

# Humanized Intelligent Nursing Care







By Wang Shu-Chen, Vice Director of the Department of Nursing, Hualien Tzu Chi Hospital

Recent discussions of information or technology always include the metaverse. Since the original meaning of meta is “beyond”, the term connotes a new era of technology characterized by linkage of realities through cloud-based and virtual technologies or an aspiration to replace or transcend reality. What are the potential benefits of the Internet, the virtual world, information technology, artificial intelligence, smart health care, and big data for patient-centered clinical nursing care with a human touch. As nursing practitioners, should we wholeheartedly embrace these technologies and champion the rapid development of smart nursing or should we rather hold on to traditional methods as deemed appropriate? What is the proper course of action?

In this era of ubiquitous smartphone and Internet use and reliance on smartphones for a sense of security, this issue of the Tzu Chi Nursing Journal will explore how nursing personnel of Tzu Chi hospitals utilize digital technologies and digital transformation of tasks in their lives and at work. This discussion also covers perceived benefits, worries, and future expectations.

## Basic Statistics

Gender	Number of People	%
Female	1,033	94.5
Male	60	5.5
Total	1,093	100.0
Age	Number of People	%
under 20	12	1.1
21~25	316	28.9
26~30	213	19.5
31~35	128	11.7
36~40	144	13.2
above 40	280	25.6
Total	1,093	100.0
Years worked in the hospital	Number of People	%
under 1	122	11.2
1.1~2	130	11.9
2.1~3	96	8.8
3.1~5	164	15.0
above 5	581	53.1
Total	1,093	100.0

## AI Products and Tools Have Become Indispensable in Our Lives

A total of 1,093 valid questionnaires have been collected for this issue. First, nursing practitioners were asked what AI-related technologies, apps, or websites they use in their daily lives. All 11 options except transcription software were selected by more than 20% of respondents. Google is ranked first with 97.4%, indicating almost universal use, followed by map search apps (75%), and translation software (68.3%). e-payment (52.1%), social media (51.7%), and search engines (49.9%) are ranked fourth, fifth, and sixth, followed by fingerprint recognition (43.2%), Uber (32.6%), Siri (32.2%), and smart home (23.8%). It can be safely assumed that the demand for e-payment and food delivery services has increased significantly during the pandemic since these options decrease the need for direct contact with other humans or objects.

Job Title	Number of People	%
Registered nurse	836	76.5
Deputy head nurse	48	4.4
Head nurse	51	4.7
Supervisor and above	20	1.8
Case manager / functional unit	47	4.3
Nurse Practitioner / senior RN	91	8.3
<b>Total</b>	<b>1,093</b>	<b>100.0</b>
Department	Number of People	%
Internal Medicine	187	17.1
Surgery	152	13.9
Pediatrics	35	3.2
Obstetrics & Gynecology	48	4.4
Intensive Care & ER	207	18.9
Functional Unit	20	1.8
Kidney Dialysis	43	3.9
Operating Room	65	5.9
Outpatient Clinic	190	17.4
Palliative Care	26	2.4
Administration	26	2.4
Psychiatry	28	2.6
Others	66	6.1
<b>Total</b>	<b>1,093</b>	<b>100.0</b>



## **Globalization Is a Breeze with the Latest Technology and Software**

These AI and digital tools which represent a common feature of daily life are increasingly applied to nursing tasks. Notable examples include Google scholar, a search engine for scholarly literature, and translation software which is a useful tool for the creation of English presentations or speech manuscripts. An actual experience of translation software use is shared below.

Generally speaking, communication in English or other foreign languages represents a vexing issue for nursing personnel. Highly mature and optimized translation software is therefore a great boon for our personnel as a perfect way to overcome language barriers. This tool greatly facilitates the task of presenting the spirit and techniques of Tzu Chi nursing care to international audiences. Ms. Cheng Ya-Chun, Nursing Supervisor, and Ms. Lee Yi-Rong, Head Nurse at Hualien Tzu Chi Hospital, have attended training programs for foreign nursing personnel organized by international medical centers in Burkina Faso and Eswatini in recent years. The biggest challenge they encountered was the language barrier since the official languages in Burkina Faso and Eswatini are French and Swazi & English, respectively. Ms. Lee points out that “ Google Translate has a pronunciation function for single words and whole passages, which is great for pronunciation practice. After practicing several times, people gain the courage to recite the same passage in public. Despite the fact that the translations are by no means error-free, Google Translate provides a real-time solution for language problems.” Due to the COVID-19 pandemic, students from Eswatini have not been able to pursue academic studies in Taiwan over the past two years. Their in-person classes have been moved online, which has further accentuated the importance of translation software as a convenient and useful communication tool.

The same software was utilized for communication and provision of health education to a Russian patient in the COVID-19 isolated ward. This patient was a captain of a deep-sea fishing vessel, who was admitted to Hualien Tzu Chi Hospital for treatment of acute pneumonia while his vessel was berthed in Hualien Harbor. Ms. Chou Ying-Fang, Nursing Supervisor at Hualien Tzu Chi Hospital, recalls that “the captain was in a state of great agitation when he arrived at the hospital. Through the use of a translation device to communicate with him and provide him with health education and the thoughtful preparation of Russian food, the nursing personnel was finally able to mitigate his anxiety and homesickness. The captain calmed down and accepted our medical treatment.” On the evening before his discharge, Head Nurse Chou Yun-Juan presented him with a Get-Well Card created with the latest technology and recorded instruction in Russian for the oximeter. This was the staff's first experience of caring for

# Q1

What AI-related technologies, apps, or websites do you use in your daily life?

( N = 1,093, multiple selections )

Google **97.4%**



Search engine **49.9%**



Maps **75.0%**



Siri **32.2%**



Uber **32.6%**



E-payment **52.1%**



Fingerprint recognition **43.2%**



Social media **51.7%**



Transcription software **7.4%**



Smart home **23.8%**



Translation software **68.3%**





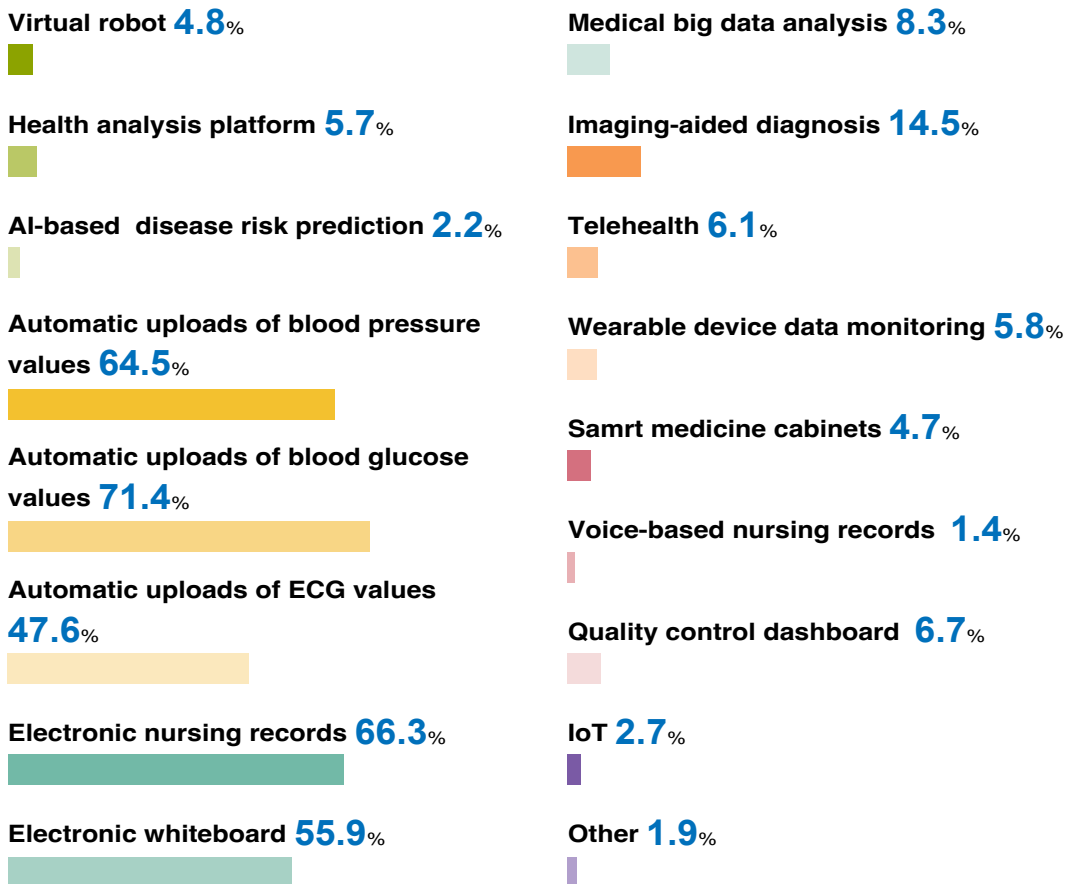
a Russian patient. They were able to rely on the latest technology to communicate with him without learning Russian from scratch.

### Digital Aids Greatly Reduce the Likelihood of Human Error

Which products of digital transformation do nursing practitioners currently use in their clinical and administrative work?

The top-ranked item is automatic uploads of blood glucose values (71.4%). The second- and third-ranked items are electronic nursing records (66.3%) and automatic

## Q2 | Which products of digital transformation do you currently use in your clinical and administrative work? (N = 1,093, multiple selections)

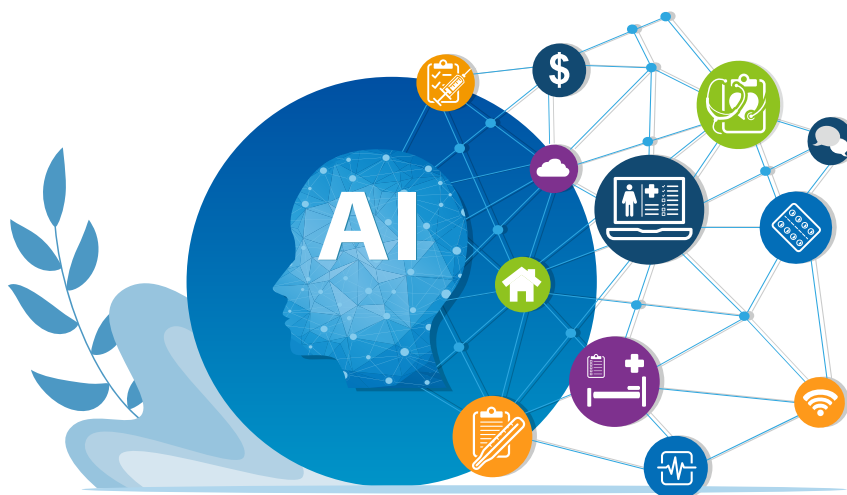


uploads of blood pressure values (64.5%), closely followed by electronic whiteboards (55.9%) and automatic uploads of ECG values (47.6%). There is a significant gap between the aforementioned options and imaging-aided diagnosis (14.5%). The remaining options are used by less than 10% of the surveyed nursing practitioners. It is however evident from the data that different units make at least some effort to utilize digital tools to ease the workload of their nursing personnel.

In our age of digitization, patients and nurses no longer have to create hand-written records. Some data derived from physiological examinations can be uploaded automatically and imported directly into electronic record forms, which helps prevent data entry errors and ensures data immediacy. This gives other members of the medical team immediate access to the latest examination results. Nursing practitioners are no longer required to copy vital sign values recorded on a piece of paper one by one into patient records after completing their regular work tasks. It is also no longer necessary to prepare differently colored pens to distinguish between body temperature, pulse, and breathing in hand-drawn graphs. All these manual procedures have been converted into data records and the generated graphs are both accurate and visually appealing. In conclusion, these technologies help reduce administrative processing times and the likelihood of human error.

### **Utilization of Electronic Whiteboards to Prevent Falls**

As for the use of electronic whiteboards, every nursing station at Hualien Tzu Chi Hospital features a large 60-inch screen which shows the movements of every patient in the ward. It is displayed on the board who is the head nurse on duty, which patients







are on the way to the operating room or examination rooms, and which patients are prone to falls. Even information pertaining to the fire-fighting team of the unit is shown on the board.

The hospice ward has utilized information pertaining to high-risk fall patients on the electronic whiteboard paired with Team Resource Management (TRM) concepts to enable volunteers to participate in fall prevention. In 2021, the ward established a PCOC (Palliative Care Outcome Collaboration) electronic record system. Patient care status is indicated through lights in different colors. A red light signals that there is an urgent need to update or revise the patient care plan, while a green light indicates that the patient is in stable condition and discharge preparations should be initiated or ongoing observation is sufficient. Ms. Chiang Ching-Chun, Head Nurse of the hospice ward, points out that these lights on the electronic whiteboard enable team members to constantly monitor the patient's situation and status and deal with patient problems in a timely manner.

### **Long Distances Can Be Bridged with Online Meeting Technologies**

The most successful example of imaging-aided diagnosis application is wound care administered by RN Hsu Mei-Yu. The team has taken on the Risk Fund Program in the Hualien and Taitung area which is hosted by the Ministry of Health and Welfare. It utilizes a wound image recording device developed by the Industrial Technology Research Institute and collaborates with home health nurses in the Hualien/Taitung region in the imaging-aided diagnosis of wounds and case-based wound management for patients in home care settings with the ultimate goal of providing timely care for patients in remote regions. The hospice ward of Hualien Tzu Chi Hospital adopted a cloud-based care system as early as 2013. This system allows family members to communicate with the medical team of the hospice ward by video conference and receive real-time information pertaining to medical care and wound care status in their homes without visiting the hospital. The drop in rehospitalization rates can be mainly attributed to this cloud-based system.

In addition to the 16 items listed on the questionnaire, a significant number of surveyed nursing practitioners entered other items such as the Chinese Medicine-based Physical Condition Detection System, which allows automatic detection of physical conditions after entry of data pertaining to the patient's physical status. Another example mentioned by the respondents is long-term care and case management systems. For instance, hospitalized patients can be referred to long-term care case managers of public health bureaus through a long-term care APP. Another approach

is the management of the allocation and locations of hired caregivers through the long-term care management system of the hospital, which can even be linked to salary calculation.

### Easing of Workloads and Rapid Access to Key Information

We asked the surveyed nursing practitioners how AI products facilitate their clinical work. The most frequently selected option is easing of workloads accounting for 71.6% followed by rapid access to patient information (56.4%). The third- and fourth-ranked items are rapid query of patient examination results (48.8%) and error reduction (48.7%), followed by shortened time required for data statistics (42.2%). These results reflect the benefits of digital tools in clinical applications. Some respondents believe that these products are capable of reducing reporting times (31.9%), enhancing care quality (31.3%), strengthening teamwork (23.9%), and reducing the frequency of inquiries by other team members (22.9%).

Q3

### How do AI products facilitate your clinical work?

( N = 1,093, multiple selections )

Easing of workloads **71.6%**



Increased patient satisfaction **12.5%**



Error reduction **48.7%**



Enhanced care quality **31.3%**



Increased interactions with patients **10.9%**



Decreased reporting times **31.9%**



Rapid access to patient information **56.4%**



Rapid query of patient examination results **48.8%**



Strengthened teamwork **23.9%**



Shortened time required for data statistics **42.2%**



Reduced frequency of inquiries by other team members **22.9%**



Other **1.0%**

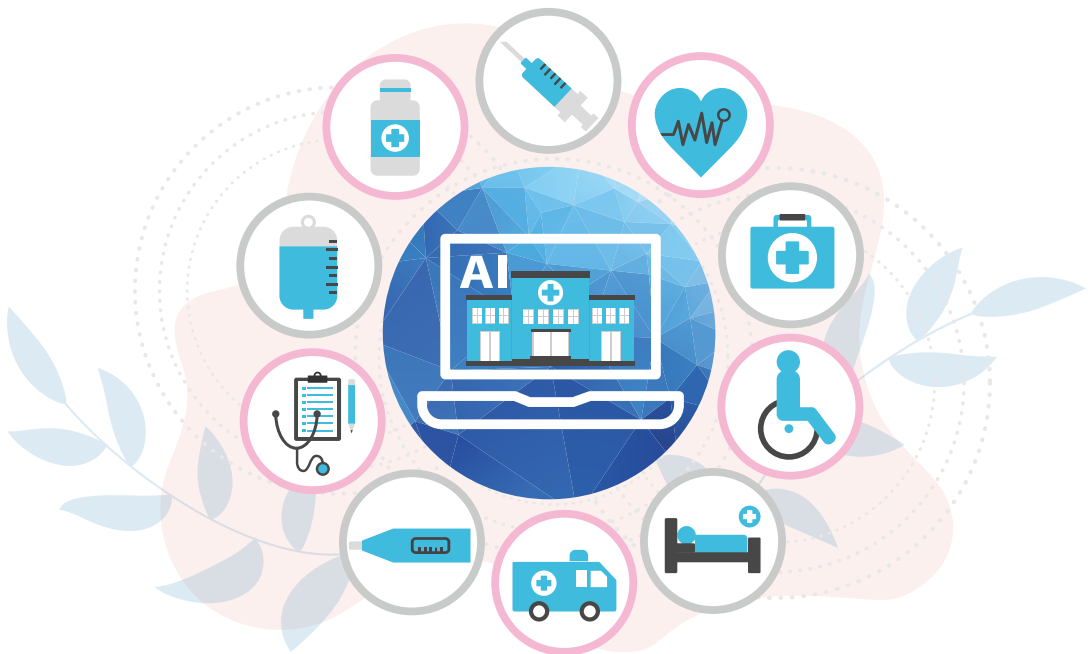
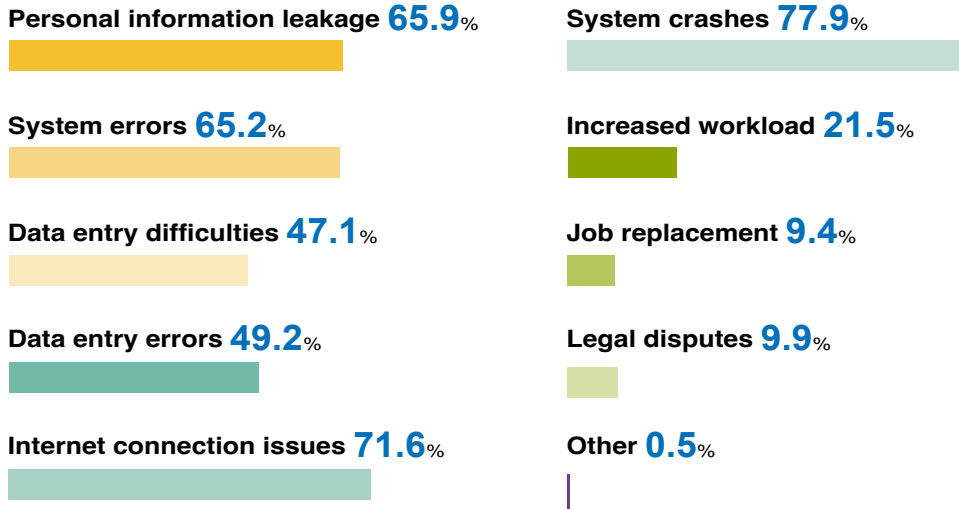




# Q4

What hidden concerns do you have regarding the products of digital transformation?

( N = 1,093, multiple selections )



In the past, nursing personnel were responsible for query and review of all patient information. Direct inquiry with RNs by other members of the medical team therefore represented the most convenient and effective way to acquire accurate information. However, this frequently resulted in work interruptions since RNs had to respond to inquiries of physicians and nurse practitioners. The aforementioned new technologies ensure rapid access to the latest information by all team members. The system will even directly notify the attending physician of emergencies, which removes the necessity of reporting by nursing personnel.

### **Digitization and Visualization of Nursing Management**

All nursing departments of Tzu Chi Hospitals in Taiwan constantly refine and optimize their information management practices. Taipei Tzu Chi Hospital organized a workshop for the sharing of experiences in the application of visualization dashboards in the field of nursing quality indicators. Dalin Tzu Chi Hospital followed up with a workshop on medical big data and Power BI. The Nursing Department of Hualien Tzu Chi Hospital launched its Power BI management system in 2022.

In the past, statistical analysis had to be conducted of complex patient abnormalities or abnormal nursing records. Further analysis of causes of occurrences indicated in the charts generated after analysis requires renewed queries of relevant details (personnel, matters, times) in the source data. After adoption of the Power BI management system, an AI Dashboard that clearly displays relevant events is available. This dashboard enables administrators to identify quality management issues and conditions in an effortless manner.

The answers of the respondents clearly reflect a positive evaluation of the process of digital transformation in hospitals. Quite surprisingly, only 10.9% of the surveyed RNs believe that such technologies can increase interactions with patients and only 12.5% are of the opinion that they will enhance patient satisfaction. These results therefore serve as a clear reminder to nursing supervisors that nursing tasks rely on the concerted efforts of frontline nursing staff. This includes building of work environments or process improvements.

### **Teething Troubles in the Field of Internet Connection and System Stability**

The fourth questionnaire item explores hidden concerns associated with the products of digital transformation. The top-ranked options are system crashes (77.9%) and Internet connection issues (71.6%), followed by personal information leakage



(65.9%), system errors (65.2%), data entry errors (49.2%), and data entry difficulties (47.1%). Ms. Chia-Hui Tai, nursing supervisor at Hualien Tzu Chi Hospital, points out that the acceptance of new equipment such as Internet-connected blood sugar monitors or ECG is very high among clinical personnel, but the functioning of these devices tends to be negatively affected by frequent Internet connection issues.

Potential issues can be illustrated with the following example: A Registered Nurse had to reconnect a blood sugar monitor to the charger after a time-wasting process of repeated connection failures and constant display of connection error messages due to signal instability. She remarks that data records for two patients could have been completed within the same time if she had switched to manual operations and data recording. It is therefore not surprising that 21.5% of the respondents believe that the products of digital transformation will result in increased workloads. Despite the fact that the percentage of respondents who express concern about their jobs being replaced (9.4%) and potential legal disputes (9.9%) is quite low, these worries bear clear testimony to a lack of trust in these new tools on the part of certain practitioners. Insufficient product stability seems to be the main concern.

### **The Future of Healthcare Digitization and Smart Wards with a Human Touch**

Finally, we asked the respondents about their expectations with respect to hospital digitization. 7 of the 8 listed options were selected by more than 30%. Only 2.5% chose the option “AI robots”. The top-ranked item is smart medical device management systems (55.9%), followed by voice-based nursing records (47.8%), smart wards (43.2%), smart medicine cabinets (41.2%), and imaging-aided diagnosis (41.0%). Nursing practitioners may have different mental images of these options. Smart wards encompass all the other options. Hualien Tzu Chi Hospital is therefore firmly committed to creating high-quality smart wards and completing its All-in-one Smart Mobile Ward Round System as early as possible.

In the final section, we solicited suggestions from the respondents. Some nursing practitioners recommended a vending machine for medical supplies similar to beverage vending machines to save the hassle of routine counts and accounting. Others suggested the development of AI-based disease risk prediction and medical big data analysis for quality management and monitoring. Outpatient nursing personnel expressed the wish for an automatic queue management system and automatic display of the number of patients who have already checked in.

It is often said that the only constant in this era of Industry 4.0, the fourth industrial

# Q5

**What are your expectations with respect to the optimization of the following smart functions in the context of hospital digitization? ( N = 1,093, multiple selections )**

**Smart wards 43.2%**



**Smart linen management 30.8%**



**Smart medicine cabinets 41.2%**



**AI robots 2.5%**



**Voice-based nursing records 78.8%**



**Imaging-aided diagnosis 41.0%**



**Smart medical device management 55.9%**



**Smart medical device management 37.3%**



revolution, is change. The analysis of big data pertaining to clinical care, disease diagnosis, and treatment provides healthcare professionals with a clearer understanding of the results and side effects of past therapies. Big data can also be utilized to forecast diseases. In the age of Industry 4.0, the main focus of all designs has shifted back to individual demands. Patient/family member/medical personnel demands are centered around immediate care. The digital transformation of the healthcare industry is associated with a painful transition period. With a view to guaranteeing the stability and accuracy of new products, we must put significant time and effort into the testing of the new and the old. Consequently, nursing personnel and nursing supervisors in particular must accept new ways of thinking and modes of operation more open-mindedly. Needless to say, the development of new programs and equipment must always be human-centered. The ultimate goal from the perspective of clinical nursing personnel and patients is to turn cold technology into helpful tools with a human touch.