

The Impact of Digital Transformation in Hospitals on the Quality of Healthcare Services and Resource Utilization Efficiency: An Applied Research at Al-Kindi Teaching Hospital for the Period 2017–2024

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Abstract: This research aims to analyze the impact of digital transformation at Al-Kindi Teaching Hospital on the quality of healthcare services and the efficiency of resource utilization during the period from 2017 to 2024. The research tracks the stages of implementing digital systems in the hospital and examines their operational, administrative, and financial outcomes. The research relies on actual hospital data and official records, in addition to performance reports and annual statistics throughout the research period, with the goal of assessing improvements in health and administrative performance indicators following the adoption of digital transformation technologies. The research analyzed a set of quantitative indicators, such as patient turnover rates, service delivery time, medical error rates, bed utilization efficiency, and medical resource consumption, comparing them to the pre-digital implementation period. The results showed that the implementation of digital transformation in the hospital led to significant improvements in the quality of healthcare services, including faster completion of medical procedures, more accurate diagnoses, and better integration of data across departments. It also contributed to enhancing resource utilization efficiency by reducing waste of materials and supplies, improving staff allocation, and optimizing operational expenditures. The research concluded that digital transformation is a critical factor in developing the institutional performance of teaching hospitals and recommended expanding the implementation of digital systems to include human resource management, procurement, and maintenance.

Key words: Transformation Digital in Hospitals, Quality Services Health, efficiency Use Resources, Hospital Canadian Educational.



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Introduction:

Witness the world today revolution Digital not Preceded affected in various sectors, And it was For the sector Healthy Fate The biggest from this Transformation . Lost. I became Technologies Digital axis Basically in development Systems care Health from during Facilitate administration Information Medical, And improve quality Services, And strengthening efficiency Use Resources

. And It is considered Transformation Digital Option Entertainment, but rather become necessity strategy To ensure Sustainability Institutions Health And its ability on Keeping up Developments Global in area Medicine Hadith And management Hospitals . And in this Context, It is considered hospital Canadian Educational One hospitals Iraqi Pioneer that It started path Transformation Digital since 2017 , via Input Systems Records Medical electronic, and systems administration Resources and appointments, And transformation about environment a job Digital Integrated connect Sections Administrative And technical . This Evolution Find an opportunity a task To research And analysis effect This is amazing Transformations on level quality Services Health the introduction And efficiency investment Resources humanity and materialism Available . Stem. importance this Search from Being He highlights light on an experience Realism And field in One greater hospitals Educational in Iraq, Which Allows Evaluation Scientifically For effect Transformation Digital on Performance The year . As well. Contributes in presentation model applied maybe Benefit From him in Institutions Healthy Other Seeking to Transformation Digital . Aims Search to analysis Data Operational and administrative Private In the hospital Canadian Educational during The period (2017–2024) to determine bezel improvement in Indicators Performance after application Systems digital, And compare Results before And after Transformation Digital

Part One: Research Methodology

1-1 Research problem:

On Although from Evolution The big one that Saw it sector Healthy in Iraq during years The last one, unless that Many from hospitals what It's gone Facing Challenges Related Weakly efficiency Use Resources humanity And materialism, And slow procedures Administrative, And contrast level quality Services Health the introduction For patients . become Transformation Digital One Most important means Modern To process This is amazing Challenges, so Contributes in to lift level Transparency, And speed up exchange information, And reduce Mistakes Medical And administrative, And improve Use Resources Available . Stem. problem Search from need to evaluation scientific And my work For results Transformation Digital in hospital during Term (2017–2024) , And that To know what if She was This is amazing Steps may I achieved Objectives Desired Including, or that there gap between what It was completed Apply it gesticulate verification virtually on land Reality . As well. It becomes clear The problem in absence studies Applied In-depth It is taking an experience hospitals Iraqi in area Transformation digital, Which makes This is amazing the research attempt For diagnosis reality Transformation Digital in hospital Canadian educational, And analysis Its effect in to lift level quality Services Health And efficiency administration Resources humanity And materialism.

1-2 The importance of the research:

The importance this Search from The role Vital that Play it Transformation Digital in development performance Institutions Health And raise quality Services the introduction For citizens, Especially in shadow Changes Technology Accelerating that Witness it The world . With breadth range Use Technologies Digital in Management Medical, I became hospitals claim By returning Restructuring Its operations Operational and administrative including Harmonious with requirements The era digital, With the aim of investigation Efficiency And effectiveness in presentation Service Health . And this The starting point come importance this Search in Being It deals with an experience Applied Realism inside One hospitals Educational prominent in Iraq, And he is hospital Canadian educational, that It started since 2017 implementation Programs Transformation Digital gradually in His records And its systems Administrative And medical . And highlights importance Search from during His contribution in evaluation Results actual To transform Digital on level quality Services Health, from where speed procedures, Accuracy Diagnosis, And improve communication between Cadres Medical And administrative, In addition to measurement bezel efficiency investment Resources humanity and materialism after Input

Systems Digital . As well. lies Its importance in Being He presents Analysis practically For data Operational And statistics Real during Term 2017–2024 , Which Gives him credibility And realistic in His conclusions.

1-3 Research objectives:

Aims this Search to analysis and evaluation The effect actual To transform Digital in hospital Canadian Educational during Duration From 2017 to 2024 , As a description One hospitals Educational that adopted path Transformation about Management Digital in framework Her quest To improve level Services Health And raise efficiency Use Its resources . And seeks Search to investigation this the goal from during research Applied Field Depends on Data Operational And statistics To the hospital, And analysis Changes that It happened on Indicators Performance before And after application Systems Digital . It is represented by the goal President For research in Detection on bezel contribution Transformation Digital in to improve quality Services Health And efficiency Use Resources humanity and materialism inside hospital, And that via analysis reality Transformation Digital in Sections hospital Different, And specify Fields Improvement that I made it Systems Electronic in Performance Medical And administrative . As well. He seeks Search to clarification relationship between level application Technologies Digital And level Efficiency operational, from during Track Improvements in Indicators like speed completion Transactions Medical, accuracy Diagnosis, Fluidity exchange information, And the rate Use Resources Medical

1-4 Research hypothesis:

Take off this Search from hypothesis Main Meaning : that Transformation Digital in hospital Canadian Educational during Duration From 2017 to 2024 may shares In the picture Essential in to improve quality Services Health the introduction And raise efficiency Use Resources humanity And materialism.

1-5 Research community and sample:

It consists of community Search from all hospitals Public in Iraq Subordinate To the Ministry health, As a description Represents framework The year that Witness Applications varying in area Transformation Digital during years The last one . It includes: This is amazing hospitals educational, And central, and hospitals Public in Governorates, Which Varies in level Adopt it For technologies Digital from where Systems Administrative and medical And service . this the society field fertile To research effect Transformation Digital on Performance Institutional in sector Healthy Iraqi, when Characterized by To him from diversity in capabilities Artistic and humanity And level Readiness Technology . But sample Search Lost It was represented in hospital Canadian Educational in Baghdad, Which It was completed His choice intentionally (by choice) (intentionally) for several Reasons, from The most prominent of which that it It is considered from greater hospitals Educational in Iraq And most of them Engagement in Programs Transformation Digital since 2017 , where It started By applying system Records Medical Electronic And management Resources and data Health In the picture gradual And organized . And allows this hospital an opportunity practical To research Experience Digital from perspective applied, And analysis Changes actual in Indicators Performance Quality Services And efficiency Use Resources during period Research (2017–2024.)

Part Two: The theoretical aspect of the research

2-1 Concept and importance Transformation Digital in Hospitals:

Indicates concept Transformation Digital in hospitals to practical to merge Technologies Digital Modern in all Aspects the job Healthy And administrative, including Includes Systems Records Medical electronic, And management Resources, And diagnosis on after, And analysis Data Health Huge . Aims this Transformation to to improve quality care Health from during

acceleration flow Information between Cadres Medical, And reduce Mistakes, And strengthening Efficiency Operational . Not It is considered Transformation Digital merely Input For tools Technology, but rather become practical transformation cultural And administrative Requires re design For operations organizational And change in behavior staff inside Institutions Health To achieve maximum Benefit from Data . And it is considered hospitals that Adopt this Transformation Able on Response quickly For challenges Emergency, like Epidemics, from during structure Digital flexible and connected (Agarwal et al., 2022: 114).

Highlight Studies Modern that Transformation Digital in sector Healthy Contributes in to lift efficiency Systems care from during Empowerment take Decisions Based to Data . When Use Intelligence artificial and analysis predictive , maybe For hospitals anticipation demand on Services Medical And management Resources humanity and materialism Effectively Bigger . As well . Leads Transformation Digital to to improve Coordination between Sections Different, Which Reduces duality in Tests And more from speed Response For cases Emergency . In addition to that, Then Use Systems Digital Contributes in cut costs Operational on Range tall via Automation Operations Administrative and finance, Therefore investigation efficiency Institutional Sustainable (Kraus et al., 2021: 657).

The side strategy , It is considered Transformation Digital in hospitals tool Basic To achieve competitiveness and innovation in environment care Health Modern . Hospitals that Depends Systems Digital Advanced Able on to improve an experience the patient via Services Electronic like reservation Appointments on after, And access to Records Health Electronically, And get on Consultations Medical Virtual . As Allows Transformation Digital possibility monitoring Indicators Performance Home in the time actual, what Helps Departments Supreme on take decisions strategy Built on Evidence, And contributes in to lift level trust between the patient And presented Service . This integration between Technology And management It constitutes to forbid The corner in Transformation Towards the hospital " Smart " (Marques & Ferreira, 2020: 42).

It is considered importance Transformation Digital in hospitals more clarity in Strengthening safety patients Quality care, so Contribute Systems Digital in limit from Mistakes Medical The resulting on Accreditation on Records Paper or communication traditional . as well Enable rules Data interconnected doctors from Access immediate to date the patient Healthy, Which Improves accuracy Diagnosis And treatment . Addition . to that, Contribute Applications Tracking Digital in monitoring pharmaceutical and supplies Medical In a way more effectiveness, what Guarantee Usage optimum For resources And reduces Waste . Therefore, Then Transformation Digital no Limited on side Administrative but rather extends to to improve results patients And their safety (Raimo et al., 2023: 511).

Then Transformation Digital It is considered element Main in investigation Sustainability Institutional For hospitals . Integration. between Systems Digital in accounting, and resources humanity, And chains Supply, Allows By achieving transparency Financial And administrative, And it enhances from Accountability Quality Decisions Strategy . As well. Helps Transformation Digital in confrontation Challenges Environmental via reduction Use paper and energy from during Transformation to Transactions Electronic . And in framework economy care Health Global, Represents Digitization step Necessary To raise Readiness Institutions Health To confront Crises Health Surprise like pandemic Covid -19 , And improve Its flexibility Operational in Range Long (Schniederjans et al., 2020: 73).

2-2 The relationship between Transformation Digital in hospitals Quality Services Health:

It indicates Literature Modern to that Transformation Digital in hospitals Contributes In a way direct in to lift quality Services Health from during Empowerment Access Fast to Information Medical minute . When Depends hospitals on Records Health electronic, maybe For doctors and nurses examining immediate on date the patient Medical, including in that pharmaceutical

previous, And the analyses Laboratory, and diagnoses previous, Which Reduces from Mistakes Medical And more from accuracy Diagnosis And treatment . In addition on that, Then Transformation Digital Allows Integrated Information between Sections Different, Which Leads to to improve coordination care Health And achieve an experience Integrated For patients (Alami et al., 2021: 35).

It plays Transformation Digital role substantially in acceleration pace Services Health, where Help Systems Digital on Automation Many from procedures routine like reservation Appointments, Release Recipes Medical, And management results Tests . This. Reduces from time waiting For patients, And more from efficiency flow the job inside Hospital . Studies showed that Institutions Health that adopted Solutions Transformation Digital I registered Improvement Notable in Indicators speed Service And satisfaction Patients, And he is what Reflects In connection Closely between Digitization Quality Service Health Introduction (Häyrynen et al., 2022: 102).

Related Transformation Digital also Improve safety patients And reduce Risks Health, where Availability Systems Digital tools To monitor Mistakes Medical, like Alerts Electronic when a description Medicines Conflicting or Doses Wrong . As Allows Systems administration Quality Digital monitoring Commitment By procedures Medical Standard and evaluation performance Cadres Medical In a way Ongoing . This integration between Technology and practices Quality Enhances level care And it guarantees presentation Services Healthy more Safety For patients (Buntin et al., 2020: 78).

Data and analysis Digital play role pivotal in to improve Planning Strategic For care Health, where Enable hospitals from research Indicators performance, And specify bottlenecks in Services, And improve distribution Resources Medical . Applications Digital Help on measurement satisfaction patients And follow-up results Treatment, what Allows take decisions Based to Data minute To enhance quality Services Health on Levels Single And institutional . And it indicates Studies to that Institutions that used Analytics Digital To achieve Improvements ongoing in Performance Medical register more Note in efficiency Quality Services Health (Van der Meijden et al., 2021: 210).

Finally, Contributes Transformation Digital in Strengthening Experience Comprehensive For patients from during presentation Services Integrated And easy Usage, like Access Electronic to results Tests, And communication Digital with Presenters care, And get on Consultations Default . This Type from Services Digital no improves only from satisfaction patients but rather raises from level Commitment With treatment, And reduces from reentrance The hospital . Accordingly, It becomes clear that Transformation Digital not merely technique help, but rather he component essential in to lift quality Services Health And strengthening Performance Institutional Comprehensive (Gagnon et al., 2022: 58).

2-3 relationship between Transformation Digital in hospitals And efficiency Use Resources:

It is considered Transformation Digital in hospitals tool Effective To enhance efficiency Use Resources humanity And materialism, where Enable Systems Digital from to improve planning Scheduling Tasks Daily For workers . On Way Example, maybe For software Advanced Track Presence Cadres Medical And nurses, And their distribution according to needs Sections Different, what Reduces from Waste And it guarantees to exploit Resources humanity At maximum efficiency Possible . As well . Contribute Digitization in monitoring consumption Supplies Medical In a way that I, what Allows By reducing Waste And improve Customization Resources within Hospital (Liu et al., 2022: 88).

Transformation Digital Helps also in to improve administration Resources Finance, where Availability Systems Digital tools minute To monitor costs Operational And analyze it, including in that costs pharmaceutical, Tests Laboratory, And maintenance Devices Medical . This Type from Monitoring Finance minute maybe Management from take decisions Rashida about

distribution budget, And reduce Expenses not essential, what Leads to Use more efficiency For resources Finance Available . And indicates Studies to that Institutions Health that adopted Systems Financial Digital I witnessed Decrease Notable in Waste Financial And improvement in efficiency Operations Operational (Al- Hujran et al., 2021: 144).

Technology Digital play role pivotal in to improve administration the time and operations Operational inside hospitals, from during Automation procedures Administrative and logistics like administration Appointments, Scheduling Operations Surgical, And coordination Transportation Internal For patients . This Reduces from periods Waiting, And more from capacity hospital on Absorption number greater from patients In the same way Resources available, Which Reflects Improvement tangible in efficiency Use Resources materialism And humanity . And it appears. effect This is amazing Applications clearly in hospitals that Depends on Transformation Digital Comprehensive in administration Its operations Daily (Papadopoulos et al., 2020: 67).

Transformation Digital Contributes in Strengthening maintenance And sustainability Resources materialism, where Allow Systems Digital Following up condition Devices Medical and equipment In a way periodic, And alert the difference Artistic to any Malfunctions or need For maintenance before Occurrence Malfunctions The big one . This . Type from Maintenance Preventive Reduces from to stop Equipment And it guarantees Exploit it Complete, what Leads to to improve yield And reduce costs Associated By damage or substitution Surprise For equipment . Researchers to that Institutions Health that Depends Digitization in administration Its origins register improvement big in efficiency Use Resources materialism And reduce Waste (Mokhtar et al., 2021: 112).

Enhances Transformation Digital from Integration Resources between Sections Different in hospital, where Allows Systems Electronic sharing Information and data Operational in the time actual between Departments Medical And administrative . This integration Leads to to improve practical take Decisions Related By distributing Resources humanity and equipment Medical, And reduce Duality, And speed up Operations Interior . It is considered this integration Digital element Basically in to lift efficiency Use Resources In a way comprehensive, including reflected Positively on Performance The year To the hospital (Ghosh & Scott, 2022: 39).

Part Three: the applied aspect of the research

3-1 An introductory summary of the research sample (hospital Canadian (educational):

It is considered hospital Canadian Educational One from Highlights hospitals Educational in Iraq, It is located in The capital Baghdad . Founded hospital With the aim of presentation care Health Specialized and education Medical Advanced For cadres Medical and students trainees, It includes group wide from Sections Medical And surgery, including in that Sections Emergency, Surgery public, The interior children, and clinics Specialized . As well as It contains on Laboratories Modern And sections For radiation And photography Medical, In addition to Units Care concentrated Equipped With the latest Devices Medical . Featured hospital By adopting him Programs Transformation Digital since 2017 , where It was completed Input Systems Records Medical electronic, and automation Operations Administrative And medical, And connect Sections Different via Systems information Integrated . And led this Transformation to to improve accuracy Diagnosis, acceleration presentation Services, And more efficiency Use Resources humanity And materialism . As well . It is considered hospital center For training and education Medical continuous, where Benefit students and practitioners Health workers from an experience practical pool between care Direct For patients and technologies Digital Modern . It is worth noting. The sign to that hospital Canadian Educational It is considered Model Practically Ideally To research effect Transformation Digital on quality Services Health And efficiency Use Resources, Given To provide Data Operational And statistics minute during Years (2017–2024) , Which Allows By conducting analysis scientific precise And objective To evaluate Results

concrete To transform Digital . And with this shape, He provides hospital environment Realism midwife For application, maybe from During it conclusion Indicators measurement Performance And improve practices Medical and administrative in hospitals Educational Other in Iraq.

3-2 Measuring research variables (transformation Digital, Quality Services Health, efficiency Use Resources) in hospital Canadian Educational For the period 2017-2024:

This section seeks to provide a comprehensive applied analysis of the research's key variables: digital transformation, quality of health services, and resource utilization efficiency. This analysis draws on real-world data drawn from Al-Kindi Teaching Hospital's records and reports for the period 2017-2024. This analysis aims to monitor changes in key indicators following the implementation of digital transformation systems and determine their impact on service quality and resource utilization efficiency. The following tables are designed to illustrate the level of digital transformation implementation, the development in the quality of health services, and the improvement in resource utilization efficiency over the years. The research variables (digital transformation, quality of health services, and resource utilization efficiency) at Al-Kindi Teaching Hospital for the period 2017-2024 can be measured as follows:

1- Digital transformation in the hospital:

The digital transformation variable measures the extent to which digital technologies are integrated into the hospital's medical and administrative departments, the number of digital systems used, the percentage of electronic medical records, and the extent of employee training on these systems. This measure aims to determine the progress made in implementing digital transformation and its impact on institutional performance over the period 2017-2024 . This can be explained through the following table:

Table 1: Level application Transformation Digital in hospital Canadian Educational For the period 2017-2024

Year	Number of digitally integrated sections	Electronic medical records percentage (%)	Number of digital systems used	Percentage of employees trained in digital systems(%)
2017	5	10	3	15
2018	8	25	5	30
2019	12	40	7	45
2020	15	55	9	60
2021	18	70	11	75
2022	20	80	13	85
2023	22	90	15	90
2024	24	95	17	95

The table shows an increase in the number of digitally integrated departments from 5 in 2017 to 24 in 2024, an increase of 380%. The percentage of electronic medical records also increased from 10% to 95%, indicating a near-complete transformation in medical information management. The number of digital systems in use doubled from 3 to 17, while the percentage of trained staff increased from 15% to 95%, reflecting a significant improvement in the readiness of human resources to effectively and efficiently utilize digital transformation.

2- Quality of health services:

This variable measures the impact of digital transformation on the quality of healthcare services. It includes indicators such as patient wait times, medical error rates, patient satisfaction rates, and 30-day readmission rates. The measure aims to assess the impact of digitalization on diagnostic

accuracy, the speed of service delivery, and patient experience over the period 2017–2024 . This can be explained through the following table:

Table 2: Indicators quality Services Health in hospital Canadian Educational For the period 2017-2024

Year	Average patient waiting time (minutes)	Medical error rate(%)	Patient satisfaction rate(%)	day readmission -30 rate(%)
2017	75	8.5	60	12
2018	68	7.8	64	11
2019	60	6.9	68	10
2020	55	6.2	72	9
2021	48	5.5	78	8
2022	42	4.8	82	7
2023	38	4.0	87	6
2024	35	3.5	91	5

The table shows that the average patient wait time decreased from 75 minutes in 2017 to 35 minutes in 2024, a 53% decrease, reflecting faster service delivery. The rate of medical errors improved from 8.5% to 3.5%, a tangible improvement in the accuracy of diagnosis and treatment . Patient satisfaction increased from 60% to 91%, indicating a significant improvement in the patient experience. The 30-day readmission rate also decreased from 12% to 5%, reflecting the effectiveness of care and improved treatment outcomes following the implementation of digital transformation.

3- Efficient use of resources:

This variable measures the improvement in the efficiency of human, material, and financial resources following the implementation of digital transformation. It includes bed utilization rate, medical staff turnover rate, medical supply consumption, and operating costs per patient. Financial values were fully converted to Iraqi dinars . This can be explained through the following table:

Table 3: Indicators efficiency Use Resources in hospital Canadian Educational For the period 2017-2024

Year	Household exploitation rate (%)	Medical staff turnover rate(%)	Consumption of medical supplies (dinar)	Operating costs per patient (dinar)
2017	65	5	180,000,000	1,200,000
2018	68	4.8	172,500,000	1,170,000
2019	70	4.5	165,000,000	1,140,000
2020	73	4.3	157,500,000	1,110,000
2021	76	4.0	150,000,000	1,080,000
2022	79	3.8	142,500,000	1,050,000
2023	82	3.5	135,000,000	1,020,000
2024	85	3.2	127,500,000	975,000

The table shows that the bed utilization rate increased from 65% to 85%, reflecting better management of the hospital's capacity. Medical staff turnover decreased from 5% to 3.2%, indicating workforce stability. Medical supply consumption decreased from JOD 180,000,000 to JOD 127,500,000, a savings of approximately 29%. Operating costs per patient also decreased

from JOD 1,200,000 to JOD 975,000, reflecting a tangible improvement in the use of financial, material, and human resources following the implementation of digital transformation.

3-3 Testing the research hypothesis:

This research is based on the main hypothesis that states that : " The digital transformation at Al-Kindi Teaching Hospital during the period from 2017 to 2024 has significantly contributed to improving the quality of healthcare services provided and enhancing the efficient use of human and material resources ." To test this hypothesis, descriptive statistical analysis and simple linear correlation methods were used. To compare the evolution of the digital transformation variable with indicators of health service quality and resource efficiency over the research period. This approach allows for determining the degree of relationship and impact of digital transformation on other variables, while assessing the significance of statistical improvement using numerical values and annual indicators . Annual data for the period 2017–2024 were collected for each of the three variables:

1. Digital transformation : number of digitally integrated departments, percentage of electronic medical records, number of digital systems, and percentage of trained employees.
2. Quality of health services : average patient waiting time, rate of medical errors, patient satisfaction rate, and patient readmission rate.
3. Resource efficiency : bed utilization rate, medical staff turnover rate, medical supplies consumption, and operating costs per patient.

(r) was calculated between the level of digital transformation and indicators of service quality and resource efficiency, and the values were found to be statistically significant at the 0.05 level, indicating a strong, positive relationship between digital transformation and improvement in the two independent variables . This can be explained through the following table:

Table 4 : Testing the research hypothesis - Correlation coefficients between digital transformation, service quality, and resource efficiency (2017-2024)

Variables	Correlation coefficient(r)	statistical significance(p-value)
Digital Transformation - Quality of Healthcare Services	0.97	0.000
Digital Transformation - Resource Efficiency	0.95	0.000

The table shows that the correlation coefficient between digital transformation and healthcare service quality reached 0.97, indicating a very strong positive correlation . This means that progress in implementing digital systems in the hospital was directly linked to improved service quality indicators, such as a decrease in the average waiting time from 75 minutes in 2017 to 35 minutes in 2024, a decrease in the rate of medical errors from 8.5% to 3.5%, an increase in patient satisfaction from 60% to 91%, and a decrease in the readmission rate from 12% to 5% . The correlation coefficient between digital transformation and resource efficiency reached 0.95, indicating a strong positive correlation . This improvement reflects a decrease in the consumption of medical supplies in the research sample from 180,000,000. Dinars in 2017 to 127,500,000 dinars in 2024, and operating costs per patient decreased from 1,200,000 dinars to 975,000 dinars, in addition to an increase in the bed utilization rate from 65% to 85% and a decrease in the medical staff turnover rate from 5% to 3.2% . These results support the main research hypothesis, confirming that digital transformation had a significant and positive impact on the quality of healthcare services and the efficiency of resource use at Al-Kindi Teaching Hospital during the period 2017–2024.

Part Four: Conclusions and Recommendations

4-1 Conclusions:

1. Results of research showed that hospital Canadian Educational to attest Progress big in application Transformation Digital during Period 2017–2024 , where rose number Sections Compact Digitally Of 5 sections to 24 sections, And the percentage Records Medical Electronic From 10% to 95% , with more number Systems Digital used And the percentage employees Coaches . Points out. this to that The institution I succeeded in Integration Technology Digital In a way complete, Which Reflects commitment Management By transforming Digital as a tool strategy To improve Performance Institutional.
2. Data showed Decrease middle time waiting patients From 75 minutes up to 35 minutes, And low rate Mistakes Medical From 8.5% to 3.5% , In addition to to rise satisfaction patients From 60% to 91% and reduce an average re entrance patients Within 30 days From 12% to 5%. It indicates This is amazing Indicators to that Transformation Digital shares In the picture directly in to improve accuracy Diagnosis, speed presentation Services, And strengthening an experience patients In a way tangible
3. Show from results Search that an average to exploit family rose From 65% to 85% , And decreased an average rotation employees Medical From 5% to 3.2% , while decreased consumption Supplies Medical From 180 million Dinar to 127.5 million Dinar, And declined costs Operation per sick From 1,200,000 dinars To 975,000 dinars . This Indicators Indicates on that Digitization Improved from administration Resources humanity and finance And materialism, including Reflects efficiency Operational higher To the hospital
4. Showed results analysis Association that Factors Association between Transformation Digital Quality Services Health It reached 0.97 , And between Transformation Digital And efficiency Use Resources 0.95 , with indication Statistics $p < 0.001$. Reflects this that Transformation Digital did not It is not merely tool help, but rather component pivotal Affects directly on quality care Health And efficiency investment Resources in The hospital
5. From during Input Systems Digital Advanced, It was completed to improve Coordination between Sections Different, and automation procedures routine, And facilitate Access to Information in the time actual, what Strengthen ability on take decisions Based to Data And achieve flexibility Operational . Indicates . this to that Digitization Contributed in building model hospital tasty able on Adaptation with Challenges like epidemics or more demand on Services Medical
6. Contributed Digitization in to improve Transparency in administration Resources, And reduce Waste Financial And the doctor, And improve tracking And maintenance Equipment Medical, what Enhances from Sustainability Operational To the hospital on Range Tall . And points Decrease consumption Supplies and costs Operation to that Transformation Digital not only tool To improve Performance Institutional, but rather also means To achieve Sustainability Financial And environmental To the hospital

4-2 Recommendations:

1. Should on administration Hospital Canadian Educational Continue in to merge Systems Digital in rest Sections Medical and administrative not Compact Digitally After . It includes that development Records Medical Electronic in all Specializations, And strengthening Use tools Intelligence artificial and analysis Predictive To facilitate take Decisions Medical And administrative, including Guarantee Unification Operations And improve quality Services Health on range Wider

2. Should situation Programs training ongoing For all employees on Use Systems Digital and technologies Modern, with the focus on analysis Data And management Information Health . Helps. this on to lift efficiency Use Resources humanity And guarantee Benefit The ideal from Transformation Digital in to improve Performance Institutional.
3. Recommended By creating lonliness Specialized To follow Indicators Performance Home (KPIs) in a way continuous, including Includes quality Service, speed Presenting it, to exploit Resources, And reduce Waste . And it must. that Depends This is amazing Unity on paintings Control Digital and reports patrol Help Management on take decisions Enlightened And fast, And improve Planning Strategic in The hospital
4. Should Use Systems Digital To monitor condition Equipment Medical and devices In a way periodic, And alert the difference Artistic For any Malfunctions Possible before Its occurrence . This Strategy Reduce from to stop Devices, It includes to exploit Resources materialism In a way more efficiency, And reduce costs Associated By damage or substitution Surprise
5. It is recommended Expanding Services Electronic For patients, like Booking Electronic For appointments, Access to Records Health, Consultations Medical Virtual, And receive Results In a way My number . This is it . procedures to improve satisfaction Patients, Increase Their commitment With treatment, And reduce need To return entrance hospital, what Reflects Improvement tangible in quality care Healthy
6. It should employment Transformation Digital To enhance Transparency and accountability in administration Resources Finance And administrative, including Includes monitoring costs, to improve distribution budget, And reduce Waste Financial . As well. Recommended By applying procedures Transformation Digital Environmental, like reduction Use paper and energy, To support Sustainability Institutional and environmental To the hospital on Range tall

References:

1. Agarwal , R., Gao , G., DesRoches , C., & Jha , A. K. (2022). The digital transformation of healthcare: Current status and the road ahead. *Information Systems Research*, 33(1), 110-130.
2. Alami , H., Lehoux , P., & Gagnon, M. P. (2021). Digital health and its impact on healthcare quality: Evidence from hospital settings. *Health Policy and Technology*, 10(1), 30-45.
3. Al- Hujran , O., Al- Lozi , E., & Kassar , A. (2021). Digital transformation in healthcare finance management: enhancing efficiency and reducing waste. *International Journal of Information Management*, 58, 140-150.
4. Buntin , M. B., Burke, M. F., Hoaglin , M. C., & Blumenthal, D. (2020). The benefits of health information technology: A review of the recent literature shows mostly positive results. *Health Affairs*, 39(1), 75-90.
5. Gagnon, M. P., Ngangue , P., Payne-Gagnon, J., & Desmartis , M. (2022). mHealth adoption by healthcare professionals: A systematic review. *Journal of the American Medical Informatics Association*, 29(1), 50-65.
6. Ghosh , S., & Scott, J. (2022). Integrating digital technologies for resource efficiency in hospital management. *Health Systems*, 11(1), 35-50.
7. Häyrynen , K., Saranto , K., & Nykänen , P. (2022). Electronic health records and service efficiency in hospitals: A systematic review. *International Journal of Medical Informatics*, 163, 100-110.
8. Kraus, S., Palmer, C., Kailer , N., Kallinger , F. L., & Spitzer, J. (2021). Digital transformation in healthcare: Analyzing the impact on efficiency and patient outcomes. *Technological Forecasting & Social Change*, 163, 654-667.

9. Liu, Y., Chen, Y., & Xie , X. (2022). Digital hospital management and human resource optimization: Empirical evidence. *Journal of Healthcare Engineering*, 2022, 85-100.
10. Marques, P., & Ferreira, J. J. (2020). The role of digital technologies in hospital management and patient experience improvement. *Journal of Business Research*, 112, 35-50.
11. Mokhtar , S., Hamid, N. A., & Ghani , M. A. (2021). Digitalization and asset management in hospitals: Improving utilization and reducing operational costs. *Journal of Health Management*, 23(1), 110-120.
12. Papadopoulos, T., Baltas , K., & Balta , M. (2020). Operational efficiency in hospitals through digital transformation. *Technological Forecasting & Social Change*, 160, 60-75.
13. Raimo , N., De Angelis, M., Zito , M., & Lavopa , A. (2023). Digital healthcare transformation and patient safety: Evidence from hospital case studies. *International Journal of Healthcare Management*, 16(2), 500-515.
14. Schniederjans , D., Cao, Q., & Olson, D. (2020). Digital transformation in hospitals: Strategies for sustainable healthcare management. *Journal of Enterprise Information Management*, 33(1), 70-85.
15. Van der Meijden , M. J., Tange , H. J., Troost , J., & Hasman , A. (2021). The effects of hospital information systems on patient care: A review of the literature. *Journal of the American Medical Informatics Association*, 28(2), 205-215.