Editorial/Uvodnik

Harnessing the power of aritifical inteligence in nursing: New data streams to transform care

Izkoriščanje zmogljivosti umetne inteligence v zdravstveni negi: preoblikovanje zdravstvene nege z novimi podatkovnimi tokovi

Maxim Topaz[1, 2, *]

Artificial intelligence (AI) is rapidly transforming health care, and nursing is no exception. By analysing data to identify patterns and trends, AI has the potential to improve patient care, reduce risks, and make our work more efficient. However, as these technologies become more sophisticated, they require new types of information to be truly effective. This editorial explores how different kinds of data—such as clinical notes, conversations between nurses and patients, and even video recordings—can make AI systems more efficient at supporting nursing care. I share examples of how AI is already helping and what the future might hold.

We start with an early AI tool called PREVENT. This system was designed to help nurses decide which patients needed urgent attention when transitioning from the hospital to homecare. It analysed structured data from electronic health records, including diagnoses, medication lists, and lab results. Using this information, PREVENT identified high-risk patients who needed faster follow-up visits. In a study, PREVENT helped nurses prioritise care, cutting rehospitalisation rates by nearly 10% (Topaz et al., 2018).

As we looked closer, we realised that nurses' clinical notes are an incredibly rich source of information. These notes often include observations about patient behavior, emotional states, and other subtle details that do not appear in more rigid parts of electronic health records. By incorporating these notes into AI systems, we improved their ability to predict risks like hospital readmissions by 20% (Topaz et al., 2024). For example, the system might pick up on patterns like a patient struggling to manage their medications or showing signs of worsening symptoms over time. This combination of structured data (e.g., lab results) and unstructured data (e.g., clinical notes) provided a more comprehensive overview of each patient's condition.

More recently, we started exploring another untapped resource: the verbal communication between nurses and patients. Conversations often reveal critical information about a patient's emotional well-being, cognitive function, and overall health. In one study, we recorded patient-nurse interactions and found that integrating these recordings into AI models significantly improved their ability to predict which patients might need emergency care or hospitalisation (Zolnoori et al., 2024). For example, patients at higher risk tended to express more sadness or anxiety or had longer pauses in their speech. No blood test or vital signs can capture this kind of insight.

AI has even been used to screen for early signs of Alzheimer's disease by analysing speech patterns, such as difficulty finding words or changes in voice tone (Zolnoori et al., 2023). These advances show how listening to our patients—something nurses already do so well—can be turned into valuable data to improve care.

The next frontier is video data. Imagine a system that can analyse video recordings of patient-nurse interactions. It could detect visual cues, like changes in posture or facial expressions, that might indicate pain or distress. Video data could also eliminate much of the time-consuming documentation nurses currently do. Instead, an AI system could automatically generate accurate records of care based on what it observes and hears.

Picture this: A nurse could ask the AI, "Have there been any concerning trends in vital signs this week?" or "What symptoms have you noticed in this patient lately?" The system, equipped with data from electronic health records, notes, conversations, and videos, could provide detailed answers. This might have sounded like science fiction a few years ago, but today, such tools are within reach. In fact, more than

[1] Columbia University School of Nursing, Columbia University Data Science Institute, 560 West 168th Street, New York, NY 10032, United States

[2] University of Maribor, Faculty of Health Sciences, Žitna ulica 15, 2000 Maribor, Slovenia

* Corresponding author/Korespondenčni avtor: mt3315@cumc.columbia.edu

Received/Prejeto: 8. 2. 2025
Accepted/Sprejeto: 2. 3. 2025

https://doi.org/10.14528/snr.2025.59.1.3323

30% of U.S. physicians already use AI systems to assist with documentation and decision-making.

As promising as these technologies are, they come with challenges. For example, AI systems can sometimes "hallucinate," producing inaccurate or nonsensical information. This could be dangerous in health care, where decisions can have life-or-death consequences. Additionally, studies have shown that some AI tools do not work as well for certain groups of patients, such as those from historically underserved communities (Topaz et al., 2024). Privacy is another concern. Recording conversations and video interactions raises questions about how to protect patient confidentiality. It is crucial that we put safeguards in place to ensure that sensitive information is handled responsibly.

Nurses must be at the center of these developments. A global think tank on AI in nursing emphasised that our profession needs to actively shape these technologies (Ronquillo et al., 2021). As the people who collect much of the data that feeds AI systems, we are uniquely positioned to ensure these tools reflect the realities of patient care. Nurses should be involved in every step, from designing AI tools to implementing them in practice.

The integration of diverse data sources into AI-driven nursing systems marks a pivotal shift in health care. By leveraging structured data, clinical notes, verbal communication, and video analysis, AI has the potential to improve risk prediction, streamline documentation, and enhance decision-making. However, realising these benefits requires careful attention to issues such as data privacy, algorithmic fairness, and the prevention of AI errors. Addressing these challenges will ensure that AI supports, rather than compromises, high-quality patient care. Importantly, nursing professionals must lead these efforts, ensuring that AI solutions are designed and implemented in ways that reflect the realities of frontline health care.

Encouragingly, AI-driven advancements in nursing are gaining traction worldwide, including in Slovenia, where researchers are working on innovative healthcare applications (Stiglic et al., 2019). As nurses, we have a critical role in shaping the future of AI in our field—advocating for solutions that uphold ethical standards while maximising clinical benefits. By embracing these innovations and ensuring their responsible use, we can harness AI's potential to complement nursing expertise, improve efficiency, and ultimately, enhance patient outcomes.

Slovenian translation/Prevod v slovenščino

Umetna inteligenca (UI) pospešeno spreminja tako zdravstvo kot zdravstveno nego. S pomočjo analize podatkov za prepoznavanje vzorcev in trendov lahko izboljša oskrbo pacientov, zmanjša tveganja in poveča učinkovitost dela v zdravstveni negi. Vendar pa so za izpopolnjevanje in doseganje resnične učinkovitosti orodij UI potrebne nove vrste informacij. Ta uvodnik se posveča rabi različnih vrst podatkov: klinične dokumentacije, pogovorov med medicinskimi sestrami in pacienti ter celo videoposnetkov za izboljšanje podpore sistemov UI v zdravstveni negi. Predstavlja primere učinkovite rabe UI in prihodnje trende na tem področju.

Eno zgodnjih orodij umetne inteligence, imenovano PREVENT, je bilo zasnovano za pomoč medicinskim sestram pri identifikaciji pacientov, ki potrebujejo nujno pozornost pri prehodu iz bolnišnice v domačo oskrbo. Sistem PREVENT je analiziral strukturirane podatke, pridobljene iz elektronskih zdravstvenih kartotek, vključno z diagnozami, seznami zdravil in laboratorijskimi izvidi. Na podlagi teh podatkov je prepoznal paciente z visokim tveganjem, ki so potrebovali hitrejši kontrolni pregled. V raziskavi Topaz et al. (2018) je PREVENT medicinskim sestram pomagal pri določanju prednostnih nalog zdravstvene nege in tako zmanjšal stopnjo ponovne hospitalizacije za skoraj 10 %.

Podrobnejša analiza kaže, da predstavlja dokumentacija, ki jo vodijo medicinske sestre, izjemno bogat vir informacij, saj pogosto vključuje opažanja o pacientovem vedenju, čustvenih stanjih in druge subtilne podrobnosti, ki jih bolj rigidni deli elektronskih zdravstvenih kartotek ne navajajo. Z vključitvijo te dokumentacije v sisteme UI smo njihovo sposobnost napovedovanja tveganj, kot so ponovni sprejemi v bolnišnico, izboljšali za 20 % (Topaz et al., 2024). Sistem UI tako lahko na primer zazna določene vzorce, kot so težave pacienta z upravljanjem zdravil ali znake postopnega poslabšanja simptomov. Ta kombinacija strukturiranih podatkov (npr. laboratorijskih izvidov) in nestrukturiranih podatkov (npr. zdravstvene dokumentacije) omogoča veliko popolnejšo sliko stanja vsakega pacienta.

Pred nedavnim smo pričeli z analizo še enega doslej neizkoriščenega vira informacij: verbalne komunikacije med medicinskimi sestrami in pacienti. Ti pogovori pogosto razkrijejo ključne informacije o pacientovem čustvenem počutju, kognitivnih funkcijah in splošnem zdravju. V eni od raziskav smo posneli interakcijo med pacienti in medicinskimi sestrami in ugotovili, da je vključitev teh posnetkov v modele UI bistveno izboljšala sposobnost sistemov za identifikacijo pacientov, ki bodo morda potrebovali nujno oskrbo ali hospitalizacijo (Zolnoori et al., 2024). Pacienti z višjo stopnjo tveganja so izražali več žalosti ali tesnobe, ali pa so imeli v govoru daljše pavze. Tovrstnega vpogleda ne omogoča noben krvni test ali merjenje vitalnih funkcij.

Z analizo govornih vzorcev, kot so težave pri iskanju besed ali spremembe tona glasu, se UI uporablja celo za odkrivanje zgodnjih znakov Alzheimerjeve bolezni

(Zolnoori et al., 2023). Ta napredek kaže, da lahko pozorno poslušanje pacientov, v čemer so medicinske sestre že tako izurjene, spremenimo v dragocene podatke za izboljšanje zdravstvene nege.

Naslednji mejnik predstavljajo video podatki. Predstavljajte si sistem, ki bi z analizo video posnetkov interakcij med pacientom in medicinsko sestro razpoznaval vizualne znake bolečine ali stiske, npr. spremembe drže ali obrazne mimike. Tovrstni video podatki bi lahko odpravili tudi večino časovno neučinkovitega dokumentiranja s strani medicinskih sester, saj bi lahko sistem UI na podlagi zaznanih informacij samodejno ustvaril natančne zapise o obravnavi pacienta.

Medicinska sestra bi lahko sistemu UI postavila vprašanje: »Ali so se v tem tednu pojavile kakšne spremembe v vitalnih funkcijah?« ali »Katere simptome si v zadnjem času zaznal pri tem pacientu?« Sistem, opremljen s podatki iz elektronskih zdravstvenih kartotek, dokumentacije, pogovorov in videoposnetkov, bi lahko podal podrobne odgovore na tovrstna vprašanja. Če se je še pred nekaj leti to morda zdelo kot znanstvena fantastika, so danes takšna orodja že na dosegu roke. Pravzaprav sisteme UI za pomoč pri dokumentiranju in odločanju uporablja več kot 30 % ameriških zdravnikov.

Kljub nedvomni obetavnosti opisanih tehnologij je njihova uporaba povezana z določenimi izzivi. Sistemi UI lahko na primer »halucinirajo«, t.j. generirajo netočne ali nesmiselne informacije. V zdravstveni negi, kjer imajo lahko odločitve potencialno usodne posledice, je to lahko nevarno. Poleg tega študije kažejo, da nekatera orodja UI pri določenih skupinah pacientov ne delujejo najbolje, na primer pri tistih iz ekonomsko prikrajšanih skupnosti (Topaz et al., 2024). Dodatno težavo predstavlja varstvo osebnih podatkov. Snemanje pogovorov in video interakcij odpira vprašanja o tem, kako zaščititi zaupnost osebnih podatkov pacientov. Uvedba zaščitnih ukrepov za zagotavljanje odgovornega ravnanja z občutljivimi informacijami je zato ključnega pomena.

Pri razvoju sistemov UI za zdravstveno rabo je sodelovanje medicinskih sester nujno. Globalni možganski trust o UI v zdravstveni negi poudarja, da je ta strokovni profil nepogrešljiv pri sooblikovanju novih tehnologij (Ronquillo et al., 2021). Kot zbiralci podatkov, potrebnih za delovanje sistemov UI v zdravstveni negi, lahko le zdravstveni delavci zagotovimo, da bodo ti odražali realnost področja. Medicinske sestre bi morale biti vključene v vsak korak oblikovanja orodij UI in njihove praktične uporabe.

Vključevanje različnih virov podatkov v sisteme zdravstvene nege, podprte z UI, predstavlja ključni premik na področju zdravstva. Z uporabo strukturiranih podatkov, zdravstvene dokumentacije, ustne komunikacije in analize videoposnetkov lahko UI izboljša napovedovanje tveganj, poenostavi dokumentiranje in izboljša sprejemanje odločitev. Vendar pa je za uresničitev teh potencialov potrebna skrbna obravnava vprašanj, kot so zasebnost podatkov, algoritmična pravičnost in preprečevanje napak UI. Le z naslavljanjem teh izzivov lahko zagotovimo, da bo UI prispevala k varni in kakovostni zdravstveni negi pacientov. Pri tem je pomembno, da ta prizadevanja vodijo strokovnjaki s področja zdravstvene nege, saj bodo le ti lahko zagotovili, da bodo rešitve UI zasnovane in izvedene na način, ki bo odražal dejansko stanje pri izvajanju zdravstvene nege.

Globalno uveljavljanje napredkov na področju UI v zdravstveni negi prinaša pomembne koristi. To velja tudi za Slovenijo, kjer se raziskovalci ukvarjajo z inovativnimi aplikacijami UI v zdravstvu (Stiglic et al., 2019). Pri oblikovanju prihodnjih trendov uporabe UI na področju zdravstvene nege imamo medicinske sestre ključno vlogo, saj zagovarjamo rešitve, ki spoštujejo etične standarde in pomembno povečujejo klinične koristi. S sprejemanjem tovrstnih inovacij in zagotavljanjem njihove odgovorne uporabe lahko izkoristimo potencial UI v smislu dopolnjevanja strokovnega znanja, izboljšanja učinkovitosti zdravstvene nege in navsezadnje izboljšanja njenih kliničnih izidov.

Conflict of interest/Nasprotje interesov

The author confirms that there are no conflict of interest./Avtor izjavlja, da ni nasprotja interestov.

Literature

Ronquillo, C. E., Peltonen, L.-M., Pruinelli, L., Chu, C. H., Bakken, S., Beduschi, A., Cato, K., Hardiker, N., Junger, A., Michalowski, M., Nyrup, R., Rahimi, S., Reed, D. N., Salakoski, T., Salanterä, S., Walton, N., Weber, P., Wiegand, T., & Topaz, M. (2021). Artificial intelligence in nursing: Priorities and opportunities from an international invitational think-tank of the Nursing and Artificial Intelligence Leadership Collaborative. *Journal of Advanced Nursing,* 77(9), 3707–3717. https://doi.org/10.1111/jan.14855
PMid:34003504; PMCid:PMC7612744

Stiglic, G., Kocbek, P., Fijacko, N., Sheikh, A., & Pajnkihar, M. (2019). Challenges associated with missing data in electronic health records: A case study of a risk prediction model for diabetes using data from Slovenian primary care. *Health Informatics Journal,* 25(3), 951–959. https://doi.org/10.1177/1460458217733288
PMid:29027512

Topaz, M., Trifilio, M., Maloney, D., Bar-Bachar, O., & Bowles, K. H. (2018). Improving patient prioritization during hospital-homecare transition: A pilot study of a clinical decision support tool. *Research in Nursing & Health,* 41(5), 440–447. https://doi.org/10.1002/nur.21907
PMid:30203417

Topaz, M., Davoudi, A., Evans, L., Sridharan, S., Song, J., Chae, S., Barrón, Y., Hobensack, M., Scharp, D., Cato, K., Collins Rossetti, S., Kapela, P., Xu, Z., Gupta, P., Zhang, Z., McDonald, M. V., & Bowles, K. H.(2024). Building a time-series model to predict hospitalization risks in home health care: Insights into development, accuracy, and fairness. *Journal of the American Medical Directors Association,* 26(2), Article 105417. https://doi.org/10.1016/j.jamda.2024.105417 PMid:39689864

Zolnoori, M., Sridharan, S., Zolnour, A., Vergez, S., McDonald, M. V., Kostic, Z., Bowles, K. H., & Topaz, M. (2024). Utilizing patient-nurse verbal communication in building risk identification models: The missing *critical data stream in home healthcare. Journal of the American Medical Informatics Association,* 31(2), 435–444. https://doi.org/10.1093/jamia/ocad195 PMid:37847651; PMCid:PMC10797261

Zolnoori, M., Zolnour, A., & Topaz, M. (2023). ADscreen: A speech processing-based screening system for automatic identification of patients with Alzheimer's disease and related dementia. *Artificial Intelligence in Medicine,* 143, Article 102624. https://doi.org/10.1016/j.artmed.2023.102624 PMid:37673583; PMCid:PMC10483114

Cite as/Citirajte kot:
Topaz, M. (2025). Harnessing the power of aritifical inteligence in nursing: New data streams to transform care. *Obzornik zdravstvene nege*, 59(1), 4–7. https://doi.org/10.14528/snr.2025.59.1.3323