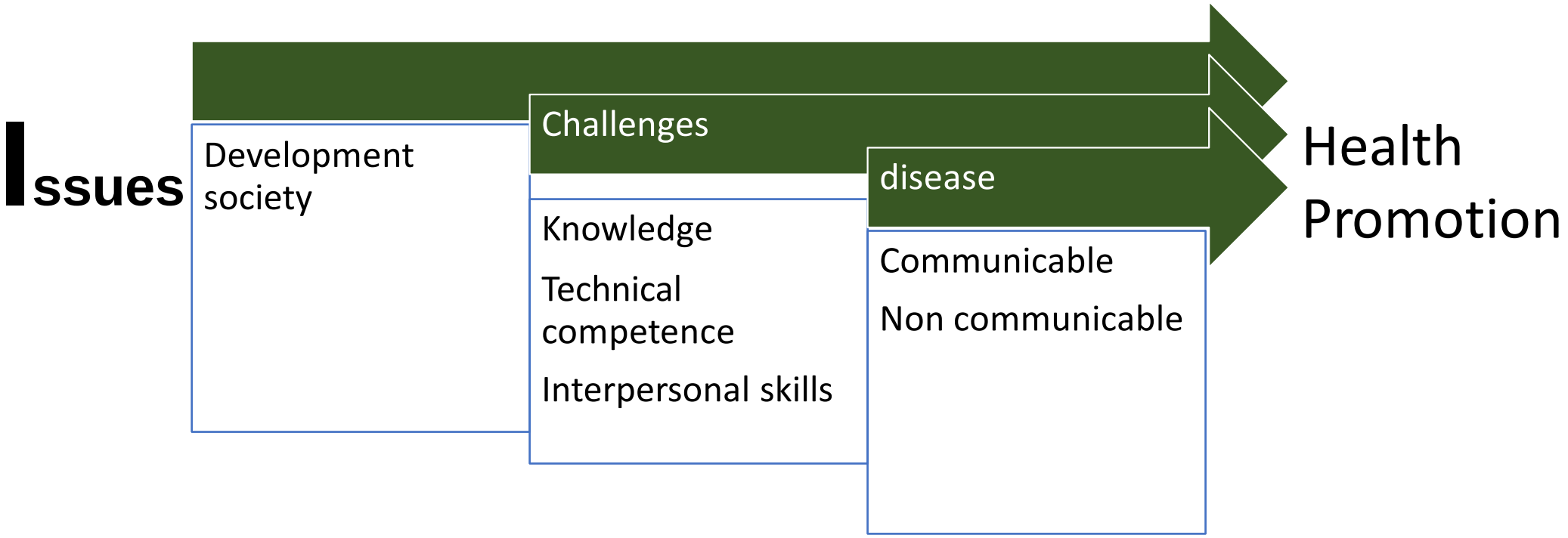
Trend and Issue in Medical Surgical Nursing

Erna Rochmawati, PhD & Fahni Haris, PhD

Outline

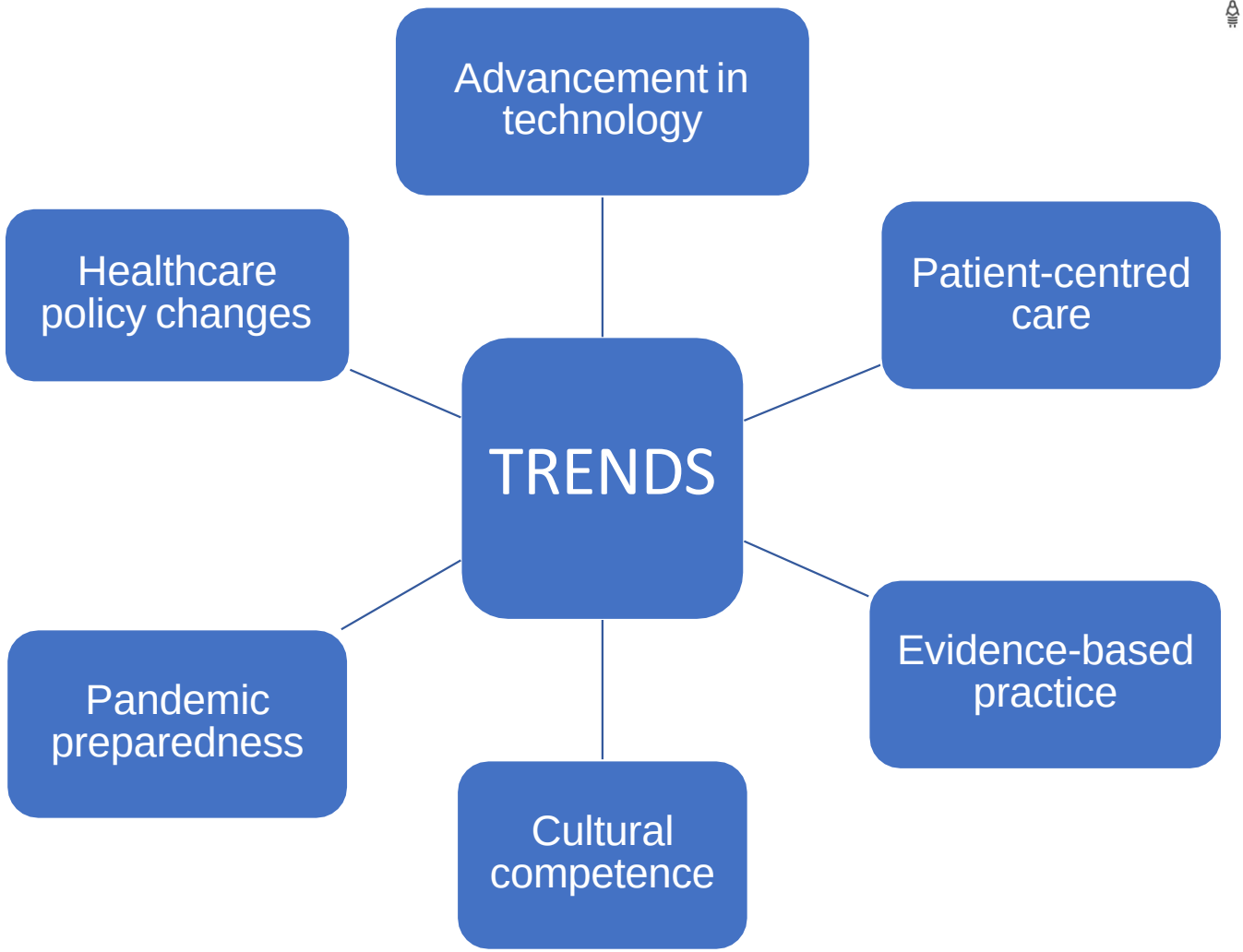
Trend and issue in medical surgical nursing

Trend and Issues in medical surgical nursing



Clement 2019

Trend


Advancement in technology
Healthcare policy changes
Patient-centred care
TRENDS
Pandemic preparedness
Evidence-based practice
Cultural competence

Advancement in technology

- **Robot**
- **Health information system: m-health; telehealth; e-health**

Advancement in technology

IT: keluar uang banyak

IT tidak bisa menterjemahkan kebutuhan RS

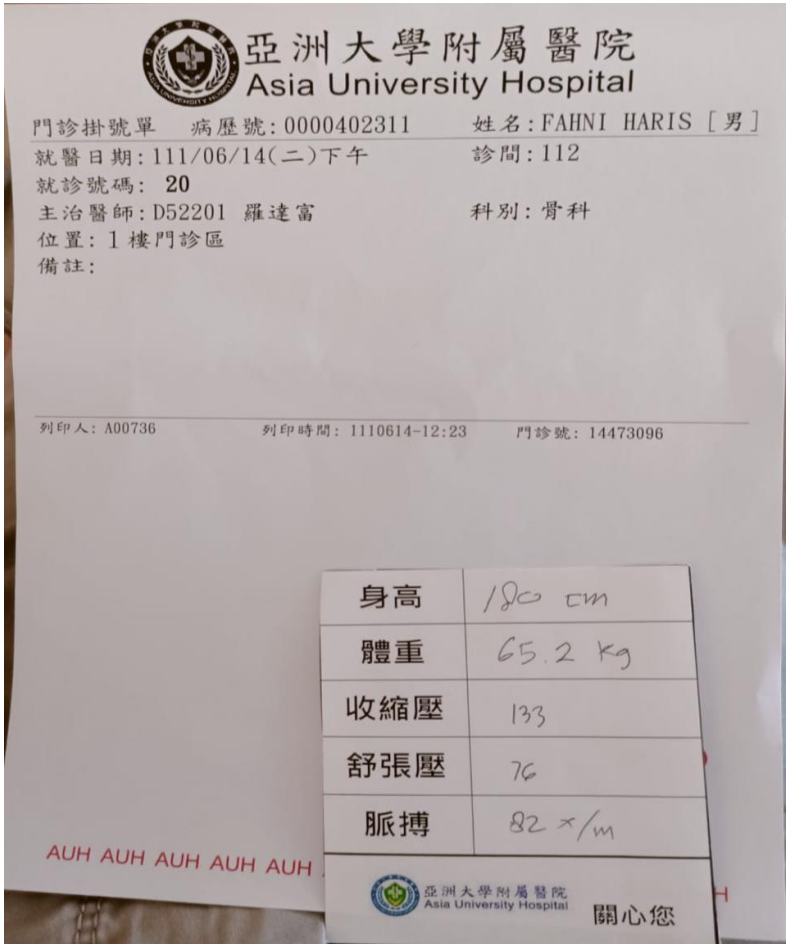
IT developer: siap

RS: belum siap

- Sharing data pasien (cloud)
- Data security
- Adverse event
- Sistem audit
- Pelatihan system baru
- Bangunan/resource lain

Advancement in technology

Advancement in technology



Advancement in technology

Solusi

MOGUCARE

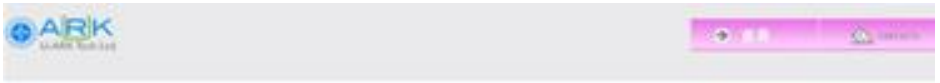
Glukometer (real time, user friendly, dan terjangkau) yang mempertahankan prinsip non-malificence

T-MOGUCARE

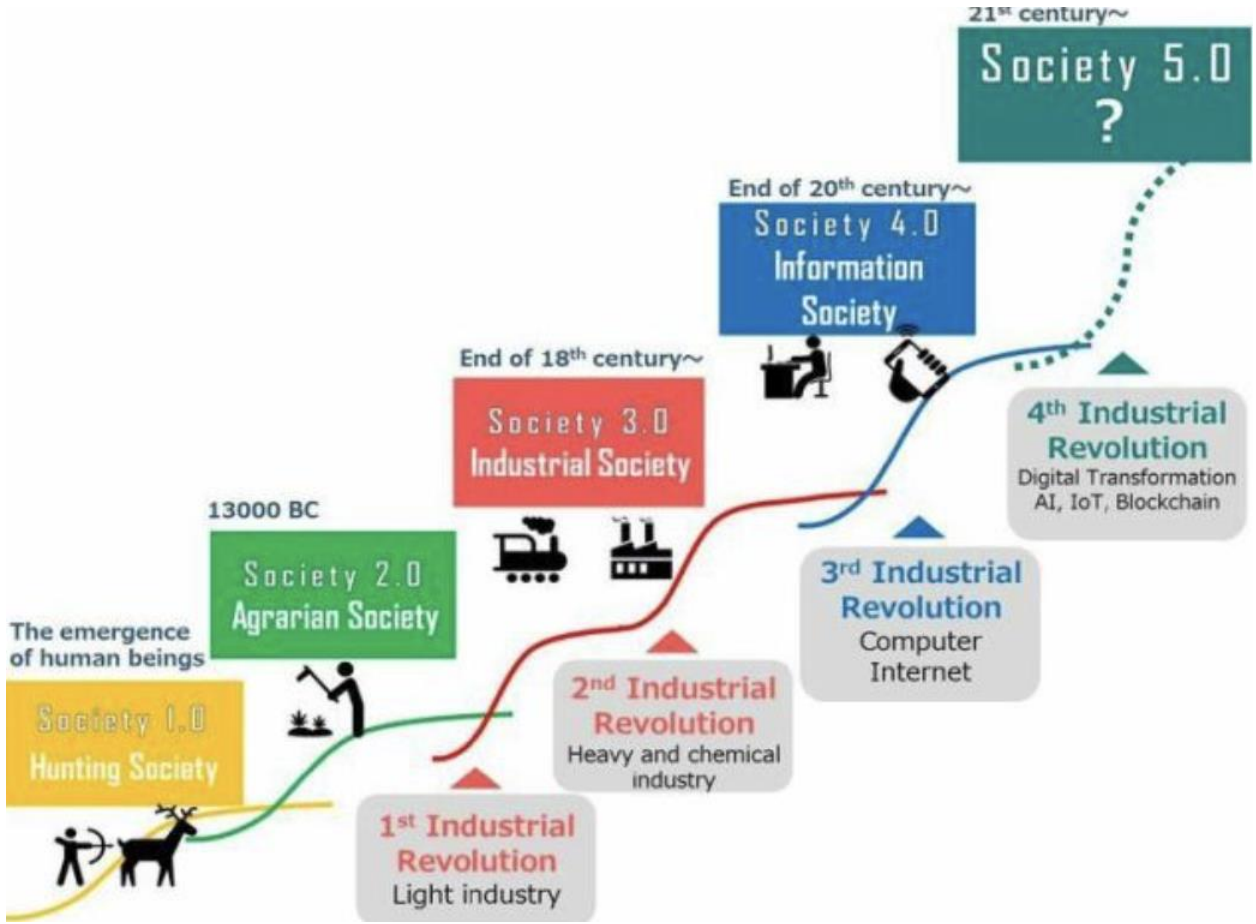
Aplikasi terapeutik yang mampu memberikan edukasi, konseling, dan pemantauan riwayat kesehatan harian pengguna.

Advancement in technology

1. Kualitas dokumentasi pengkajian – evaluasi keperawatan sangat baik
2. Kualitas dokumentasi *discharge planning* buruk
3. Terjadi penurunan "*critical thinking*" perawat → hanya *clicking*
4. Kurang *quality control* dari pihak manajemen
5. Efisiensi manajemen & billing only
6. Kesenjangan SOP



Advancement in technology



Advancement in technology

Robots replace nurses' work duties

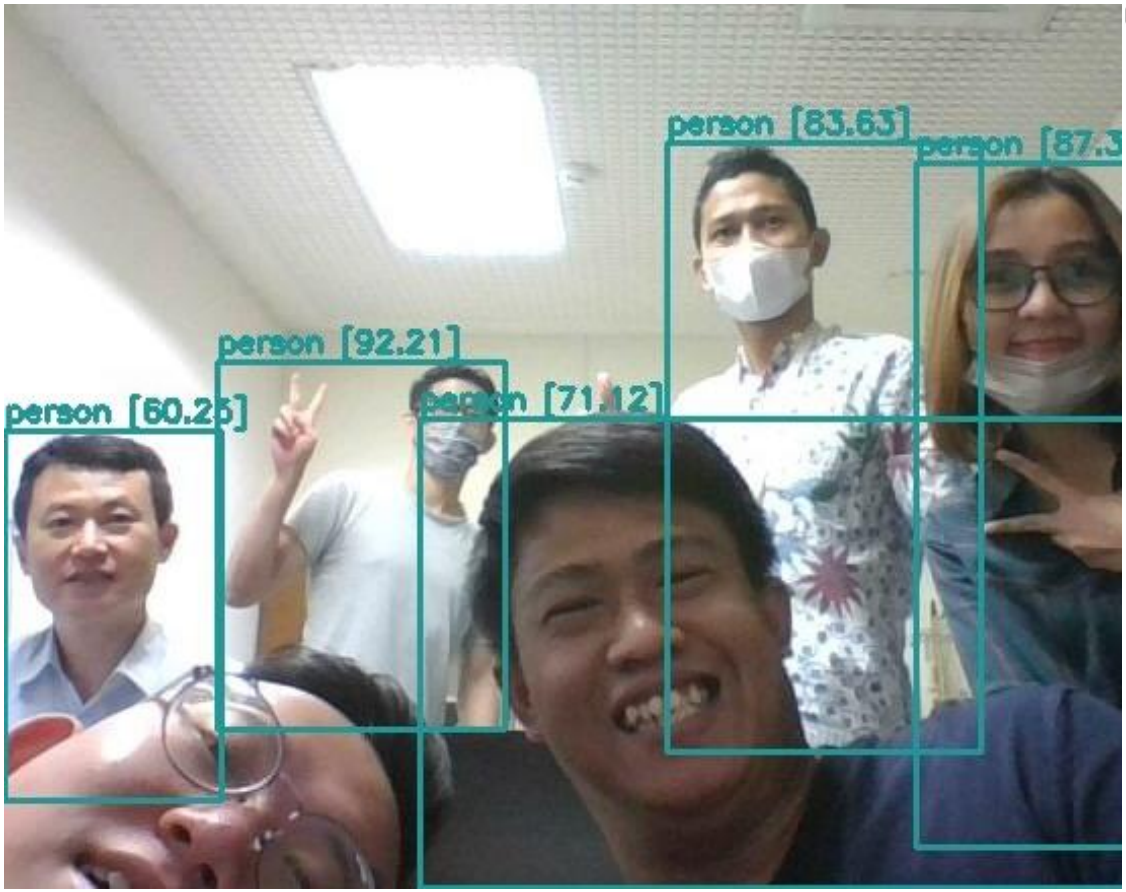
https://www.youtube.com/watch?v=0LaVwDmLDLw

Robots help patient with memory disorder

https://www.youtube.com/watch?v=AQn8RuKcGII

Advancement in technology

Teknologi telah menjadi fasilitas utama bagi kegiatan berbagai sektor kehidupan dimana memberikan andil besar terhadap perubahan-perubahan yang mendasar pada struktur operasi dan managemen organisasi, pendidikan, transportasi, kesehatan,dan penelitian.



Advancement in technology

sensors

MDPI

Article

A Deep Learning Method for Foot Progression Angle Detection in Plantar Pressure Images

Peter Ardhianto [1,2], Raden Bagus Reinaldy Subiakto [3], Chih-Yang Lin [4], Yih-Kuen Jan [5,6,7], Ben-Yi Liau [8], Jen-Yung Tsai [2], Veit Babak Hamun Akbari [9] and Chi-Wen Lung [5,9,*]

1 Department of Visual Communication Design, Soegijapranata Catholic University, Semarang 50234, Indonesia; peter.ardhianto@unika.ac.id
2 Department of Digital Media Design, Asia University, Taichung 413305, Taiwan; stevet@asia.edu.tw
3 Department of Mathematics, Airlangga University, Surabaya 60115, Indonesia; raden.bagus.reinaldy-2016@fst.unair.ac.id
4 Department of Electrical Engineering, Yuan Ze University, Chung-Li 32003, Taiwan; andrewlin@saturn.yzu.edu.tw
5 Rehabilitation Engineering Lab, University of Illinois at Urbana-Champaign, Champaign, IL 61820, USA; yjan@illinois.edu
6 Kinesiology and Community Health, University of Illinois at Urbana-Champaign, Champaign, IL 61820, USA
7 Computational Science and Engineering, University of Illinois at Urbana-Champaign, Champaign, IL 61820, USA
8 Department of Biomedical Engineering, Hungkuang University, Taichung 433304, Taiwan; byliau@hk.edu.tw
9 Department of Creative Product Design, Asia University, Taichung 413305, Taiwan; 109711569@live.asia.edu.tw
* Correspondence: cwlung@asia.edu.tw or lung@illinois.edu

Abstract: Foot progression angle (FPA) analysis is one of the core methods to detect gait pathologies as basic information to prevent foot injury from excessive in-toeing and out-toeing. Deep learning-based object detection can assist in measuring the FPA through plantar pressure images. This study aims to establish a precision model for determining the FPA. The precision detection of FPA can provide information with in-toeing, out-toeing, and rearfoot kinematics to evaluate the effect of physical therapy programs on knee pain and knee osteoarthritis. We analyzed a total of 1424 plantar images with three different You Only Look Once (YOLO) networks: YOLO v3, v4, and v5x, to obtain a suitable model for FPA detection. YOLOv4 showed higher performance of the profile-box, with average precision in the left foot of 100.00% and the right foot of 99.78%, respectively. Besides, in detecting the foot angle-box, the ground-truth has similar results with YOLOv4 ($5.58 \pm 0.10^{\circ}$ vs. $5.86 \pm 0.09^{\circ}$, $p = 0.013$). In contrast, there was a significant difference in FPA between ground-truth vs. YOLOv3 ($5.58 \pm 0.10^{\circ}$ vs. $6.07 \pm 0.06^{\circ}$, $p < 0.001$), and ground-truth vs. YOLOv5x ($5.58 \pm 0.10^{\circ}$ vs. $6.75 \pm 0.06^{\circ}$, $p < 0.001$). This result implies that deep learning with YOLOv4 can enhance the detection of FPA.

Keywords: YOLO; object detection; foot problems; angle parameter; foot clinic

Citation: Ardhianto, P.; Subiakto, R.B.R.; Lin, C.-Y.; Jan, Y.-K.; Liau, B.-Y.; Tsai, J.-Y.; Akbari, V.B.H.; Lung, C.-W. A Deep Learning Method for Foot Progression Angle Detection in Plantar Pressure Images. *Sensors* **2022**, *22*, 2786. https://doi.org/10.3390/s22072786

Academic Editor: Petros Daras

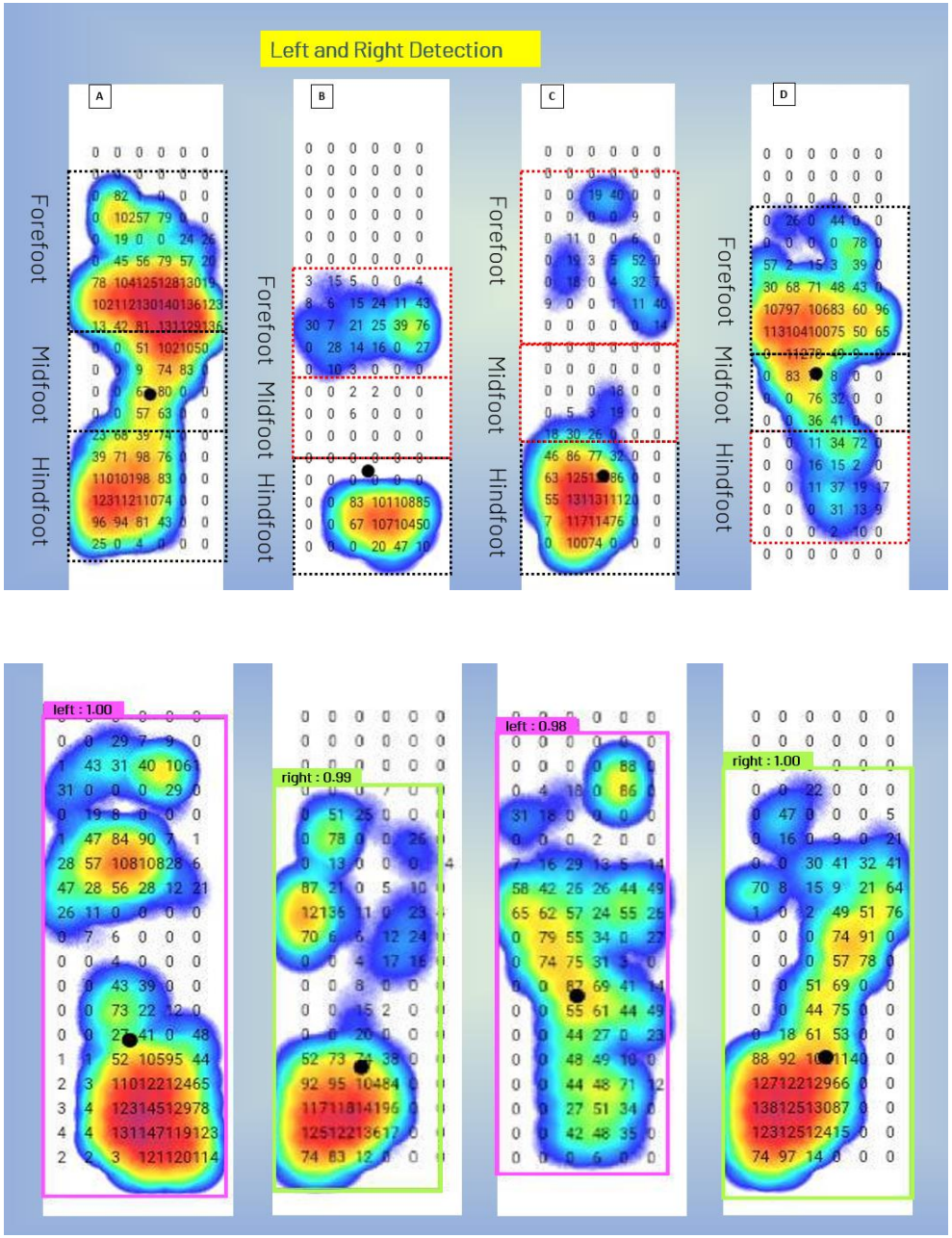
Received: 14 March 2022
Accepted: 1 April 2022
Published: 5 April 2022

Advancement in technology

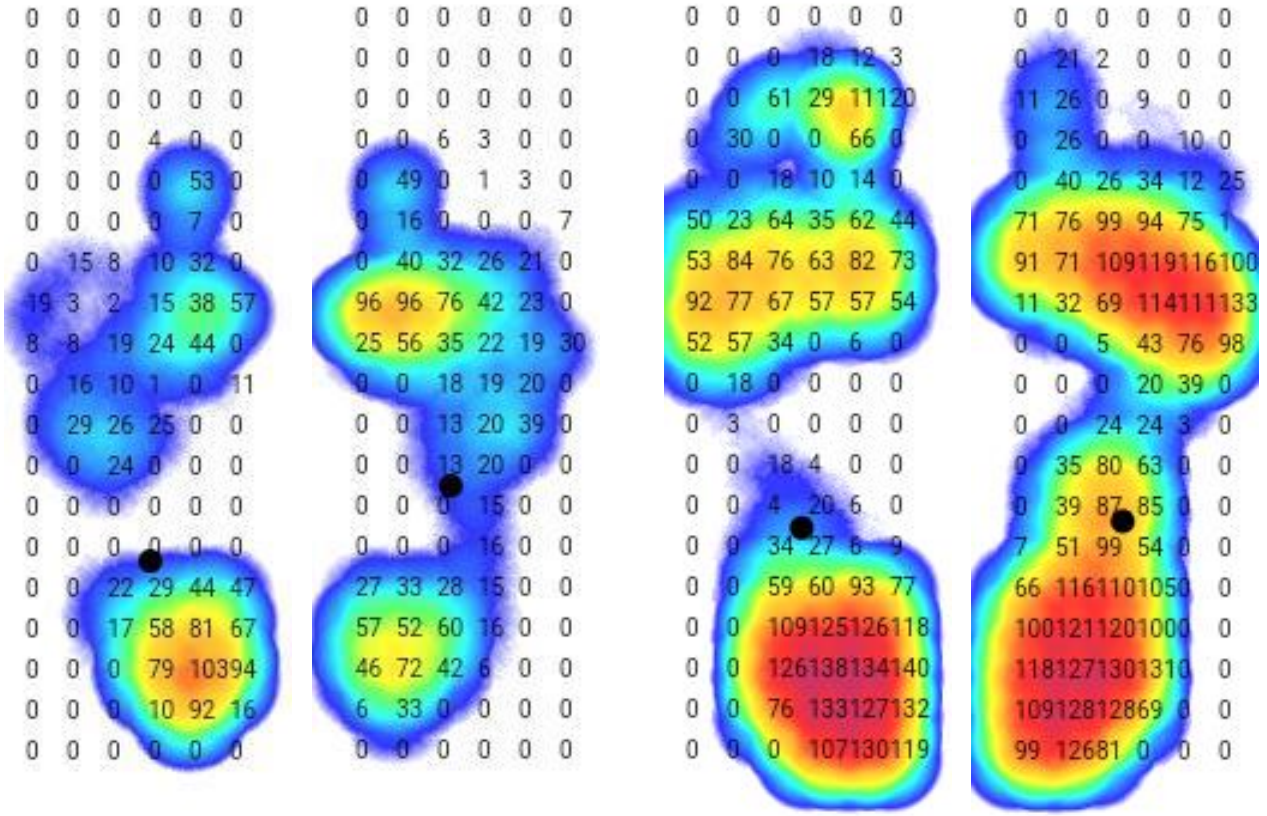
Abnormal FPA
In-toeing and out-toeing;

Defect plantar pressure

Advancement in technology



Advancement in technology



Advancement in technology

Advancement in technology

applied sciences

MDPI

Review

A Review of the Plantar Pressure Distribution Effects from Insole Materials and at Different Walking Speeds

Fahni Haris [1,2], Ben-Yi Liau [3], Yih-Kuen Jan [4,5,6], Veit Babak Hamun Akbari [7], Yanuar Primanda [1], Kuan-Han Lin [2] and Chi-Wen Lung [4,7,*]

1 School of Nursing, Universitas Muhammadiyah Yogyakarta, Yogyakarta 55183, Indonesia; fahni.h@umy.ac.id (F.H.); yanuarprimanda@umy.ac.id (Y.P.)
2 Department of Healthcare Administration, Asia University, Taichung 41354, Taiwan; okonkwolin@asia.edu.tw
3 Department of Biomedical Engineering, Hungkuang University, Taichung 433304, Taiwan; byliau@hk.edu.tw
4 Rehabilitation Engineering Lab, University of Illinois at Urbana-Champaign, Champaign, IL 61820, USA; yjan@illinois.edu
5 Kinesiology and Community Health, University of Illinois at Urbana-Champaign, Champaign, IL 61820, USA
6 Computational Science and Engineering, University of Illinois at Urbana-Champaign, Champaign, IL 61820, USA
7 Department of Creative Product Design, Asia University, Taichung 41354, Taiwan; 109711569@live.asia.edu.tw
* Correspondence: cwlung@asia.edu.tw

Featured Application: (A) Walking speeds and insole material are common modulating factors that decrease peak plantar pressure (PPP) in different foot regions; (B) the appropriate walking speed for reducing PPP of the forefoot in DM was slower than non-DM; (C) at a similar walking speed, DM had higher PPP than non-DM; (D) the EVA is more prevalent in investigating reduced PPP in DM compared with other materials; (E) cushioning, resilience, and stiffness may be the essential mechanical properties in insole material for DM.

Citation: Haris, F.; Liau, B.-Y.; Jan, Y.-K.; Akbari, V.B.H.; Primanda, Y.;

#1

Advancement in technology

- 1585 papers > 27 papers
- We found that in faster walking speeds, the forefoot PPP was higher (308 kPa) than midfoot (150 kPa) and rearfoot (251 kPa) PPP.
- The appropriate walking speed for reducing the forefoot PPP was about 6 km/h for non-DM and 4 km/h for DM people.
- The forefoot PPP in DM people was 185% higher than that of non-DM people.

Advancement in technology

VOL. 6 NO. 2 DECEMBER 2022

IJNP (Indonesian Journal of Nursing Practices)
Vol 6 No 2 DECEMBER 2022: 109-116

The effect of different inflated air insole in the foot plantar pressure

Fahni Haris[1,2], Wei-Cheng Shen[3], Ji-Feng Wang[4], Yori Pusparani[3,6], Ardha Ardea Prisilla[3,7], Min-Wei Lu[8], Ben-Yi Liau[9], Chi-Wen Lung[5,10]*

[1]School of Nursing, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Indonesia
[2]Department of Healthcare Administration, Asia University, Taiwan
[3]Department of Digital Media Design, Asia University, Taiwan
[4]Department of Mechanical Engineering, National Yang Ming Chiao Tung University, Taiwan
[5]Department of Creative Product Design, Asia University, Taiwan
[6]Visual Communication Design Study Program, Budi Luhur University, Indonesia
[7]Fashion Design, LaSalle College Jakarta, Indonesia
[8]Department of Mechanical Engineering, National United University, Taiwan
[9]Department of Biomedical Engineering, Hungkuang University, Taiwan;
[10]Rehabilitation Engineering Lab, University of Illinois at Urbana-Champaign, United States of America

Corresponding Author: Chi-Wen Lung
Email: cwlung@asia.edu.tw

#2

Advancement in technology

A within-subject design, 3 x 1 factorial approach

(B. -Y. Liau et al., 2021; C. –W. Lung et al., 2021; C. –W. Lung et al., 2020)

Three inner pressure (80 mmHg, 160 mmHg, and 240 mmHg)

1 duration (20 min)

3.6-mph

10-min

80 mmHg	160 mmHg	240 mmHg
10 min	**10 min**	**10 min**

Advancement in technology

Based on the findings of this study, it is recommended that individuals at high risk of developing foot ulcers wear shoes with inner air insoles (80 mmHg).

Advancement in technology

Clinical Trial/Experimental Study

Medicine

OPEN

The effects of different inner pressures of air insoles and walking durations on peak plantar pressure

Fahni Haris, MNS[a,b], Yih-Kuen Jan, PhD[c], Ben-Yi Liau, PhD[d], Chang-Wei Hsieh, PhD[e], Wei-Cheng Shen, PhD[f], Chien-Cheng Tai, PhD[g], Yin-Hwa Shih, PhD[a], Chi-Wen Lung, PhD[c,h,*]

Abstract

Background: Exercise reduces chronic complications in individuals with diabetes and peripheral vascular diseases. In clinical practice, the use of air insole may reduce peak plantar pressure (PPP), and risk for diabetic foot ulcers (DFUs). However, there is no guideline on selecting air insole pressure for effectively reducing PPP. Therefore, this study aimed to investigate the effects of different air insole pressure on PPP at different walking durations.

Methods: We tested 13 participants using repeated measures study design, including 3 air insole pressures (80, 160, and 240 mm Hg) and 2 walking durations (10 and 20 minutes) for 6 walking conditions. PPP values at the first toe, first metatarsal head, and second metatarsal head were calculated.

Results: The one-way ANOVA showed significant pairwise differences of PPP at 20 minutes duration in the first metatarsal head between 80 and 240 mm Hg ($P = .007$) and between 160 and 240 mm Hg ($P = .038$); in the second metatarsal head between 80 and 240 mm Hg ($P = .043$). The paired t test confirmed that walking duration significantly has lower PPP at 10 minutes than 20 minutes with 240 mm Hg air insole in the first metatarsal head ($P = .012$) and the second metatarsal head ($P = .027$).

Conclusion: People at risk of foot ulcers are suggested to wear shoes with 80 mm Hg of air insole for reducing PPP in the first metatarsal head and the second metatarsal head. Moreover, people may avoid wearing the stiffer insole (240 mm Hg) for more than 20 minutes.

Abbreviations: DFUs = diabetic foot ulcers, DM = diabetes mellitus, PPP = peak plantar pressure.

Keywords: air insole, diabetic foot ulcers, forefoot, insole stiffness, walking duration

#3

Advancement in technology

A within-subject design, 3 x 2 factorial approach

(B. -Y. Liau et al., 2021; C. –W. Lung et al., 2021; C. –W. Lung et al., 2020)

Three inner pressure (80 mmHg, 160 mmHg, and 240 mmHg)

2 duration (10 and 20 min)

80 mmHg **10 min**	160 mmHg **10 min**	240 mmHg **10 min**
80 mmHg **20 min**	160 mmHg **20 min**	240 mmHg **20 min**

Advancement in technology

Highlight:

- People are suggested to wear shoes with 80 mm Hg of air insole for reducing PPP in the first metatarsal head and the second metatarsal head.
- People may avoid wearing the stiffer insole (240 mm Hg) for more than 20 minutes.

Advancement in technology

OPEN ACCESS

EDITED BY
Qichang Mei,
Ningbo University, China

REVIEWED BY
David Perpetuini,
University of Studies G. d'Annunzio Chieti and Pescara, Italy
Zixiang Gao,
Eötvös Loránd University, Hungary

*CORRESPONDENCE
Chi-Wen Lung,
cwlung@asia.edu.tw

RECEIVED 11 December 2023
ACCEPTED 21 February 2024
PUBLISHED 11 March 2024

CITATION
Haris F, Jan Y-K, Liau B-Y, Hsieh C-W, Shen W-C, Tai C-C, Shih Y-H and Lung C-W (2024), Plantar pressure gradient and pressure gradient angle are affected by inner pressure of air insole.
Front. Bioeng. Biotechnol. 12:1353888.
doi: 10.3389/fbioe.2024.1353888

Plantar pressure gradient and pressure gradient angle are affected by inner pressure of air insole

Fahni Haris[1,2], Yih-Kuen Jan[3], Ben-Yi Liau[4], Chang-Wei Hsieh[5], Wei-Cheng Shen[6], Chien-Cheng Tai[7], Yin-Hwa Shih[1] and Chi-Wen Lung[3,8]*

[1]Department of Healthcare Administration, Asia University, Taichung, Taiwan, [2]School of Nursing, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia, [3]Rehabilitation Engineering Lab, University of Illinois at Urbana-Champaign, Champaign, IL, United States, [4]Department of Automatic Control Engineering, Feng Chia University, Taichung, Taiwan, [5]Department of Computer Science and Information Engineering, Asia University, Taichung, Taiwan, [6]Department of Digital Media Design, Asia University, Taichung, Taiwan, [7]International Ph.D. Program for Cell Therapy and Regeneration Medicine, Taipei Medical University, Taipei, Taiwan, [8]Department of Creative Product Design, Asia University, Taichung, Taiwan

Clinically, air insoles may be applied to shoes to decrease plantar pressure gradient (PPG) and increase plantar gradient angle (PGA) to reduce foot ulcers. PPG and PGA may cause skin breakdown. The effects of different inner pressures of inflatable air insoles on dynamic PPG and PGA distributions are largely unknown in non-diabetics and people with diabetes. This study aimed to explore the impact of varying inner air insole pressures on PPG and PGA to establish early mitigation strategies for people at risk of foot ulcers. A repeated measures study design, including three air insoles (80 mmHg, 160 mmHg, and 240 mmHg) and two walking durations (10 and 20 min) for a total of six walking protocols, was tested on 13 healthy participants (height, 165.8 ± 8.4 cm; age, 27.0 ± 7.3 years; and weight, 56.0 ± 7.9 kg, BMI: 20.3 ± 1.7 kg/m2) over three consecutive weeks. PPG, a measurement of the spatial variation in plantar

#4

Advancement in technology

Highlight:

- Walking on a softer air insole results in lower PPG and higher PGA.
- Softer air insole decreases peak plantar pressure (PPP) and increases PGA.
- The shorter walking duration causes a lower PPG than the longer walking duration in the metatarsal region.

Advancement in technology

Classification of Plantar Pressure Based on Walking Duration and Shoe Pressure Using a Convolutional Neural Network

Gilang Titah Ramadhan[1], Fahni Haris[2, 3], Yori Pusparani[4, 5], Maftuhah Rahimah Rum[6], Chi-Wen Lung[1, 7, a)]

[1]*Department of Computer Science and Information Engineering, Asia University, Taichung, Taiwan.*
[2]*School of Nursing, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia.*
[3]*Department of Healthcare Administration, Asia University, Taichung, Taiwan.*
[4]*Department of Visual Communication Design, Budi Luhur University, Jakarta, Indonesia.*
[5]*Department of Digital Media Design, Asia University, Taichung, Taiwan.*
[6]*Department of Bioinformatics and Medical Engineering, Asia University, Taichung, Taiwan.*
[7]*Department of Creative Product Design, Asia University, Taichung, Taiwan.*

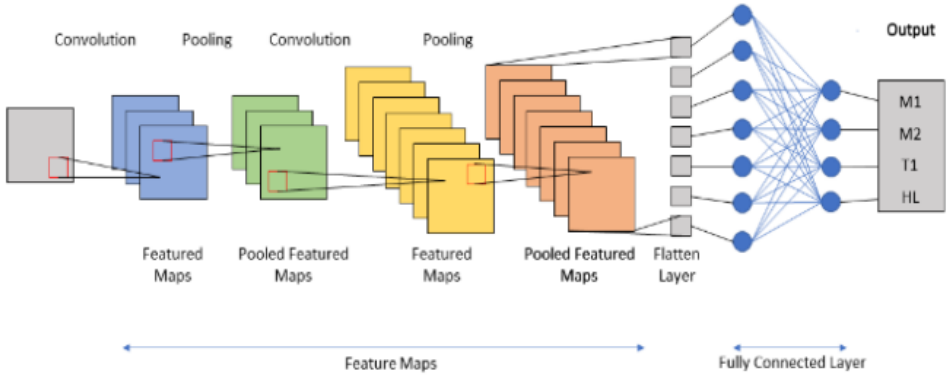


FIGURE 2. Convolutional neural network model

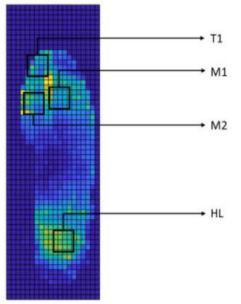


FIGURE 1. Region of interest of plantar pressure image

#5

Advancement in technology

- AIoT bisa memprediksi mana sol sepatu yang bagus
- 16 sample (Post walking → 3 inner pressure, 2 walking duration, 4 location)
  - 13 training
  - 3 validation (test)
- Ddurasi berjalan 10 menit dari efek tekanan sepatu menghasilkan F1 score sebesar 0.89
- Efek durasi berjalan menunjukkan skor F1 sebesar 0.86 dengan T1 dan M1 cenderung lebih mudah untuk diklasifikasikan daripada M2 dan HL.

Advancement in technology

www.nature.com/scientificreports

scientific reports

Check for updates

OPEN

Effect of different inner pressures of air insoles and walking durations on plantar pressure time integral

Gilang Titah Ramadhan[1], Fahni Haris[2], Yih-Kuen Jan[3], Ben-Yi Liau[4], Wen-Thong Chang[1], Chien-Cheng Tai[5] & Chi-Wen Lung[3,6]✉

Air insoles have provided insights for reducing the risk of diabetic foot ulcers (DFU). The pressure time integral (PTI) is an effective assessment that considers the time effect in various physical activities. We investigated the interactions between three different insole inner pressures (80, 160, and 240 mmHg) and two walking durations (10 and 20 min). The big toe (T1), first metatarsal head (M1), and second metatarsal head (M2) were investigated in 13 healthy participants. One-way analysis of variance (ANOVA) showed that the effects of each insole inner pressure significantly differed ($P < 0.05$) with a 10 min walking duration. The PTI values resulting from 80 mmHg in M2 (38.4 ± 3.8, $P = 0.002$) and 160 mmHg in M1 (44.3 ± 4.3, $P = 0.027$) were lower than those from 240 mmHg. Additionally, the paired t test showed that the effects of each walking duration were also considerably different at 160 mmHg. The PTI at 10 min was lower than that at 20 min in M1 (44.31 ± 4.31, $P = 0.015$) and M2 (47.14 ± 5.27, $P = 0.047$). Thus, we suggest that walking with a pressure of 160 mmHg for 10 min has a lower risk of DFU.

Keywords Pressure time integral, Air insole, Walking duration, Insole inner pressure, Diabetic foot ulcer

#6

Advancement in technology

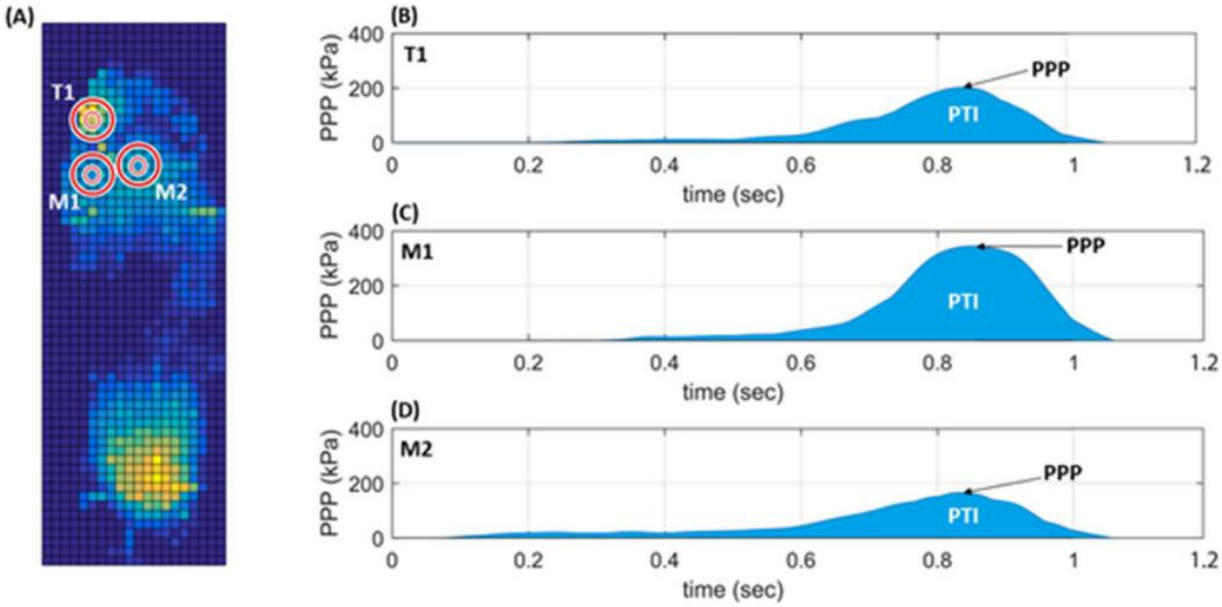


Figure 5. Illustration of Plantar Pressure and PTI Data. (**A**) Plantar pressure data; (**B**) PTI data in T1; (**C**) PTI data in M1; (**D**) PTI data in M2. PTI, pressure time integral; T1, first toe; M1, first metatarsal head; M2, second metatarsal head.

#6

Advancement in technology

- The critical insight from these findings is that walking with an insole inner pressure of 160 mmHg for 10 min can offer a lower risk of foot ulcers.
- Conversely, walking with an inner insole pressure of 240 mmHg for all durations may increase the risk of foot ulcers.
- Furthermore, this research contributes to evidence supporting the need for selecting appropriate insole inner pressures to reduce the risk of DFU.

Advancement in technology

BMC Musculoskeletal Disorders - Receipt of Manuscript 'Effect of Different...'

BM

BMC Musculoskeletal Disorders <pavithra.brahmaiah.1@springernature.com>
To Fahni Haris

Reply | Reply All | Forward

Sat 8/24/2024 12:07 AM

Ref: Submission ID 0332b3dd-ed9d-4fc0-bd5b-d1e151f16489

Dear Dr Haris,

Please note that you are listed as a co-author on the manuscript "Effect of Different Air insole pressure and Walking Durations on Microcirculation to Prevent Diabetic Foot Ulcers", which was submitted to BMC Musculoskeletal Disorders on 23 August 2024 UTC.

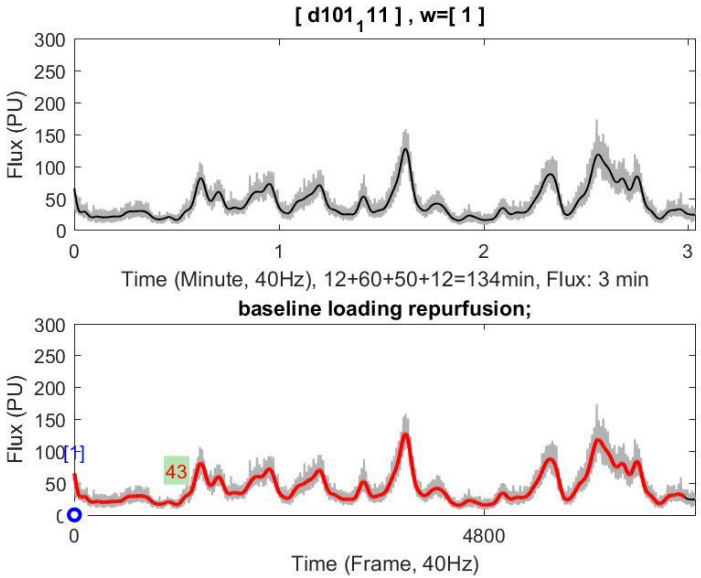
If you have any queries related to this manuscript please contact the corresponding author, who is solely responsible for communicating with the journal.

Kind regards,

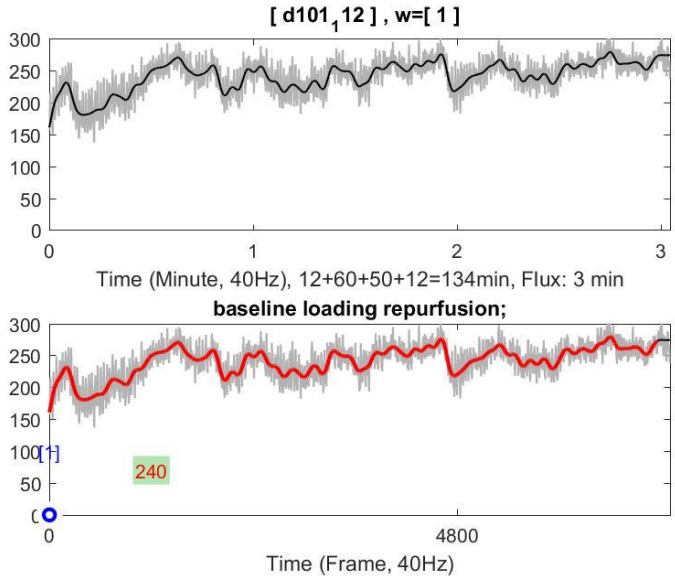
Editorial Assistant
BMC Musculoskeletal Disorders

#7

Advancement in technology



before



after

Advancement in technology

Submission Confirmation for The effects of different inner pressures of air insoles and walking durations on elastic properties of plantar soft tis...

JO em.jfa2.0.8c9599.3d8cefce@editorialmanager.com on behalf of Journal of Foot and Ankle Research <em@editoria

To Fahni Haris

Reply | Reply All | Forward

Tue 7/9/2024 12:08 AM

You are being blind carbon copied ("bcc:'d") on an e-mail "To" "Chi-Wen Lung" lung@illinois.edu

Dear Dr. Lung,

Your submission entitled "The effects of different inner pressures of air insoles and walking durations on elastic properties of plantar soft tissue" has been received by journal Journal of Foot and Ankle Research. The manuscript number for your submission is jfa2.202400134.

To view your submission, please login to https://www.editorialmanager.com/jfa2/ by entering your username (********) and password and selecting the "Author Login" option.

If the manuscript is accepted for publication, this author's affiliation will be used to determine eligibility for some open access funding (click here for details).

This journal offers a number of license options; information about this is available here. The submitting author has confirmed that all co-authors have the necessary rights to grant in the submission, including in light of each co-author's funder's policies. If any author's funder has a policy that restricts which kinds of license they can sign, for example if the funder is a member of Coalition S, please make sure the submitting author is aware.

This message has been sent to all named co-authors listed in the submission process to serve as notification of submission.

Please note that the journal is transitioning to Wiley as the new publisher. We anticipate slight delays in manuscript processing and thank you for your patience.

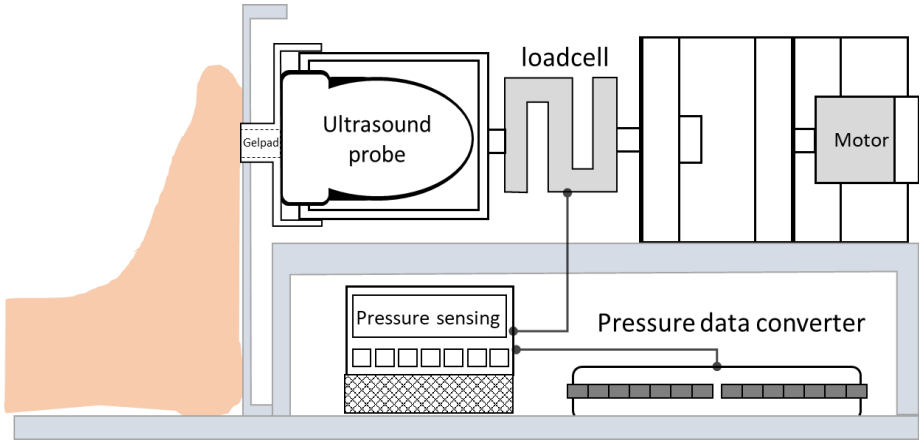
#8

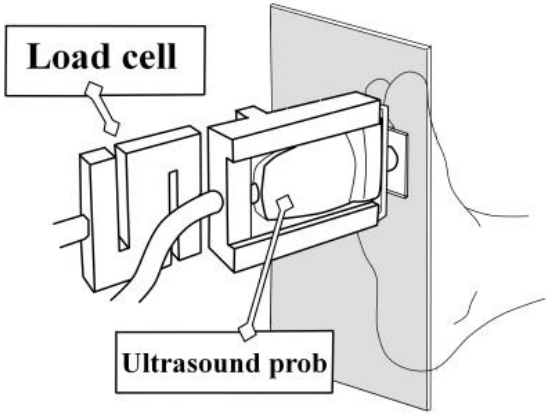
Advancement in technology

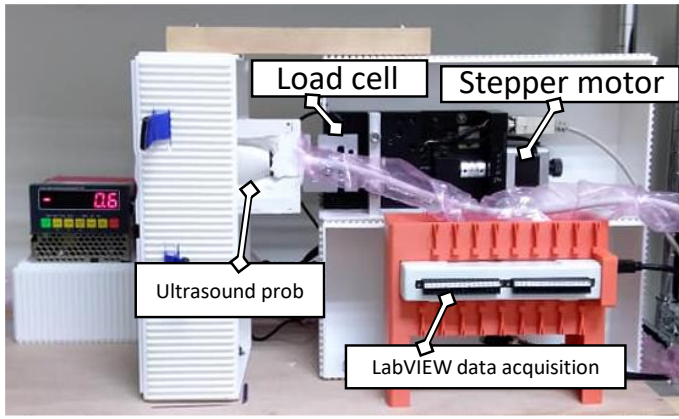
before

after

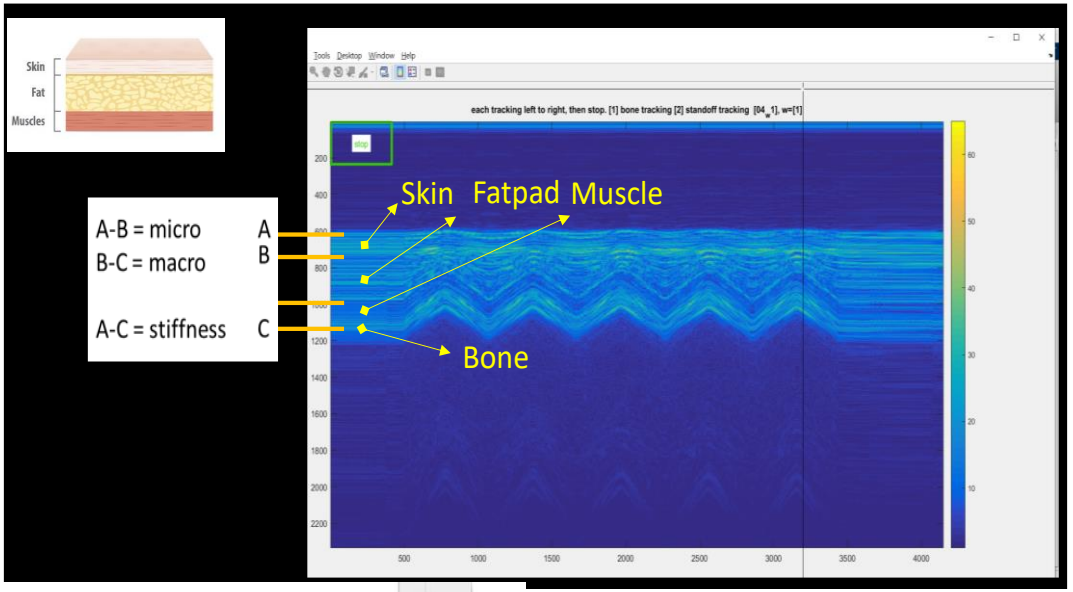
First metatarsal head

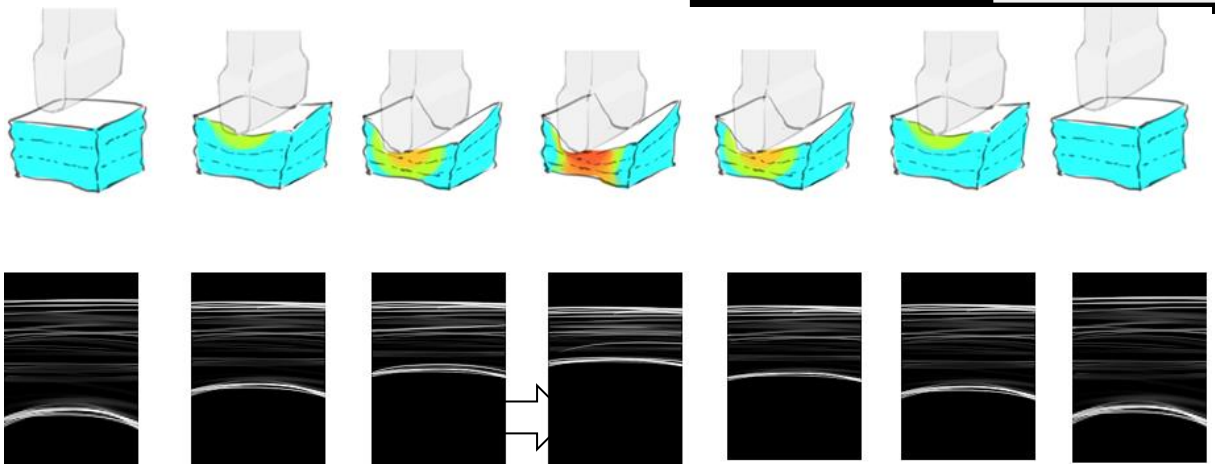


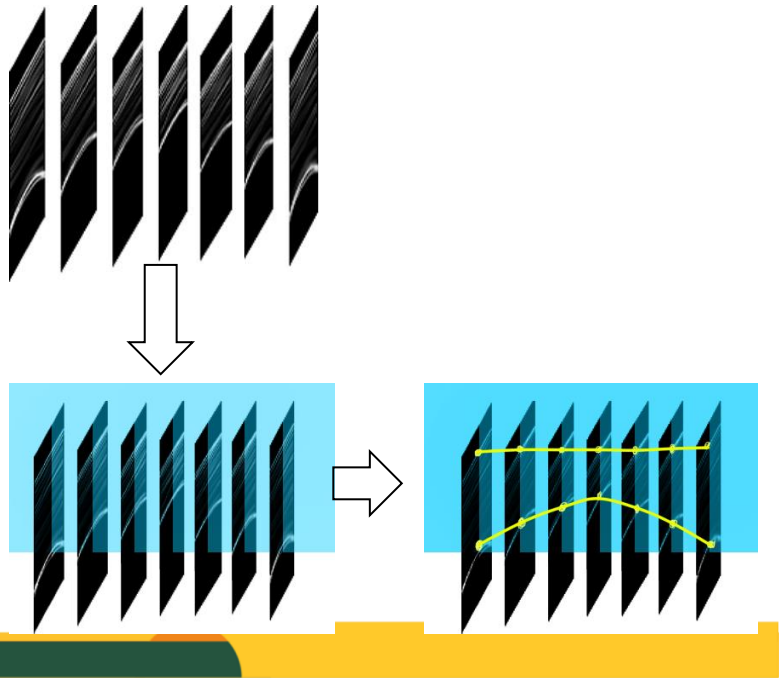




Advancement in technology



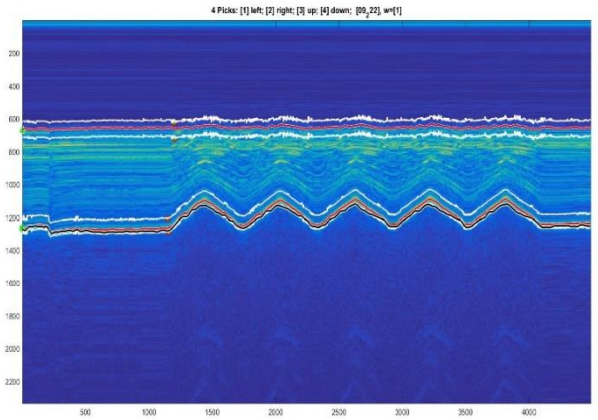


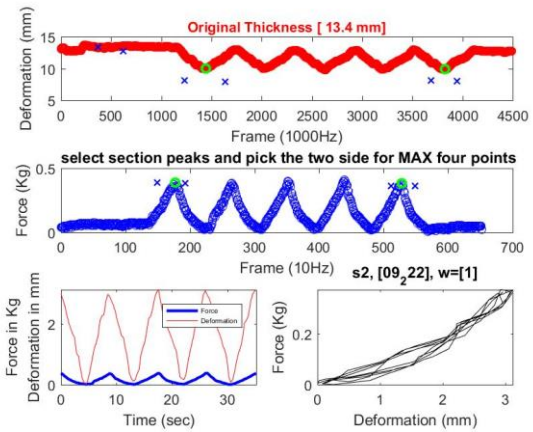


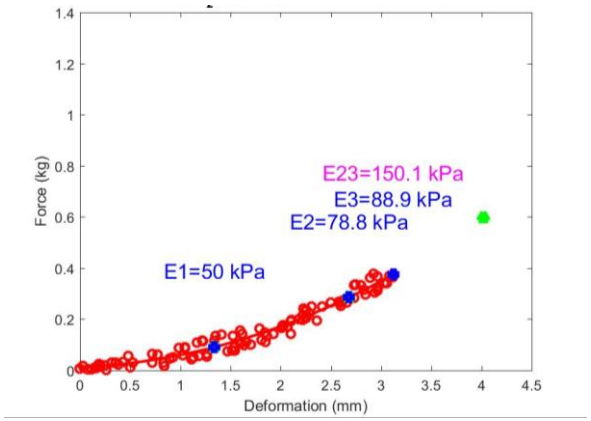
Advancement in technology

Soft tissue stiffness

Young' s Modulus

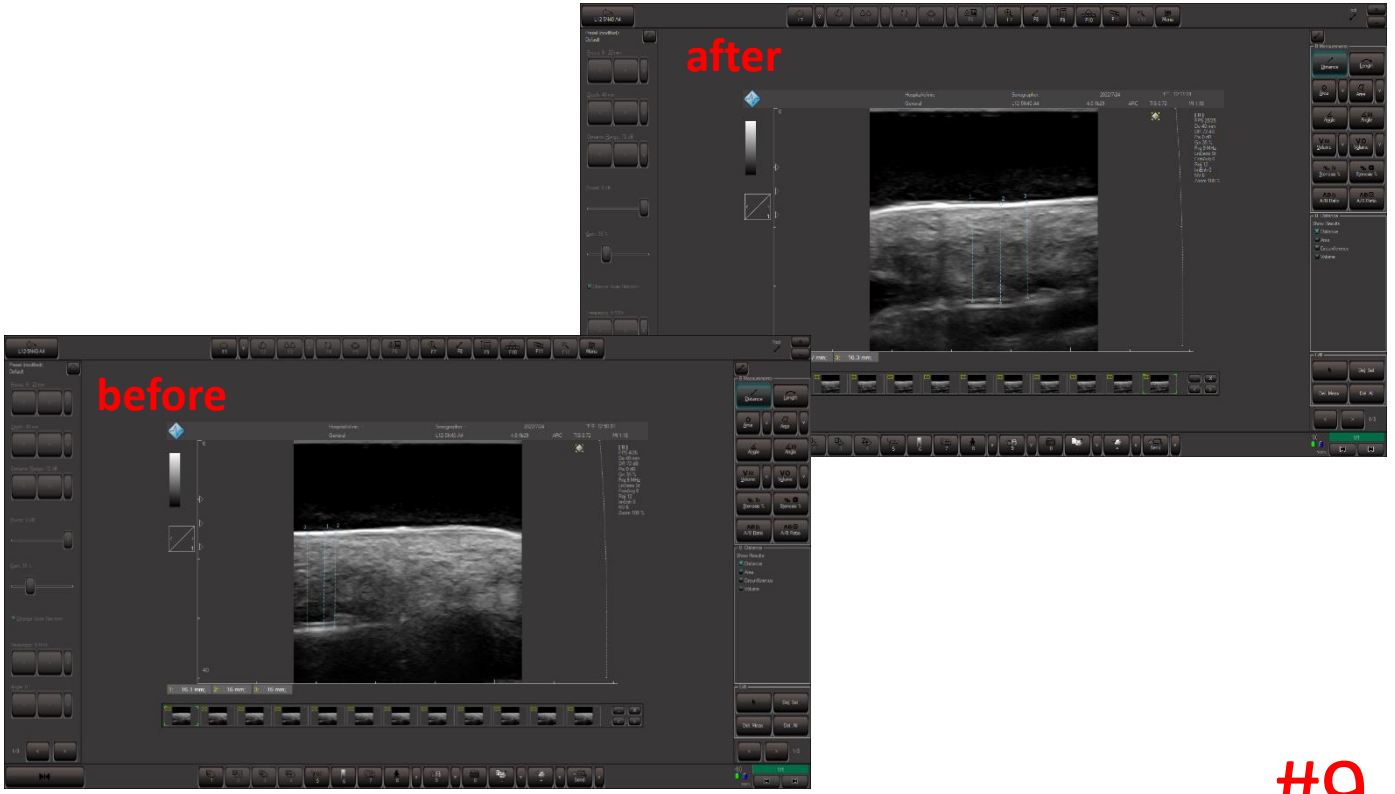






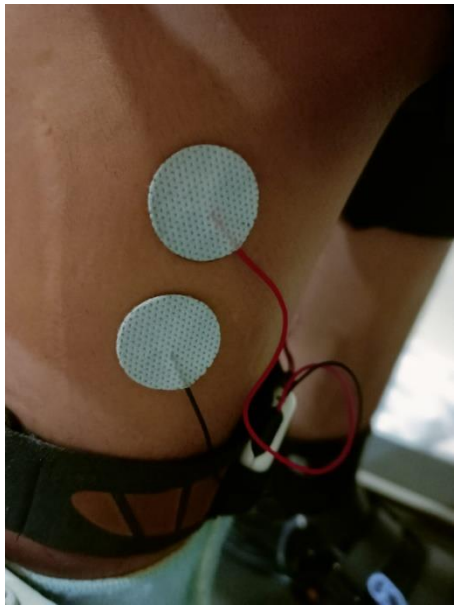
Soft tissue thickness

Advancement in technology



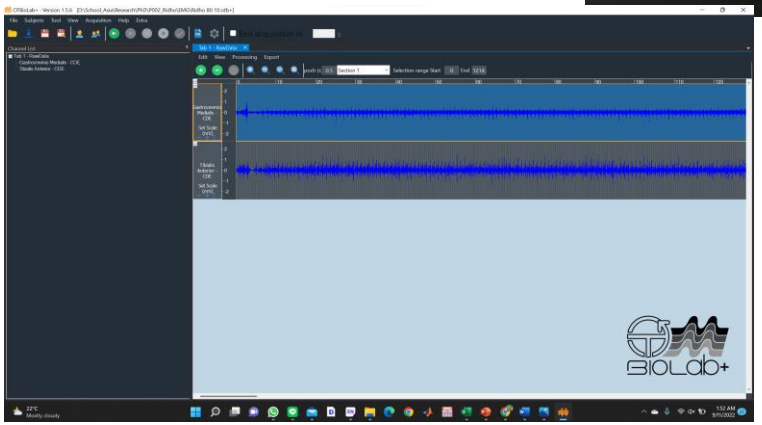
Soft tissue fatigue

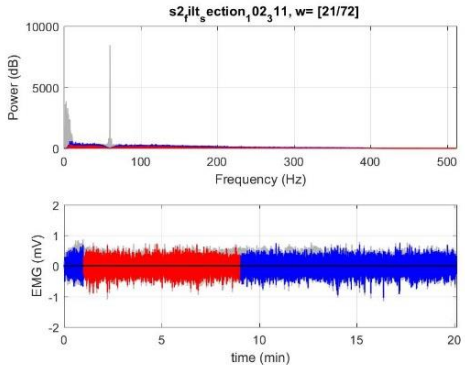
Advancement in technology

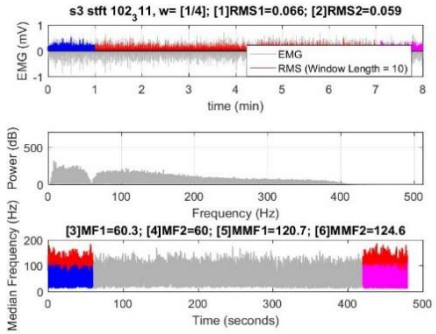


before

after

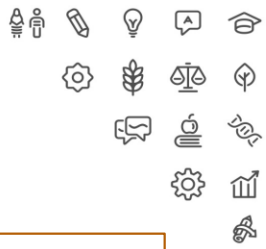






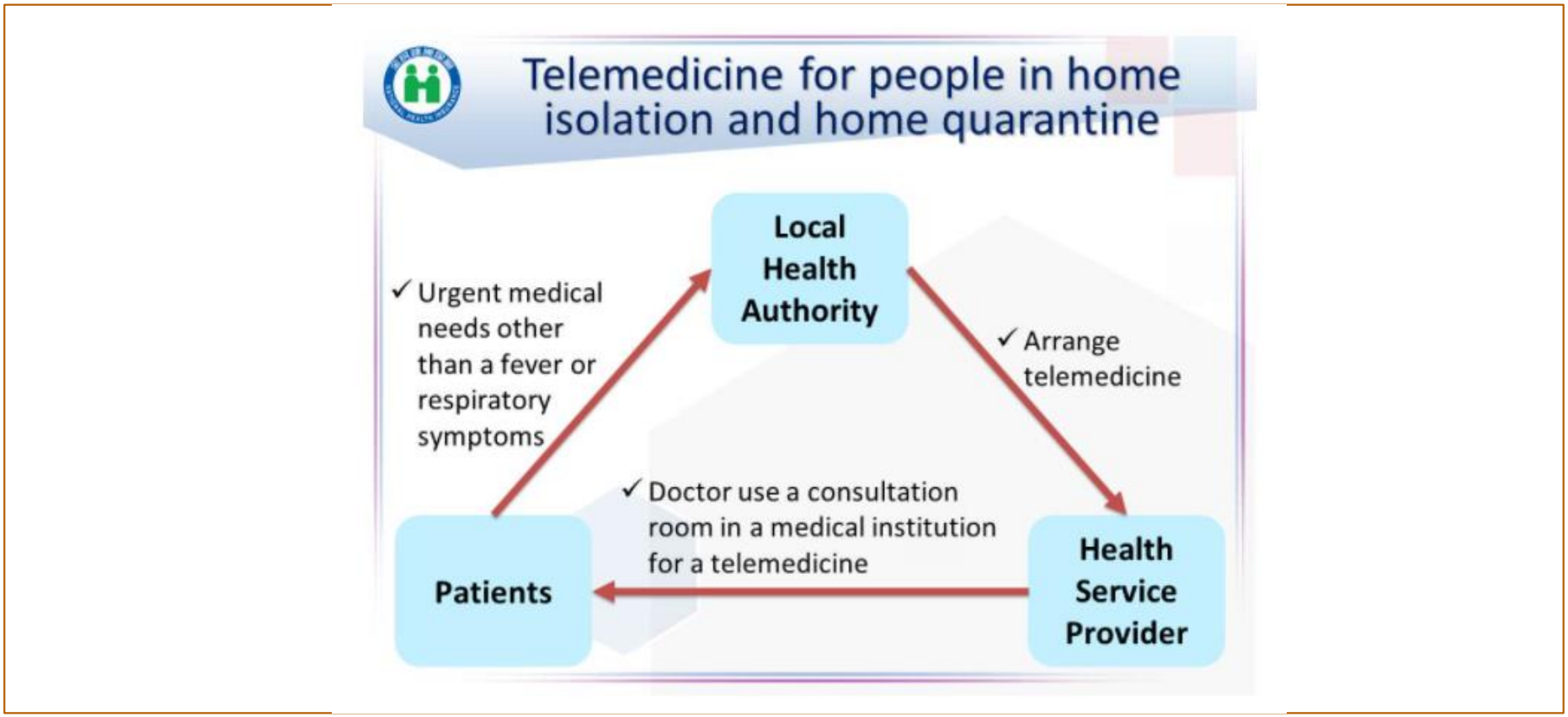
#10

Patient-centred care

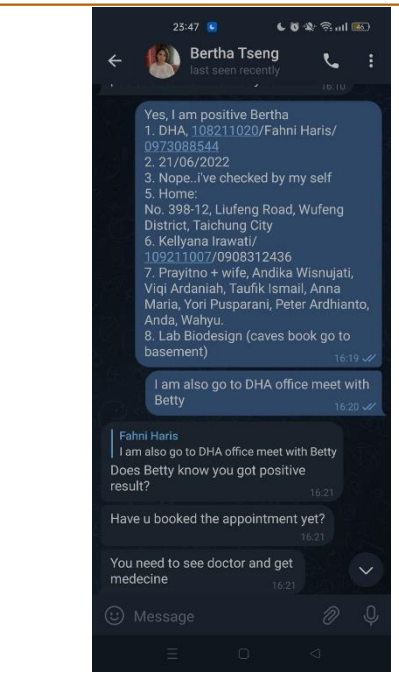


- Tailoring treatment plans to individual patient needs and preferences.
- A focus on shared decision-making and a holistic approach to patient care

Patient-centred care

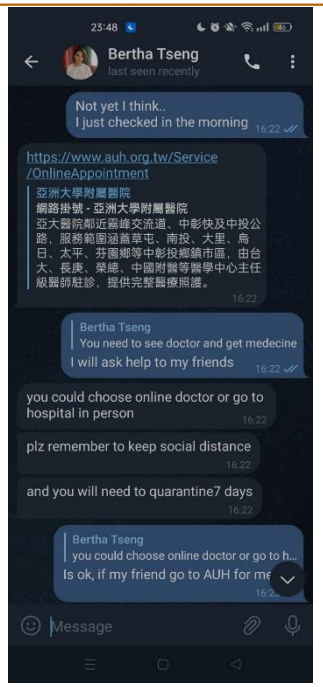


Patient-centred care

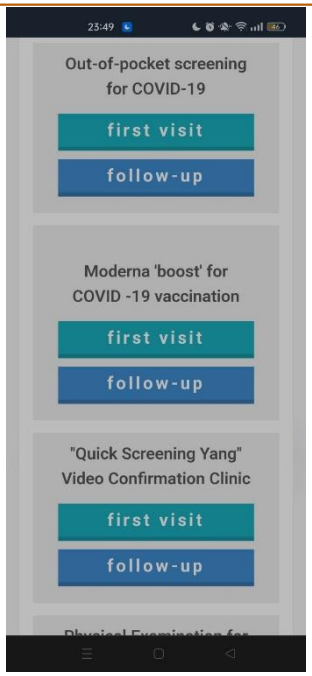


Konfirmasi
(local health authority)

Pelaporan



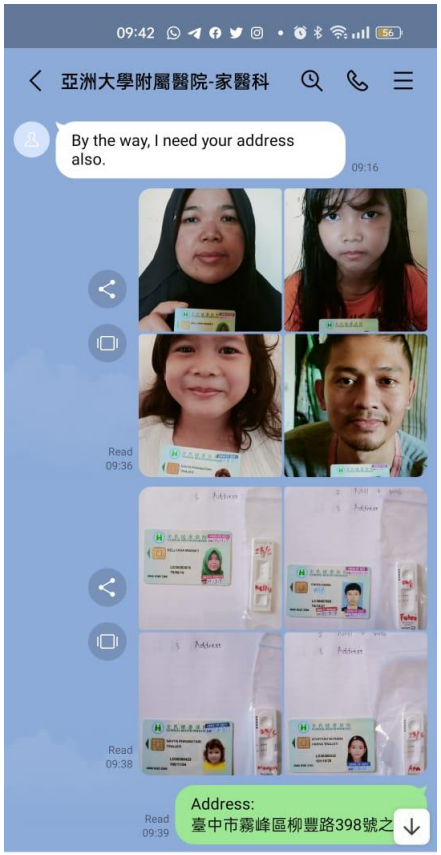
Pelaporan ke RS



Pendaftaran ke RS
(health service provider)

Patient-centred care

Pendataan syarat



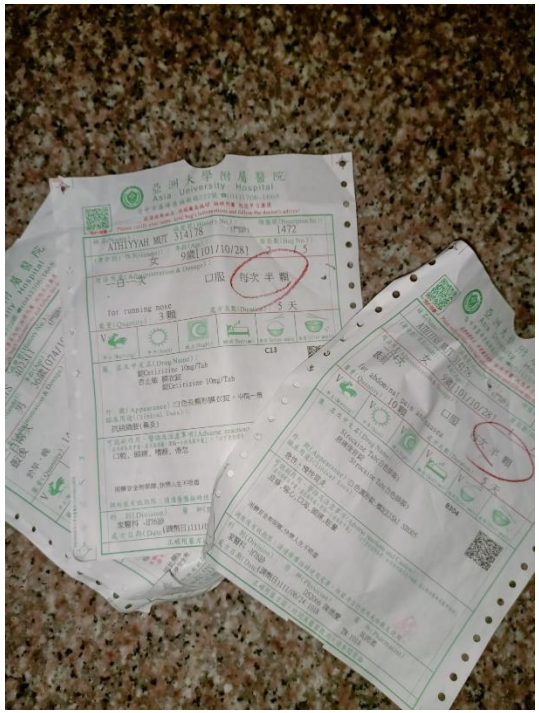
Benar pasien

Telemedicine

Apa saja yang dilakukan

- RS memastikan benar pasien
- Dtujukan ke dokter sesuai dgn pendaftaran
- Dikaji gejala2 yg timbul
- Difollow up ke klinik terdekat
- Mengisi form (health monitor) setiap hari
- Di telepon setiap hari oleh klinik
- Center Disease Control: mengawasi jarak jauh (signal HP)

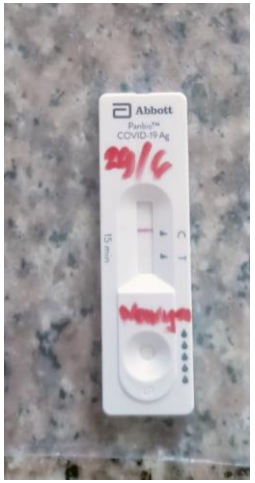
Patient-centred care



Medicine

Controlling

Dinyatakan sembuh

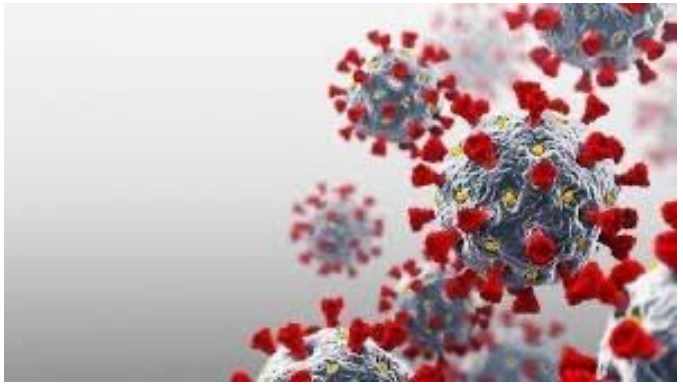


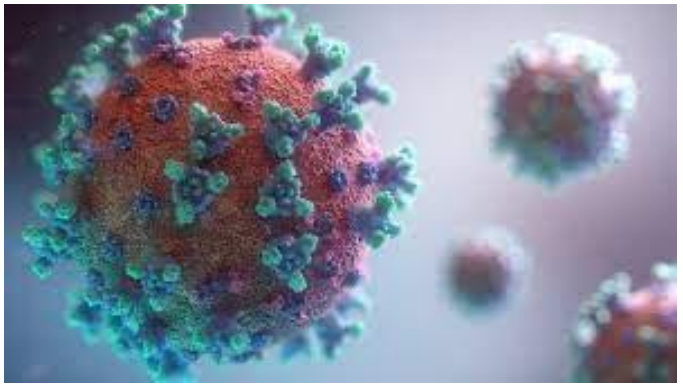
Cultural competence

- Patient populations become more diverse --> nurses need to be culturally competent.
- This means **understanding and respecting the cultural beliefs and practices of their patients** to provide culturally sensitive care

Pandemic preparedness

- The COVID-19 pandemic highlighted the importance of preparedness for infectious disease outbreaks.
- Medical-surgical nurses must be **well-trained in infection control** and **ready to respond to public health crises**





Pandemic preparedness

Robots help decreased nurse's burnout

https://www.youtube.com/watch?v=BDQlfiN6e-Y

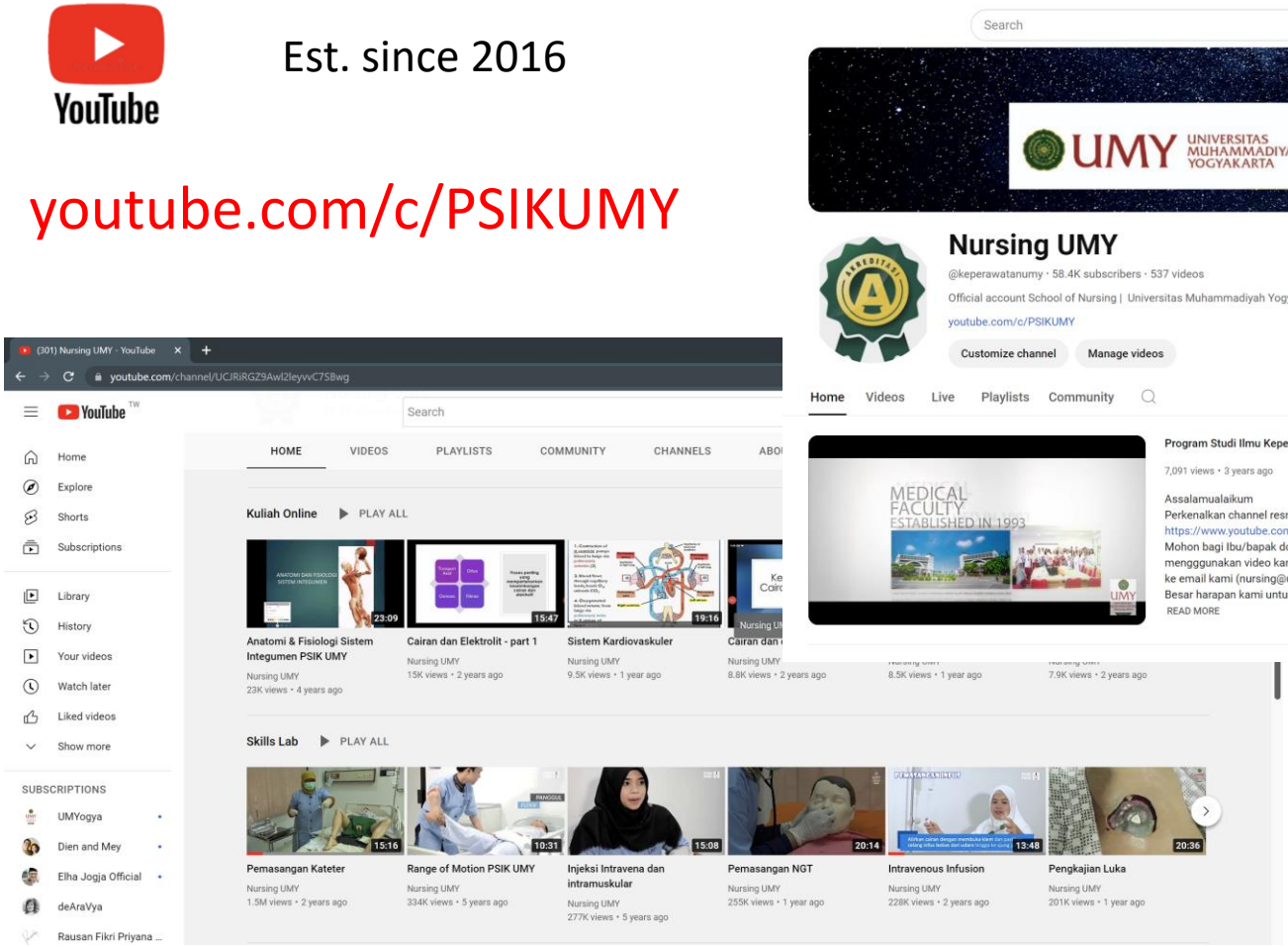
Robots help healthcare to "untouched" with patient

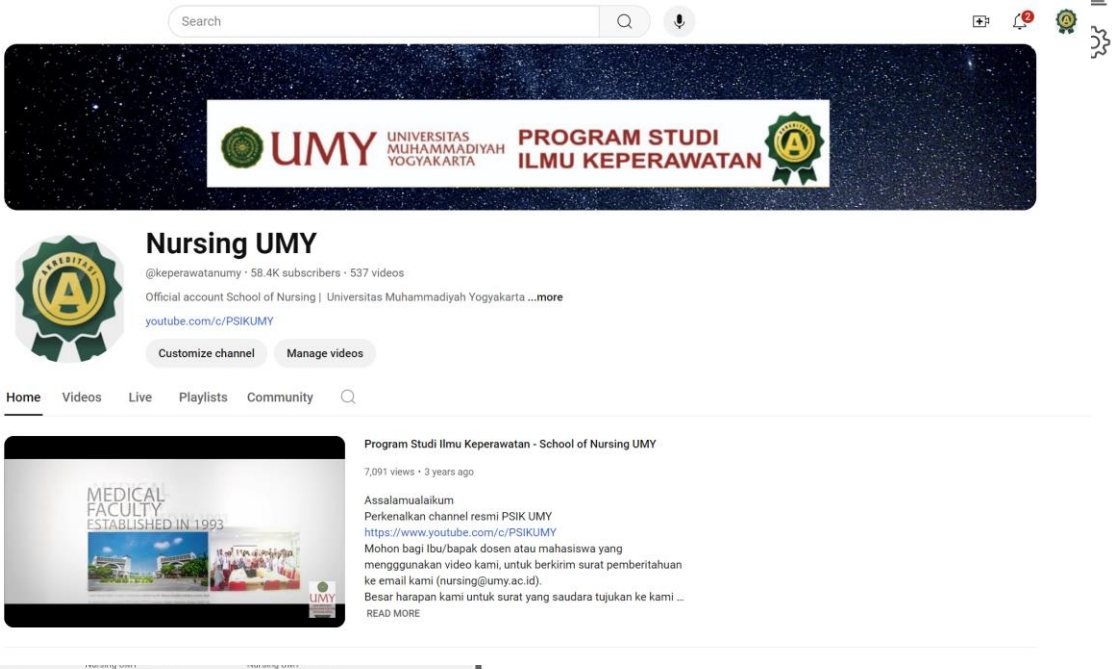
https://www.youtube.com/watch?v=6lcyBTis17g

Pandemic preparedness

Est. since 2016

youtube.com/c/PSIKUMY





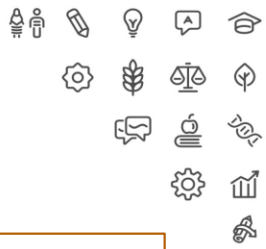
60K subscribers

Healthcare policy changes

Omnibus law in health

- **Mengubah fokus dari pengobatan menjadi pencegahan**
- Memudahkan akses layanan kesehatan.
- **Mempersiapkan sistem kesehatan yang tangguh menghadapi bencana**
- Meningkatkan efisiensi dan transparansi pembiayaan kesehatan.
- Memperbaiki kekurangan tenaga kesehatan.
- **Mendorong industri kesehatan untuk mandiri di dalam negeri dan mendorong penggunaan teknologi kesehatan yang mutakhir.**
- Menyederhanakan proses perizinan kesehatan.
- Melindungi tenaga kesehatan secara khusus.
- **Mengintegrasikan sistem informasi kesehatan**

Evidence-based practice



- Evidence-based practice (EBP) is a key trend
- EBP incorporates theory, clinical decision-making, judgement and research knowledge to arrive at the application of the best, most effective and most useful evidence to specific elements of practice (Windell, 2003)

- Nurses are encouraged to base their clinical decisions on the latest research evidence.
- Staying up-to-date with the latest research and implementing evidence-based interventions is **crucial**.