.
Gernant, S. Pharmacist Technicians Can Play Key Role in Push Toward Telemedicine During COVID-19 Pandemic. Pharmacy Times. Published 2020 April 7.

# CONCLUDING POINTS

Healthcare organizations continue to invest a significant amount of financial and human resources in health information technology (HIT) initiatives, increasing growth and demand of HIT workers.

Health IT has grown to be an integral part of the medication management process.

Promoting delivery of medication related data, information, patient-centered care, and knowledge across systems.

As systems supporting medication management become more intricate and expansive, so does the need for professionals to guide, oversee, and assess them.

# Assessment Question 1

Optimization of medication management can be achieved by which of the following HIT methods:

A. Formulary Management

B. P & T Committees

C. Clinical Decision Support Systems (CDSS)

D. None of the above

# Assessment Question 1

## Correct Response

Optimization of medication management can be achieved by which of the following HIT methods:

A. Formulary Management

B. P & T Committees

C. Clinical Decision Support Systems (CDSS)

D. None of the above

# Assessment Question 2

Telepharmacy and telemedicine can be leveraged in medication management by which of the following:

A. Electronic Medication Administration Record (eMAR)

B. Store and Forward Technology Platforms

C. Remote Patient Monitoring

D. Both B & C

# Assessment Question 2

## Correct Response

Telepharmacy and telemedicine can be leveraged in medication management by which of the following:

A. Electronic Medication Administration Record (eMAR)

B. Store and Forward Technology Platforms

C. Remote Patient Monitoring

D. Both B & C

# Assessment Question 3

Which of the following regulatory compliance guidelines is most pertinent to medication management?

A. Laws such as <u>Privacy Rule at 45 CFR 164.502(g)</u>, which allows patient representation

B. Legislation such as <u>2016 21st Century Cures Act</u>, which streamlines the approval process for new drugs and medical devices

C. Laws such as the <u>Affordable Healthcare Act</u>, which increases health insurance coverage for the uninsured

D. None of the above

# Assessment Question 3

## Correct Response

Which of the following regulatory compliance guidelines is most pertinent to medication management?

A. Laws such as <u>Privacy Rule at 45 CFR 164.502(g)</u>, which allows patient representation

B. Legislation such as <u>2016 21st Century Cures Act</u>, which streamlines the approval process for new drugs and medical devices

C. Laws such as the <u>Affordable Healthcare Act</u>, which increases health insurance coverage for the uninsured

D. None of the above

# Assessment Question 4

Pharmacy management technology can be used to promote efficiency in medication inventory management by which of the following:

A. Carousel Dispensing Technology (CDT)

B. Natural Language Processing (NLP)

C. Artificial Intelligence (AI)

D. Electronic Medication Administration Record (eMAR)

# Assessment Question 4

## Correct Response

Pharmacy management technology can be used to promote efficiency in medication inventory management by which of the following:

A. Carousel Dispensing Technology (CDT)

B. Natural Language Processing (NLP)

C. Artificial Intelligence (AI)

D. Electronic Medication Administration Record (eMAR)

# Assessment Question 5

**Technology can be used to improved patient safety and prevent errors in medication by which of the following:**

**A. Computerized Provider Order Entry (CPOE)**

**B. Barcoded Medication Administration (BCMA)**

**C. Both A & B**

**D. None of the above**

# Assessment Question 5

## Correct Response

Technology can be used to improved patient safety and prevent errors in medication by which of the following:

A. Computerized Provider Order Entry (CPOE)

B. Barcoded Medication Administration (BCMA)

C. Both A & B

D. None of the above

# Assessment Question 6

The pharmacy technician's primary role in utilizing telepharmacy technology may include the following (select all that apply)

A. Optimizing function of technology through communication with end users and stakeholders

B. Educating patients in technology literacy

C. Collecting demographic information and inputting this information into the system

D. None of the above

# Assessment Question 6

## Correct Response

**The pharmacy technician's primary role in utilizing telepharmacy technology may include the following (select all that apply)**

**A. Optimizing function of technology through communication with end users and stakeholders**

**B. Educating patients in technology literacy**

**C. Collecting demographic information and inputting this information into the system**

**D. None of the above**

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# Thank you!

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