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Health Pods for Automated Triage Improve Efficiency and Satisfaction in Nurses and Patients

Giuseppe Andreoni [1,2,3,*], Alessandra Santangelo [3], Riccardo Sannicandro [4] and Alessandro Nizardo Chailly [3]

[1] Design Department, Politecnico di Milano, 20158 Milan, Italy
[2] Bioengineering Laboratory, Scientific Institute "E. Medea", 23842 Bosisio Parini, Italy
[3] Capsula s.r.l., 20161 Milan, Italy; as@capsula.app (A.S.); anc@capsula.app (A.N.C.)
[4] Department of Emergency and Admission, Scientific Institute "Ospedale San Raffaele", 20132 Milan, Italy; sannicandro.riccardo@hsr.it
* Correspondence: giuseppe.andreoni@polimi.it

Featured Application: Phygital solutions for automation of healthcare processes.

Abstract: Emergency department (ED) overcrowding and limited staff availability pose ongoing challenges to healthcare efficiency. Recent advancements in automated health technologies, such as the health pod, aim to alleviate these pressures by automating vital sign measurements for low-risk patients. Over three months, the CAPSULA Health Pod was implemented and used in a paired setting with normal triage procedures in an urban hospital ED; it demonstrated improvements in triage efficiency and patient satisfaction, aligning with evidence that supports automation as a solution in high-demand healthcare settings. With 1342 assessments across 404 patients, despite some challenges with elderly patient engagement, CAPSULA achieved excellent measurement accuracy and relevant efficiency for the first assessment of patients in crowded situations and for reassessment. The findings indicate CAPSULA's potential to reduce patient wait times, improve workflow efficiency, and support resource-limited EDs. Although the main limitation remains IT integration, the system demonstrates scalability and potential for broader adoption.

Keywords: hospital emergency department; healthcare process efficiency; patient satisfaction; health pod; automated triage; vital sign self-measurement

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1. Introduction

Hospitals are complex systems requiring integrated and efficient organization of both inter and intra-departments to provide the best possible care for patients. One of the main entry points to the hospital is the emergency department (ED), which has great importance, but it also faces relevant challenges that can hamper the overall flow of the hospital, have an impact on personnel performance and wellbeing, and can affect the quality of care for patients [1].

In recent years, during and after the pandemic period, different factors emerged that affect the safe and efficient operation in EDs: in particular, staffing shortages, limited capacity to manage accessed patients, and performance of ancillary services can lead to an increased risk of medical errors together with longer wait times, resulting overall in a lower quality of care [2,3]. These critical elements constitute the ED situation: usually, this department is one of the busiest areas of the hospital, experiencing spikes in patient volume, which can strain staff resources.

In this context, two of the major problems within hospital emergency rooms are crowding and management of continuous reassessments of waiting patients [4]. Although foreseen by guidelines that mandate regular reassessment to monitor condition changes, this process is often deprioritized due to limited available personnel, who are frequently diverted to manage high-risk, complex cases. This gap in care creates a cycle where low-risk patients may experience delayed evaluations, increasing the occurrence of undetected health deterioration and leading to potential complications. Additionally, ED overcrowding impacts both patient and staff satisfaction, as prolonged wait times and inconsistent reassessments reduce at the same time the service efficiency and the patient trust in the care process [4–7].

The persistent overcrowding in EDs is driven by a combination of factors: an aging population, rising rates of chronic illnesses, and limited inpatient bed availability, which restricts patient throughput and extends ED stays. These conditions strain healthcare resources and further increase wait times, as staff struggle to meet the needs of a growing patient volume while also attempting to maintain high standards of care [6]. This issue has made it imperative for healthcare providers to explore innovative solutions that address both operational efficiency and patient care quality.

One promising response to these challenges is the use of automated solutions like health pods: they are self-contained, autonomous stations equipped with medical devices capable of autonomously monitoring vital signs. Health pods—like the CAPSULA Health Pod here tested—offer a novel approach by automating the measurement of vital parameters, allowing low-risk patients to be monitored independently from direct nurse supervision [8]. This automation can facilitate triage operations and reduce the workload on ED personnel, enabling them to prioritize high-acuity cases without compromising the safety of other patients waiting in the ED [8,9]. In this case, telemedicine systems are not applicable because health pods are an in-person setting with possible urgent intervention. Other possible solutions can be represented by mobile apps, but these digital solutions lack certification as medical devices, which is an essential requirement and do not integrate the necessary measurement of the vital signs through specific biomedical devices.

This study presents the first pilot test of a health pod, certified as a biomedical device and registered by the Italian Ministry of Health with the specific intended purpose, that is implemented in the waiting area of a busy urban ED. By autonomously managing access and measurement of vital signs for patients categorized as low risk during the triage process, the CAPSULA Health Pod aims to reduce triage time and to allow a continuous reassessment process, thus alleviating some of the bottlenecks associated with ED overcrowding. Evidence suggests that such digital health solutions not only streamline workflows but also maintain high accuracy in vital sign measurement, offering a potential improvement in triage efficiency [10–12]. As these pods take on repetitive, time-intensive tasks, voluntary staff are freed up to address critical cases, ultimately supporting better resource allocation and enhancing overall patient satisfaction [12].

2. Materials and Methods

The CAPSULA system is an IoMT system integrating some medical devices for the self-measurement of heart rate (HR), respiratory rate (RR), body temperature (BT), oxygen saturation (SpO_2), and arterial blood pressure (BP) with diastolic and systolic values. This setup enables continuous monitoring with minimal staff intervention, reflecting the feasibility of automated systems in high-volume environments.

Health pods are new systems that include small spaces equipped with medical devices where users can measure several biomedical parameters related to their health status and receive other medical services [8]. The presence (or not) of a healthcare operator to

support or lead the procedure is one important variable. In the proposed case study, where the reduction in effort of the nurses is one of the main targets, the preferred solution of not having the operator is mandatory. In case of absence, the subject has to carry out the procedure in self-mode. In this case, a very efficient, intuitive, and engaging user experience/user interface (UX/UI) is needed to avoid procedural errors and obtain reliable measurements. For this reason, after a deep task analysis and co-design workshop with users (patients and nurses), the CAPSULA Triage system uses an engaging UI that guides step-by-step the patient in the process: images and animations of devices, measuring procedures, status of the systems with confirmation of having properly completed each measure, meaning of values, and sequences of actions to be carried out are proposed to the patient so that the efficiency and reliability of operation are achieved. This will be further analyzed and discussed in the experimental outcomes.

The consent was obtained by the participant in anonymous form at the beginning of the process: entering the CAPSULA Pod each user was asked to sanitize the hands to start the process and by tapping the START button the user confirmed the agreement to participate to the protocol of automated ED triage analysis, including the collection of data in anonymous form and their possible publication only in aggregated and anonymous form.

The CAPSULA triage system was installed for three months (April–July 2024) in the ED of a reference city hospital. In particular, the CAPSULA pod was placed in a low-intensity zone for low-risk patients identified during initial triage that was carried out by the nurse (Figure 1). This setup assessed the system's capacity to streamline patient management without requiring continuous nurse intervention, providing real-world data on CAPSULA's efficiency and care quality.

Figure 1. The CAPSULA "Triage express" health pod in the waiting room of the emergency room.

Immediately after the triage conducted by the nurse, the low-risk patient is asked to repeat the vital sign measurement to verify the reliability of the measures with the self-assessment procedure. Then, they were asked to repeat the CAPSULA assessment every 30 min. All data were stored in the system's cloud platform: each record is anonymous and contains all vital signal values, the parameters of the subject, and the ECG track, which HR

and RR are computed from. This initiative aims to enhance the management of low-risk and low-intensity (the so-called "blue code") patients by continuously monitoring vital signs: SpO_2, BT, HR, RR, and BP. While these patients are stable, they present symptoms that may lead to relapses, requiring further evaluation. In case one or more of the vital signs fall outside the normalcy range, or they differ more than 10% from the previously measured value, the health pod provides a warning to the nurse so that a complete re-evaluation and eventual decision can be performed. This involves a sentence ("please contact immediately the triage nurse") printed onto the paper ticket released to the patient. In this first experiment, we asked the patient to self-check this possible deviation and to refer to the nurse. In fact, the process is still nurse-driven: the system can support the self-measurement of vital signs and the compilation of the anamnestic questionnaire but the nurse is still in charge of the classification for legal reasons. In the future, this process is expected to be automated and customized for the specific triage (cardiovascular, traumatological, neurological, dermatological triage, etc.), including the dedicated anamnestic questionnaire with questions guiding patients to the proper decisional tree with clinically validated rules and algorithms.

The system was used either in total autonomy or with indirect supervision. In fact, during some hours of the day, assessments in the CAPSULA clinic pod were also supported by personnel of a voluntary service, who could suggest that the patient uses the CAPSULA Health Pod after triage for reevaluation. In any case, nurses were available to assist if necessary, ensuring patient comfort and addressing technical issues, though the device could operate independently.

Data Collection and Analysis

Metrics on vital sign measurements, time-of-day usage, demographic metrics and patient interaction duration were collected and analyzed.

At the end of the experimentation, interviews with hospital personnel, the coordinator of the ED and 2 triage nurses were recorded to integrate the quantitative data with subjective assessments. Also, a panel of 50 patients was anonymously interviewed after the CAPSULA measurement process with a single question about their satisfaction (scoring scale: 0 = very dissatisfied; 1 = dissatisfied; 2 = neutral; 3 = satisfied; very satisfied). These scores were collected by the voluntary personnel present at daytime in the ED room in anonymous form; as the patients were in the waiting room of the ED, we decided not to proceed with other and more time-consuming questions.

3. Results

3.1. Procedural Data

During the period, the implementation of the Capsula Clinic within the low-intensity emergency zone at the hospital reported the collection of 1342 tests in response to 404 admissions (with an average of 3.32 tests per person).

The test did not analyze the CAPSULA usage rate with respect to the total number of visits to the ED: the participation in the study was on a voluntary basis and during the experimentation, the nurses were not asked to record this datum to ensure that it did not impact their effort.

No nurse intervention for measurement was recorded.

From the interviews with the service coordinator and two nurses, it was confirmed that CAPSULA allowed for a 30% reduction in triage time in the case of multiple and simultaneous visits to the ED, and a 100% reassessment efficiency in this environment.

For the 404 participants, CAPSULA achieved a 100% process completion rate, demonstrating user-friendliness and reliability. No session was interrupted or abandoned. The

system averaged a triage time of 2 min and 4 s for competing all four tests, indicating efficiency improvements over traditional methods.

Data about the system's usage are presented in the following Figures 2–4.

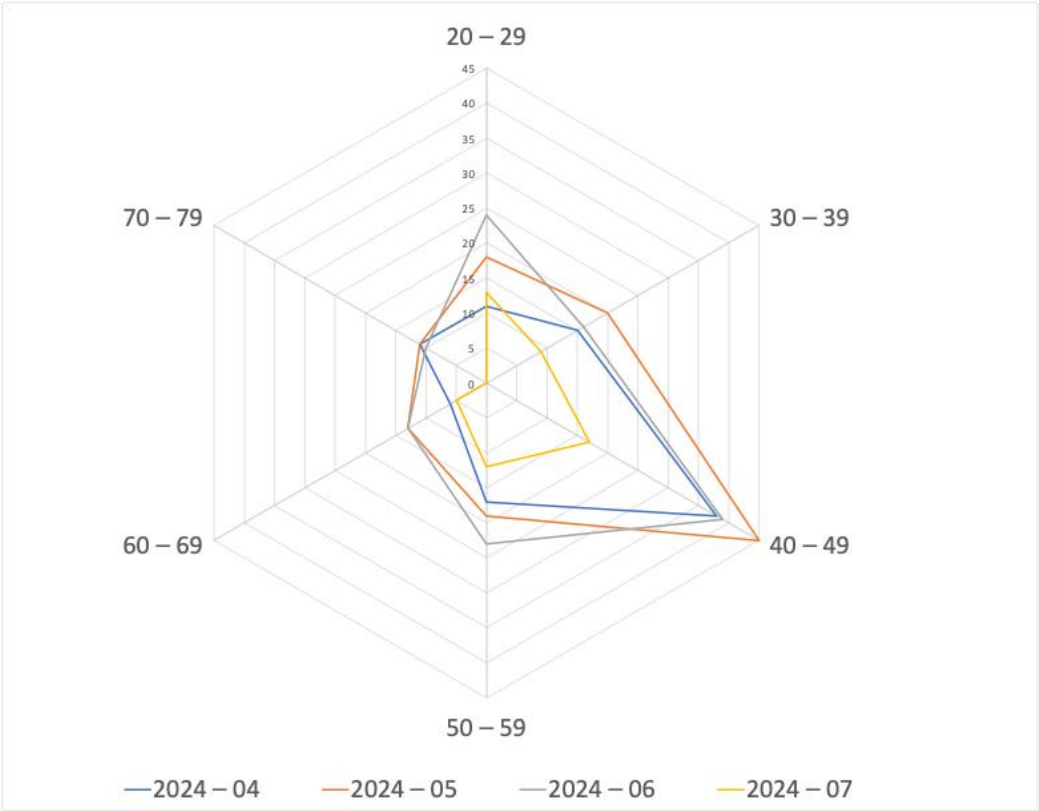

Figure 2. CAPSULA utilization by month and age groups: monthly distribution of CAPSULA usage by age group (April–July 2024).

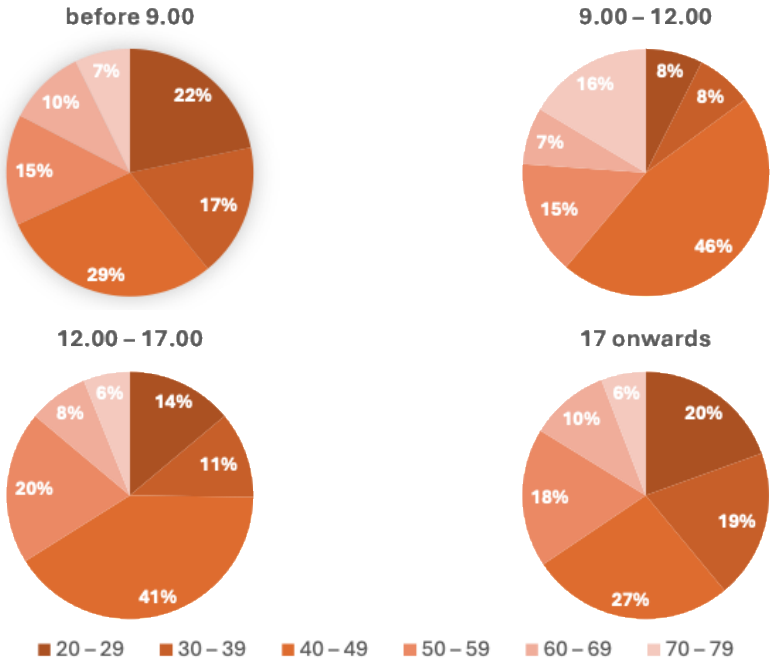

Figure 3. Daily usage of CAPSULA by time and age ranges of the population.

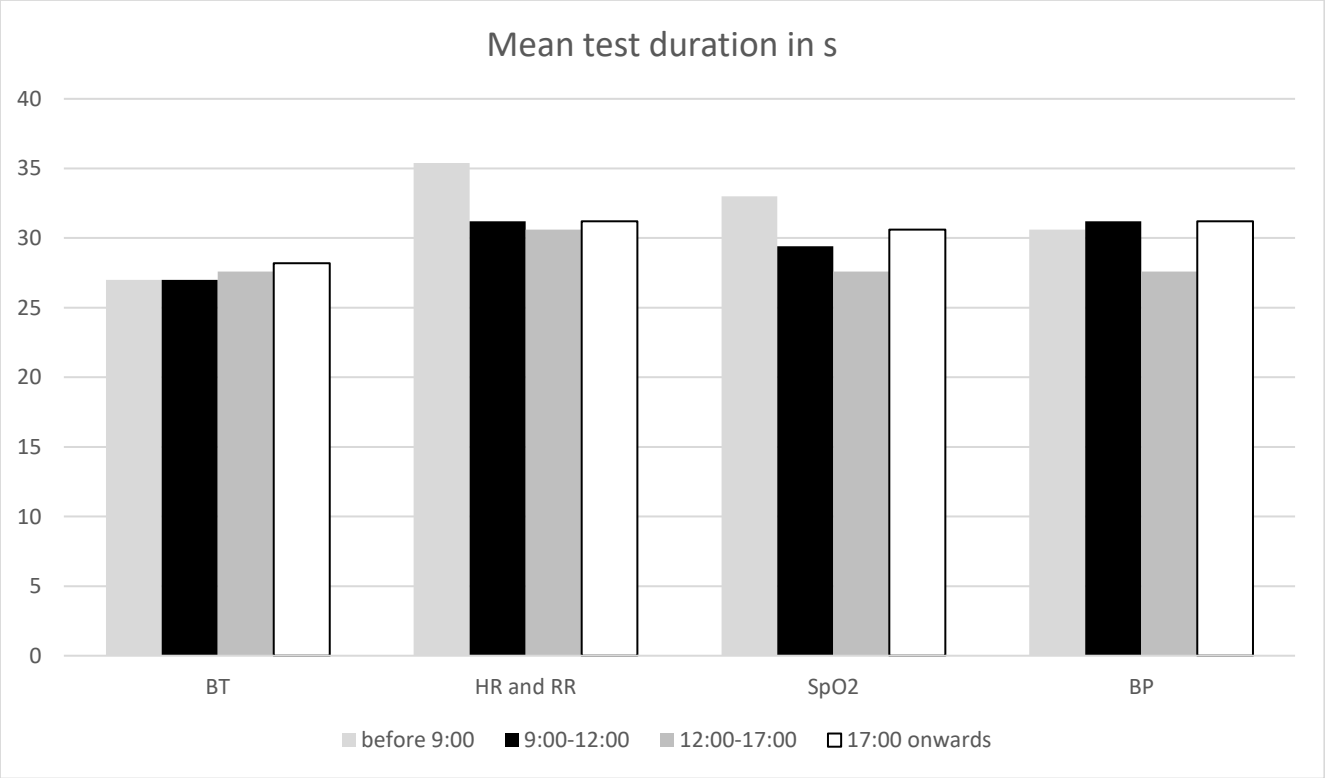

Figure 4. Mean values of test duration expressed in seconds for the four biosignals measured at different times of the day: before 9:00, 9:00–12:00, 12:00–17:00, and 17:00 onwards.

Figure 2 shows the presence of a peak in usage in May, particularly among the 30–39 and 40–49 age groups, followed by a gradual decrease in the following months. Younger and middle-aged groups (20–49) were the most active users of the CAPSULA pod, while older age groups (60–79) show limited engagement. The 40–49 age group had the highest average participation and significant variability, likely due to increased attention or a greater need for health monitoring in this range. In fact, visits to hospital EDs are usually serious for people in this age range that are usually healthy. The extreme age groups, such as 20–29 and 70–79, show lower and relatively stable participation, due to the following justifications: younger populations visit the ED mostly for traumatic issues that limit their mobility (bone or joint traumas), so visiting the CAPSULA service requires movement and patients can not or may not wish to move to reach the pod; elderly populations usually visit the ED for possibly severe pathologies (cardiovascular, neurological, etc.), so that they were classified as high-risk patients and quickly admitted for further evaluation.

CAPSULA's peak usage was aligned with the ED's busiest hours (08:00–10:00 and 16:00–18:00) as reported in Figure 3. Notably, CAPSULA's adaptive functionality allowed for patients to be processed slightly faster during these times, reducing wait times and supporting a smooth ED workflow.

Across all time intervals, there is a noticeable trend of higher CAPSULA usage among younger adults (particularly those in the 20–29 and 30–39 age brackets) and lower engagement from elderly patients. The highest percentage of users can be found in the 40–49 age group during the morning hours (before 9:00 and 9:00–12:00), highlighting that middle-aged individuals might find the system convenient for early-day visits. In the afternoon and evening (12:00–17:00 and 17:00 onwards), there is a slight shift, with some reduction in the younger age groups' participation, while the 40–49 age group still forms a significant portion of users, even if slightly reduced.

3.2. Clinical Measurements

In relation to data accuracy and in accordance with the nurse's measurement, the following Figures 5–9 illustrate the obtained outcomes in terms of data for each physiological parameter.

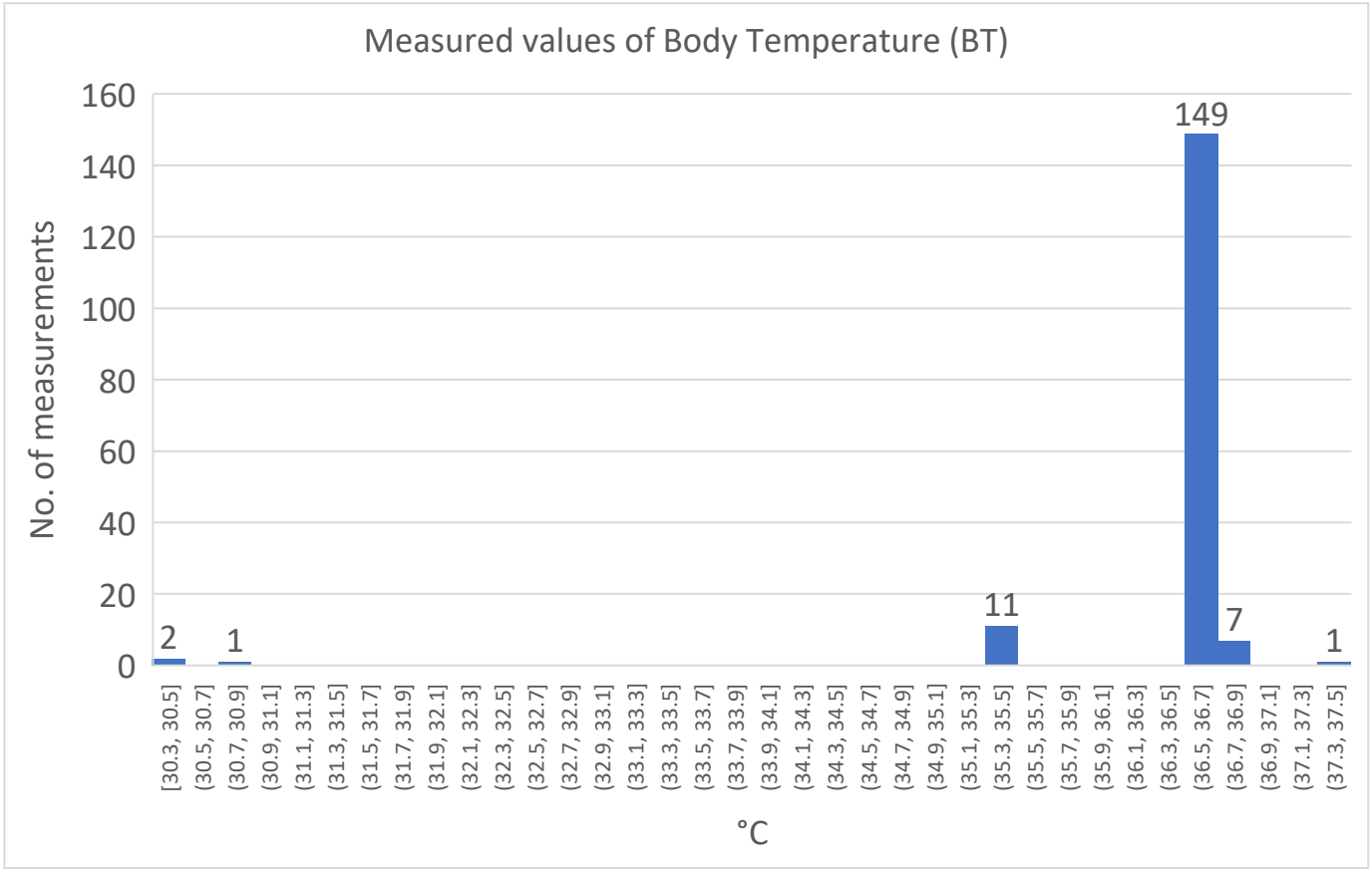

Figure 5. Measured data of body temperature (temperature in °C).

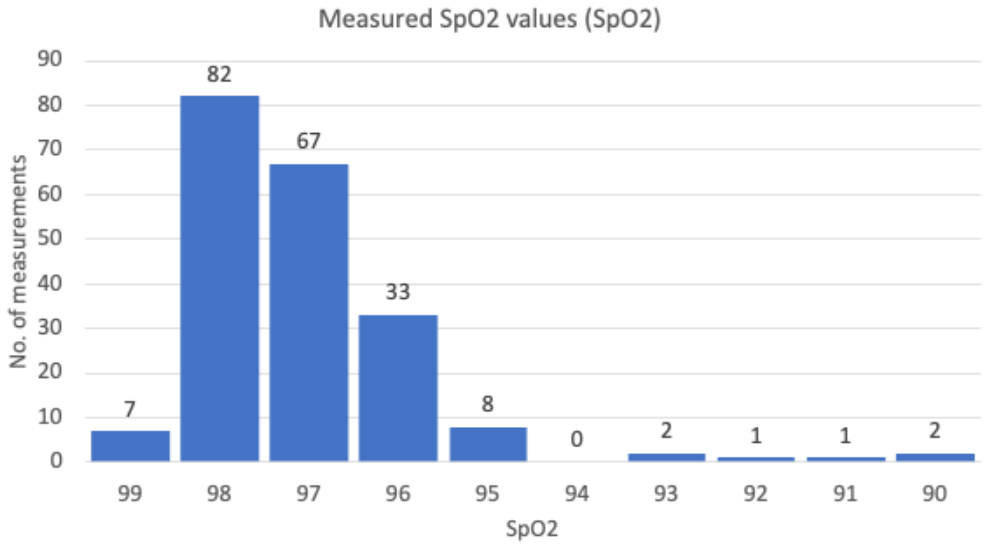

Figure 6. Measured data of pulse oximetry (% of blood oxygen saturation).

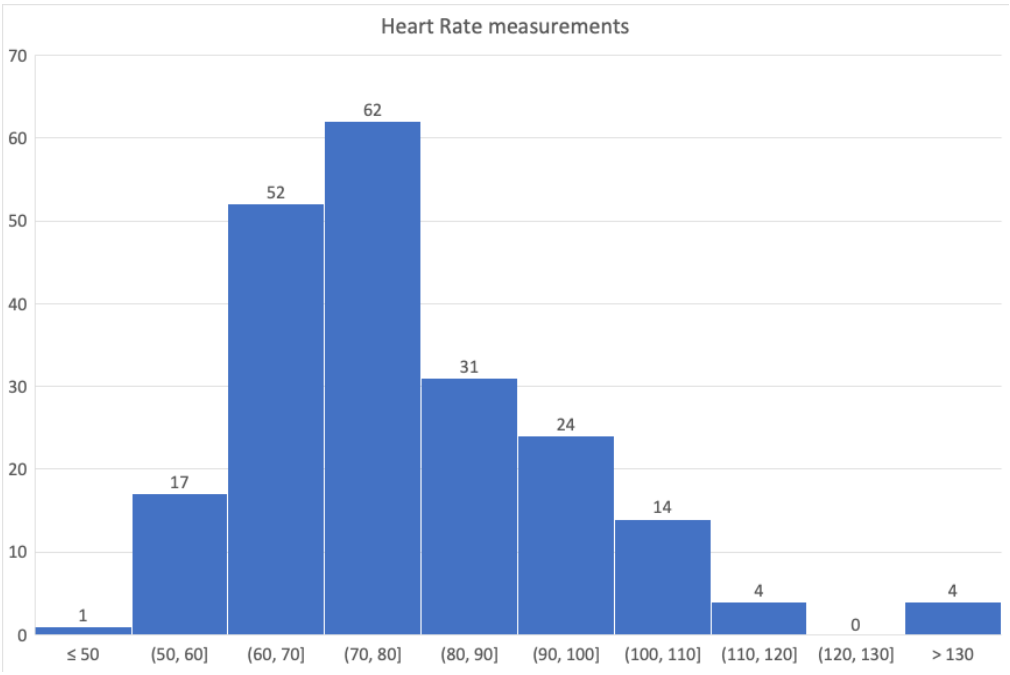

Figure 7. Measured data of heart rate (in beats-per-minute).

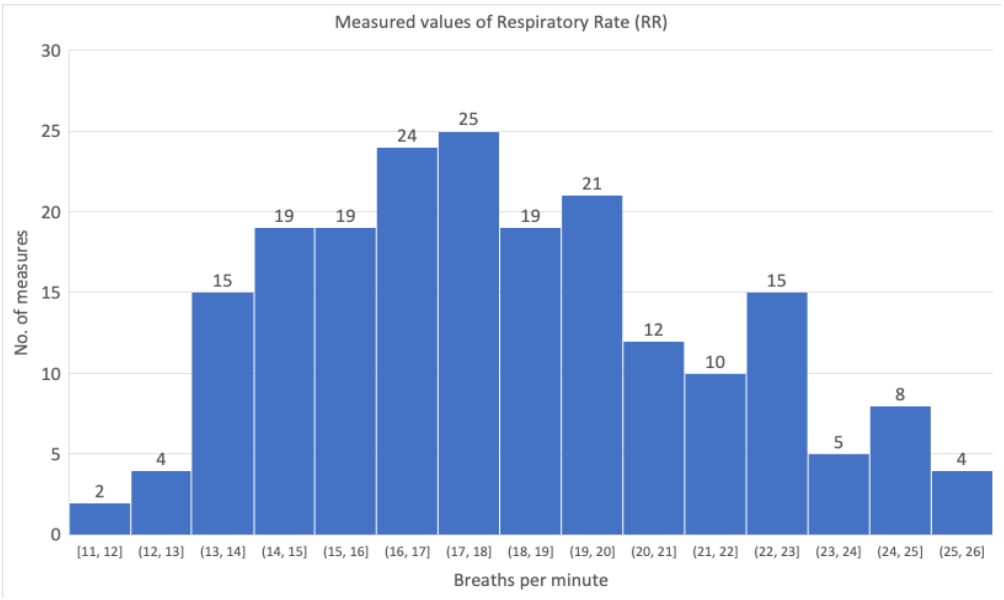

Figure 8. Measured data of respiratory rate (in breaths-per-minute).

Figure 5 shows the very good reliability of the self-measurement of the body temperature, as expected due to the high familiarization of patients with this measure and related instruments. Indeed, three outliers (<1% of the total measurements) are present (measured body temperature between 30.3 °C and 30.9 °C); this is due to the poor positioning of the thermometer on the forehead at the correct distance, and therefore the lower environmental temperature of the air that is present between the body and the device. Also, the other eleven measurements (=2.72% of the total measurements) of body temperature in the range 35.3–35.5 °C are shown in the same Figure 5; the reason for the underestimation of the value is probably due to the too short time for the measurement (the subject removed the thermometer before the conclusion of the process, thus resulting in a lower measured temperature). These errors, accountable as procedural errors, were 3.46% of the total measurements. This value is very acceptable in the analyzed setting. However, this finding

suggests the possible revision of the UI to improve the awareness of the subject about the process status and correct the positioning or the time needed by the thermometer to complete the right measurement.

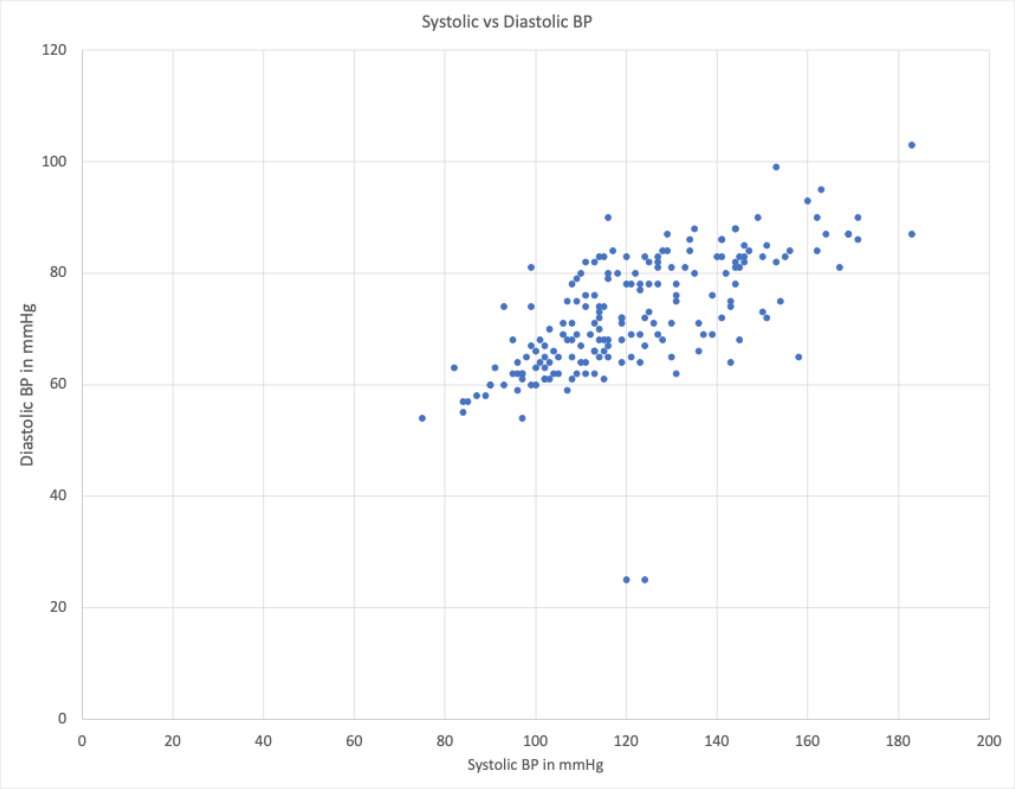

Figure 9. Measured arterial blood pressure in mmHg.

The SpO_2 measurement protocol is more standard and the device is fixed in the health pod so that the user is required to insert their finger into the ring only. No positioning errors were found, and the measures were all valid. Figure 6 shows the excellent reliability of the self-measurement of the pulse-oximetry and the SpO_2 value in the expected normalcy range for subjects with the low-risk code. Some values are quite low but within the range of possible light de-saturation in a small portion of the population and this can reflect the presence of poorly irrorated hands, thus producing an underestimation of the actual oxygen saturation level. However, these low values are only 6 out of 404 records (1.48%).

HR data were obtained both from pulse oximetry and the measurement of 1 ECG lead using the participants' hands (Figure 7). The considered values were those computed by ECG. The HR value distribution is within normalcy ranges. A few "outliers" are present, including one value below 50 beats-per-minute (bpm), four values greater than 140 bpm in the high HR range, for a total of 5 out of 404 records (1.24%). Analyzing the tracks, these data are affected by poor signal quality with a high frequency content and low signal amplitude. This may be due to the poor contact (a very small portion of the hand surface, or a too strong pressure of the hands onto the electrodes with electrical activity of the arm muscles—in high frequencies—that is added to the ECG signal) between the hands and the electrode. The overall assessment of reliability is very good.

RR data were computed from the ECG track through an integrated ECG-Derived-Respiration algorithm. All the data are in the normalcy range and in line with the expected values (Figure 8). Again, for this vital sign, the overall assessment of reliability is very good.

The BP data are very good and coherent. Only two measurement errors were found in the diastolic values (diastolic BP < 30 mmHg) for a 0,48% error rate. Some peaks in systolic

BP (>180 mmHg) can also be noted in the graph but we had no confirmation of these peaks after double-checking with the nurse because they were collected in a self-reassessment during the daytime without the presence of voluntary staff members that carried out this service during the study. For this reason, and in the presence of such limited outliners, we can confirm that for the BP measurement, the overall assessment of the reliability of the automated system is very good.

To analyze the range of variation in each vital sign, we also computed the coefficients of variation (CV). The values of the CV for each physiological parameter highlights the relative very low dispersion in measurements for each parameter, as shown below:

- BT: CV = 2.38%;
- SpO_2: CV = 1.38%;
- HR: CV = 23.84%;
- RR: CV = 17.81%;
- Systolic BP: CV = 17.46%;
- Diastolic BP: CV = 15.10%.

Indeed, the CV of HR, BR and BP reflects coherently the normal variability of these parameters.

3.3. Satisfaction Data

From the interview of the ED personnel, it emerges how relevant the use of the system can be; thus, the possible introduction of the health pod in the process could favorably match the need of the re-assessment of patients. Also, in case of simultaneous visits to the structure, nurses confirm the importance of having a medical device that could facilitate the triage procedure with a reliable self-measurement of vital signs and a compilation of the basic anamnestic questionnaire.

Regarding the patients, the satisfaction survey gave very good results (Figure 10). No patients were dissatisfied by the process; indeed, satisfaction and high satisfaction were expressed by most of the respondents.

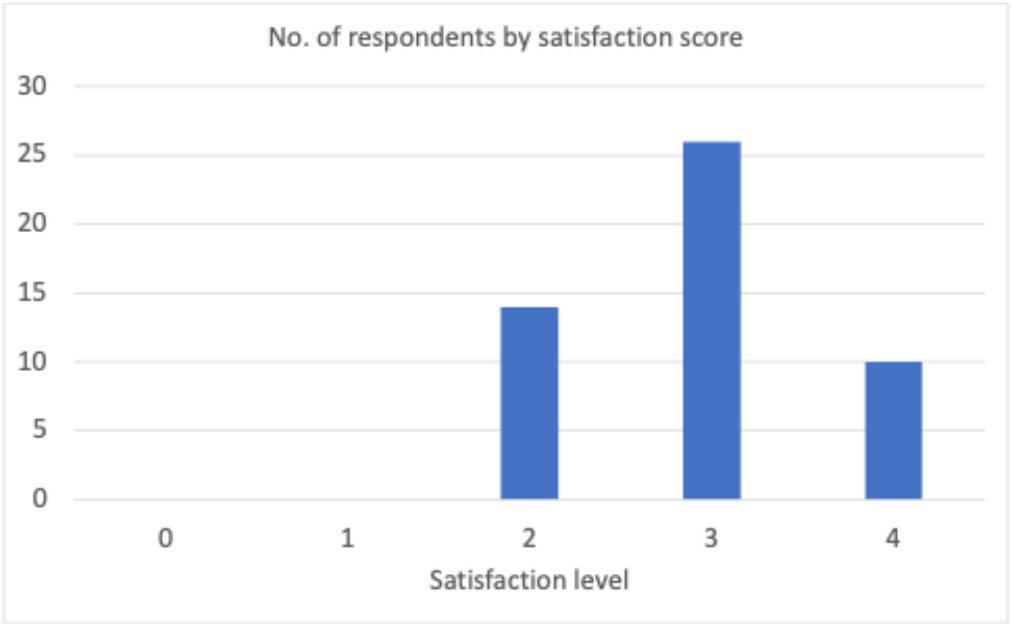

Figure 10. Results of the satisfaction survey from the panel of patients (0 = very dissatisfied; 1 = dissatisfied; 2 = neutral; 3 = satisfied; 4 = very satisfied).

4. Discussion

The main scope of the paper was to test and evaluate the impact of an automated triage solution for basic anamnesis and vital sign measurement. For the purpose, in collaboration with a city hospital, it was decided that the test would be carried out only on low-risk codes patients that arrived at the ED on their own and that would execute the following procedures:

- Self-measurement of vital signs after the standard triage process performed by the dedicated nurse on a panel of 50 subjects to verify the accuracy of the systems in terms of coherency between the manual measures of the clinical personnel of the ED and the system; this verification was carried out with a random selection of cases and reported by the operators of the voluntary service (presence of the company personnel was excluded for prevent any potential conflicts of interest and not to polarize the results) who were also in charge of collecting satisfaction assessments;
- Self-measurement of vital signs in a period of 2 months with the health pod being freely accessible and without supervision of any operators; after the standard triage, the nurse recommended us to carry out our re-evaluation after 30 min and to report any significant changes.

At the end of the experimental period, interviews with ED personnel and voluntary personnel were also carried out for the estimation of the impact of the use of the health pod on the service in terms of time reduction in the procedures or service implementation (time for first triage, patient reassessment execution and time).

With this methodological approach, the three aspects were analyzed: reliability of the process, satisfaction of patients and personnel and impact of the new technological solution on the ED triage process.

Regarding reliability, the health pod measurements clearly matched the nurse-administered readings: a very limited number of outliers is shown, and nurses reported very good accordance between the self-measurements and the same measurements collected during the triage process. The deviations shown—although small, ranging from 3.46% for BT up to 0.48% for BP in procedural errors—suggest areas of improvement for UI design (better visual description and guide throughout the measurement process) to avoid the presence of artifacts (e.g., arm movement or talking while measuring BP, the imperfect positioning of the thermometer for the BT check, and/or the unstable position of the hands or the movement of the fingers during the recording of the ECG lead I to measure HR and RR) for process calibration and optimization to enhance accuracy in vital sign measurements.

In relation to satisfaction and impact, the deployment of the automated health pod in the low-intensity ED zone showed considerable benefits for managing non-urgent cases, with direct implications for workload distribution and patient flow. By autonomously handling low-risk patients, the health pod reduced nurse workload, enabling more focus on high-acuity patients and facilitating better resource allocation, particularly during peak hours. Nurses and their coordinator were interviewed at the end of the experimental period to collect data about this impact factor other than their satisfaction. All of the participants reported very high satisfaction for the following two main aspects: (1) the possibility of longer and higher quality assessments for critical cases in relation to the fact that low-risk cases are constantly monitored by the health pod and there is automated alerting when values of vital signs change so that the situation of that patient can be re-evaluated. Reassessment is usually not carried out by nurses due to the lack of time and this is considered a very relevant impact on the physical and mental workload of nurses in the ED. For this reason, the estimated rate for the overall impact on the re-assessment process is 100%, and the estimation of saved time for the process is estimated to be 5 min

per patient every 30 min. (2) Another key point raised in the interviews of nurses is the situation of multiple visits to the ED. In this case, a quick evaluation of the patient's vital signs and the anamnestic questionnaire can identify the priorities. Currently, this process is stressful, and it is managed by the operator that attempts to carry out this screening with their first visual impression. The interviewed nurses estimate that the improvement rate for this situation is about a 30% reduction in time for the screening of multiple cases. This impact is even expected to increase. In fact, with the use of health pods in the future, this process would be automated and customized for specific access paths to triage (cardiovascular, traumatological, neurological, dermatological triage, etc.); this differentiation could improve further the process and ensure that the proper decision is taken through a dedicated anamnestic questionnaire and validated decision support algorithms.

These impact outcomes are consistent with findings that automated systems can ease operational burdens and improve care efficiency in crowded environments. Also, patients reported a very good satisfaction score regarding the experience and its ease of use.

The analysis of demographic data allows us to draw some other comments. Apart from the previous consideration about the number of users belonging to different age ranges and related to pathology and high-risk coding, analysis of usage patterns revealed demographic trends, with higher usage among younger adults and lower engagement from elderly patients. These results imply that younger individuals may be more receptive to automated systems, while elderly patients might benefit from supportive options to foster ease of use. Indeed, some elderly patients were hesitant to use the health pod system, underscoring the need for alternative solutions tailored to specific patient demographics. This demographic trend suggests that while younger patients adapt quickly, additional support may be necessary to optimize engagement among older populations.

A crucial point to design and apply these biomedical devices is related to the diverse patient scenarios that these systems can handle. Health pods for self-measurement of vital signs in ED setting are dedicated (and we tested) to the following categories of patients:

- Patients without critical conditions (but usually, these patients arrive to the ED with an ambulance and are being already monitored),
- Patients with intact physical and cognitive abilities to undergo self-assessment of vital signs,
- Patients accompanied by relatives or people that can assist them in the self-assessment procedure in the health pod.

Patients with rare symptoms or non-verbal communication—that are usually accompanied to the ED—enter in other procedural flows with the level of priority according to their status and assigned by the nurse.

Integration challenges with existing hospital IT infrastructure limit real-time data flow, emphasizing the importance of seamless IT compatibility for optimizing the full potential of these systems. As self and automated triage solutions in the form of health pods, like the tested CAPSULA Triage version, become more widely integrated, future updates should address IT interoperability to improve data management.

5. Conclusions

This study aimed to evaluate the efficacy of health pod triage solutions in enhancing ED efficiency and patient satisfaction. Specifically, it investigated whether an automated triage system (CAPSULA Triage version) supporting anamnesis and vital sign monitoring can reduce the time required for patient assessment and reassessment. In accordance with prior studies suggesting that digital solutions in high-demand settings can enhance overall department flow and optimize resource use [10,11], we verified that the phygital

health pod exemplifies the potential exploitation of automation in ED settings, delivering measurable improvements in triage efficiency and patient satisfaction. The health pod system demonstrated a 30% reduction in triage time and 100% reassessment efficiency in high-demand situations. Addressing compatibility issues with hospital IT systems and providing additional support for elderly patients can further enhance the health pod usability and performance.

The success of this health pod solution in a pilot setting highlights its scalability and adaptability, showing potential for broader application in diverse healthcare environments. With strategic integration, health pods can contribute to more responsive, efficient healthcare solutions, and align with the digital transformation in modern healthcare [9,11]. Automated triage systems could become essential in future EDs, improving patient flow and optimizing resource use.

The study also aimed to provide data-driven insights into the potential scalability and integration of this health pod within other healthcare settings. A hypothesis is that territorially distributed health pods equipped for measuring vital signs and filling in the anamnestic questionnaire (and offering the televisit option in case of specific needs) can improve the efficiency of the ED process, avoiding unnecessary visits to the hospital [9]. This requires further study to complete the analysis in this clinical service.

However, the main health perspective focuses on the introduction of these innovative IoT and cloud platforms to the health market to enable the development different services for ubiquitous health applications, ranging from prevention, teleconsultation, televisits, remote low-risk triage and touristic medicine. Considering the possible impact on the reduction in healthcare costs and effort, empowering patients to self-manage their own lifestyle and health to reduce health-related risk factors is probably the most interesting challenge. Personalized coaching delivered through the advanced level cloud services, personalized prevention programs and encouraging physical activity and healthy diets are the most promising applications. Being widely distributed and close to the patients' houses, these health pods can also support the self-management of chronic diseases, helping patients to increase the level of adherence to their clinical programs.

Author Contributions: Conceptualization, G.A. and A.N.C.; Methodology, G.A.; Validation, R.S., A.S. and G.A.; Formal Analysis, A.S. and G.A.; Writing—Original Draft Preparation, G.A.; Writing—Review and Editing, G.A. and A.S. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and ethical review and approval were waived for this study due to the fact that the CAPSULA Health Pod is a medical device used in the frame of its intended use (and tested in this operative environment by the hospital) and fully anonymous data were collected.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. The consent was obtained by the participant in anonymous form at the beginning of the process. Entering the CAPSULA Pod each user was asked to sanitize the hands and the screen displays the following statement: "By tapping the START button you agree to participate to the protocol of automated ED triage analysis: your data will be collected in anonymous form and could be pub-lished only in aggregated and anonymous form in compliance of GPDR".

Data Availability Statement: The data presented in this study are available on request from the corresponding author due to privacy restrictions.

Conflicts of Interest: Authors Giuseppe Andreoni, Alessandra Santangelo and Alessandro Nizardo Chailly were employed by Capsula s.r.l. G.A. and A.N.C. hold shares in Capsula s.r.l. The remaining

authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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