A single-centre RetrospeCtive sTudy Investigating patient-reported outcomeS of extended dressing wear time for incisional healing following orthopaedic surgery: the ARCTIS study

Objective: Orthopaedic surgery is an effective intervention for treating the symptoms of degenerative joint disease or osteoarthritis (OA). Frequent wound dressing changes, unless clinically indicated, can disrupt the healing process and increase the occurrence of incision site contamination. Protection from contamination is critical for surgical incisions and, therefore, undisturbed wound healing (UWH) in surgical wound management is vital. This article describes a retrospective study reporting the clinical performance of a self-adherent, absorbent postoperative dressing, with a focus on dressing wear time.

Method: A single-centre, retrospective electronic medical record review of a convenience sample of adult patients treated with a dressing (Mepilex Border Post Op; Mölnlycke, Sweden) following elective hip or knee replacement was undertaken. Data relating to dressing wear time, rationale for dressing changes and patient-reported outcomes were extracted from a mobile health application moveUP Therapy (moveUP NV, Belgium). Health-related quality of life assessment was conducted using the EQ-5D-5L questionnaire and orthopaedic-specific quality of life (QoL) indicator tools.

Results: Of the 558 records reviewed, 151 respondents (27.1%) reported outcomes relating to dressing wear time and frequency of dressing change. The average wear time of the first dressing was 13.6 days (second dressing: 5.3 days). The proportion of patients who wore the first dressing for 1–7 days, 8–13 days and for ≥14 days was 17.2%, 13.2% and 69.5%, respectively. Data from the completed questionnaires revealed improvement in QoL over time.

Conclusion: The results of this study are a good indicator of the suitability of the postoperative dressing for a 14-day wear time, in line with the principles of UWH.

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incision care • PROMS • sustainability • telemedicine • undisturbed wound healing (UWH) • UNSDG 12 • wound care • wound dressing • wound healing

Orthopaedic surgery, specifically total hip or knee arthroplasty, is an effective intervention for treating the symptoms of degenerative joint disease or osteoarthritis (OA)—often a consequence of obesity, ageing and preexisting comorbidities.[1–4] With the growing global approach of early discharge for surgical patients, improvements in postoperative management of the patient in the homecare setting are warranted.[5–7] Post-discharge monitoring of incisional wounds, including patient-reported outcomes, is still an advancing field.[8–12] Undisturbed wound healing (UWH) is a relatively new concept.[13,14] Supported by principles of wound bed preparation and moist wound management, the concept of UWH focuses on undisturbed, optimal and uninterrupted healing by leaving dressings in situ longer and minimising tissue disturbance.[14] A reduction in the frequency of dressing changes after surgery underpins the principle of UWH.[14] Clinical management of incisional wounds is either supported by evidence-based practice or may be habitual or ritualistic, and often consists of frequent dressing changes which, at times, may not be necessary. Frequent dressing changes, unless otherwise indicated, disrupt the healing process and increase the chance of incision site and periwound skin contamination.[15] Protection from contamination is critical for acute wounds, such as surgical incisions,[16,17] and therefore the implementation of UWH in clinical practice is vital.

During international consensus meetings, spanning several continents during the period 2019–2022, >40 international surgeons from varying disciplines agreed that UWH deserved more significant consideration in incision care to reduce the risk of

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wound contamination.[18–20] While most surgical wounds heal without impediment, healing becomes problematic when wound dehiscence, contamination or infection occurs, and managing unhealed wounds can be a costly exercise. For example, managing unhealed surgical wounds in the UK during 2017/18 incurred an annual cost to the National Health Service of £8.3 billion,[21] in Australia $268 million AUD[22] and in the US $3.7 billion USD.[23] Moreover, it has been reported that surgical wound dehiscence (SWD) following surgery is ranked in the top three most common types of wounds managed in a community nursing setting in Australia.[24]

Surgical wound complication (SWC) is a broad umbrella term that comprises a number of diagnoses that lead to delayed healing, including SWD, seroma and haematoma, surgical site infection (SSI), hypergranulation, periwound maceration/moisture-associated skin damage (MASD), scarring and medical adhesive-related skin injury (MARSI).[25]

SWCs significantly impact patients' mental, social and physical health. SSIs are a major cause of morbidity, prolonged hospital stay and elevated healthcare costs.[26] Approximately 0.5–3.0% of patients undergoing surgery will experience infection at or adjacent to the site of incision.[27] In addition, patients with an SSI are hospitalised for around 7–11 days longer than patients who undergo surgery and do not acquire an SSI.[27] Moreover, SSI is one of the leading causes of 30-day unplanned readmissions for hospital care.[28–34]

SWCs, including SSIs and SWDs, pose a considerable financial burden on healthcare systems, and can delay patient recovery and rehabilitation.[35–37] Despite advances in surgical technique, intraoperative practice and wound care technology, SWCs remain one of the leading global causes of morbidity following surgery.[25,38] In addition, SWCs are associated with considerable pain and psychological distress that can delay patients' recovery after surgery.[39]

Evidence exists to show that leaving dressings on surgical wounds for up to 14 days supports the principles of UWH, with favourable healing outcomes and prevents potential contamination of the incision site.[40] Even so, a fundamental change in mindset about dressing wear time is needed. Improved outcomes for post-surgical incision care requires a change in attitude and beliefs among clinicians that gives more consideration to the concept of UWH to reduce the risk of contamination, optimise dressing performance and increase quality of care for patients.

Benefits of UWH and sustainable wound care practices

Dressings constantly removed while in close contact with the wound bed and periwound skin can damage or disturb the wound and skin integrity, incur suboptimal moisture balance, adherence, mechanical stress, introduction of foreign bodies, result in suboptimal temperature, chemical imbalance and chemical stress.[15] Repeated application and removal of dressings can also cause epidermal stripping, and damage the wound and surrounding skin.[41] Other negative consequences of frequent dressing changes include: impaired wound healing; decreased patient satisfaction; increased pain; and frequent exposure of the wound to cross contamination/infection.[14]

UWH should only be considered following a full holistic assessment, including the individual's history, any comorbidities and infection risk.[16,42] Benefits of UWH depend on the individual, their wound and overall circumstances, including but not limited to the following: optimised healing if the wound remains undisturbed; reduced wound bed contamination; and savings in cost and clinician time.[14] UWH has the potential to contribute to sustainable practices in surgical wound care management. Reduction in the frequency of dressing changes can result in reduced clinical time and resources used to prepare and change dressings engaging standardised protocols. Moreover, UWH can aid in reducing the use of consumables and medical waste generated by frequent dressing changes. UWH has a role to play in sustainable contemporary wound care practices, and aligns with global directives, such as the United Nations Sustainable Development Goal 12 (UNSDG 12): Sustainable production and consumption patterns.[43–45] Further research, such as comparative effectiveness trials, are required to determine the full clinical validity of UWH and its place in surgical wound care protocols. Considering this emerging clinical practice, this study attempts to contribute to the growing evidence for UWH, and report the utility of this practice from a clinical and patient perspective.

Methods

Study design

This was a single-centre, retrospective medical record review of patients who were treated with a self-adherent, absorbent postoperative dressing (Mepilex Border Post-Op; Mölnlycke Health Care, Sweden) following elective hip or knee replacement at a clinic in Belgium (Hip and Knee Unit, Ghent).

Sample population and setting

The sample population consisted of adults who had consented to an elective orthopaedic procedure between January 2016 and February 2021, and had Mepilex Border Post-Op applied to their closed surgical incision sites in theatre, in line with standard practice at the clinic and in accordance with the manufacturer's instructions for use.

The care received at the clinic included a preoperative visit, the surgery itself, a short inpatient stay following the surgery, and postoperative follow-up visits at approximately 14 days, 1.5 months, three months, six months and one year. In addition, patients were given access to a commercially available mobile health application, moveUP Therapy (moveUP NV, Belgium). The application allowed patients to answer questionnaires, and to communicate with their surgeon

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and physical therapist via a chat function, and also enabled the surgical/clinical staff to record patient-specific log entries. The moveUP Therapy software has been developed in accordance with IEC 62304 (Medical device software – Software life cycle processes) and is marketed as a class I medical device (CE-marked in accordance with the European Union Medical Devices Directive (93/42/EEC)). The software is a validated system and fulfils the requirements listed for electronic clinical data systems in section 7.8.3 of ISO 14155:2020.

In case there was a need for a dressing change, patients were provided with additional dressings, together with education and instructions from the treating surgeon or clinical nurse on how to change a dressing at home. These instructions advised the patient to only change a dressing when at least three corners of it were stained with blood, and to consult the treating surgeon or clinic nurse by sending a moveUP Therapy chat message with a picture of the dressing requesting advice on whether to conduct a dressing change.

Study objectives

The primary objective of the study was to assess the clinical performance of the postoperative dressing when used according to clinical practice, by assessing dressing wear time from the day of surgery to the end of the period of dressing usage. Additional dressing performance (e.g., occurrences of strikethrough (bleeding) and dressing detachment), and the quality of life (QoL) of patients were the focus of the secondary objectives of the study.

Inclusion/exclusion criteria

Only data relating to patients who had: undergone knee or hip surgery between January 2016 and February 2021 at the clinic; had Mepilex Border Post-Op applied to their closed surgical incision site; and had provided consent to the clinic to use their anonymised data stored in the moveUP Therapy application for medical research and scientific publications, were considered. Excluded from the analysis were data relating to patients for whom all answers to the question: 'Is the dressing dry?' on the moveUP Therapy application were missing.

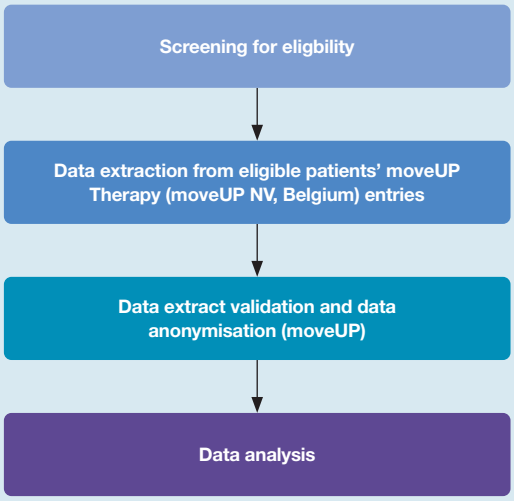
Statistical plan

This study used a convenience sampling method to derive the sample; no power calculation was used to determine sample size. Descriptive statistics were used to describe baseline sample characteristics.

Ethical considerations and patient consent

The investigation was performed in accordance with the Declaration of Helsinki and applicable regulatory requirements. Ethical approval was granted by the Ethics Committee of Antwerp University Hospital and the University of Antwerp (Approval ID: 21/21/264). Written informed consent was obtained from participants prior to enrolment.

Fig 1. Patient flow chart – ARCTIS (A single-centre RetrospeCtive sTudy Investigating patient-reported outcomeS of extended dressing wear time for incisional healing following orthopaedic surgery)



Data collection

Only patients who had provided their consent to the use of their anonymised data stored in the moveUP Therapy application were enrolled in this investigation.

Table 1. Assessment and procedure schedule

Procedure	Timing assessment		
	Pre-operation	Day of surgery (Day 0)	Post-operation / rehabilitation
Demography		✓	
Relevant medical history		✓	
Relevant concomitant medications		✓	✓
Knee/hip replacement surgery and dressing application		✓	
Dressing change			✓*
Surgical treatment information		✓	
Dressing status			✓
Physical activity level (daily step count)	✓	✓	✓
EQ-5D-5L (days –8 and 83)	✓		✓
KOOS/HOOS (days –12, 42 and 83)	✓		✓
Complications/safety			✓
HCP log (entries optional)		✓	✓
Chat function (use optional)		✓	✓

*Only if required; HCP—healthcare provider; HOOS—the Hip Disability and Osteoarthritis Outcomes Survey[47,48]; KOOS—the Knee Injury and Osteoarthritis Outcomes Survey[49]

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Table 2. Patient-reported outcome measures from the moveUP Therapy application (moveUP NV, Belgium)

Parameter	Patient-reported outcome measures	Frequency
Pain	Indicate the level of pain you experienced in your affected joint at the time of discharge?	Once (day of surgery)
	Indicate how much pain you had in your affected joint during the night	Daily
	Did you experience any pain other than in the affected joint	Daily
	Indicate where and when you experience pain	Daily
General health	Did you feel sick today?	Daily from day of surgery to 3 days post-operation
	How are you feeling today?	Daily
Signs of inflammation	Do you have any swelling or bruising around the affected/operated joint?	Once (day of surgery)
	Do you experience swelling in places other than the affected joint?	Daily
	Does your affected joint feel warm?	Daily
	Does your affected joint feel swollen?	Daily
Consultation with healthcare provider/general practitioner	Did you consult your healthcare provider last week?	Weekly
	Did you consult your general practitioner (GP) last week?	Weekly
	How many times did you consult your general practitioner (GP) last week?	Weekly
	Was this a planned or an unplanned consultation?	Weekly
Concomitant medication	Did you take any painkiller(s) today?	Daily
	Did you take these painkiller(s) because of the affected joint?	Daily
	Which painkiller(s) did you take?	Daily
	Did you take any anti-inflammatory medication today?	Daily
	Did you take these anti-inflammatories because of the affected joint?	Daily
	Which anti-inflammatory did you take?	Daily
	What was the reason for taking this anti-inflammatory?	Daily
	Anti-inflammatory amount	Daily
	Have you taken any medication other than painkillers or anti-inflammatory drugs today?	Daily
	Which other medication did you take?	Daily

All data were deidentified and tabulated in aggregate form. Data collected were from patient-reported responses within the moveUP Therapy application.

Procedures and assessments

This retrospective medical record review consisted of the four main activities shown in Fig 1:

1. Screening moveUP Therapy for eligibility
2. Data extraction from eligible patients' moveUP Therapy entries by moveUP staff
3. Data extract validation and data anonymisation
4. Anonymised data shared with the investigation site for eligibility and data anonymisation confirmation.

Study variables were collected during the pre-, intra-, and post-surgical phases until one year after surgery (Table 1).

Dressing wear time and strikethrough

Dressing wear time was determined from the following information recorded on the moveUP Therapy application:

- How frequently patients answered the question: 'Is the dressing dry' with 'Yes, it was changed today'
- Potential healthcare provider (HCP) log entries relating to dressing changes
- Potential chat messages relating to dressing changes.

The time to dressing strikethrough from day of surgery to end of dressing use was determined by taking into consideration the following information recorded on the application:

- The number of patients who answered the question: 'Is the dressing dry?' with 'No, it's coloured'
- How frequently patients answered the question: 'Dry wound?' with 'Yes, but there is a bloodstain on the bandage'

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- Potential HCP log entries relating to dressing strikethrough
- Potential chat messages relating to strikethrough.

Health-related quality of life

Patient-reported health-related quality of life (HRQoL) was measured using the standardised EuroQol 5-Dimensional 5-Level (EQ-5D-5L) instrument (EuroQol).[46] The EQ-5D-5L consists of two parts: a descriptive system and a visual analogue scale (VAS). The descriptive system records HRQoL in five dimensions (mobility, self-care, usual activities, pain/discomfort and anxiety/depression), each of which has five levels of possible response indicating:

1. No problems
2. Slight problems
3. Moderate problems
4. Severe problems
5. Extreme problems.

The HRQoL utility score is measured on an interval scale, where a utility score of 0 is equal to death and a score of 1 corresponds to perfect health. These health states can be converted to a single index value representing how a particular health state is valued by the general population. Regarding the VAS, patients rate their health state on a 0–100 vertical scale. Patients were asked to complete the EQ-5D-5L questionnaire twice during the investigation: eight days preoperatively and 83 days postoperatively.

Knee or hip injury and osteoarthritis outcome scores

The Hip Disability and Osteoarthritis Outcomes Survey (HOOS)[47,48] and the Knee Injury and Osteoarthritis Outcomes Survey (KOOS)[49] validated joint-specific patient-reported outcomes measures (PROMs) were used to record patient wellbeing. The HOOS consists of a 40-item questionnaire, constructed to assess patient-relevant outcomes in five separate subscales (pain, symptoms, activities of daily life, sport and recreation, and hip-related QoL). The KOOS questionnaire contains 42 items designed to evaluate patients' experiences of symptoms and functional limitations related to their knee during the past week.

All items are scored on a Likert scale with five categories, scored from 0 (no problems) to 4 (extreme problems). Each subscale score is calculated as the sum of the included items, and transformed to a 0–100 scale, with 0 representing extreme problems and 100 representing no knee problems. The HOOS and KOOS questionnaires used to collect the data in this investigation only included four subscales: pain; symptoms; activities of daily life; and hip/knee-related QoL. Percentage and absolute change in the KOOS/HOOS subscale scores (pain, symptoms, activities of daily living, sport and recreation function, and joint-related QoL) were calculated from 12 days pre-surgery to day 42 and day 83 post-surgery. To calculate substantial clinical benefit (SCB) from the KOOS/HOOS scores, an anchor-based approach proposed by Lyman et al.[50] was used.

Table 3. Participant descriptive statistics

Characteristic		Value
Age, years	Mean±SD Median (range)	65.6±10.2 66.0 (24.0–90.0)
Sex, n (%)		
Male		264 (47.3)
Female		294 (52.7)
Height, cm	Mean±SD Median (range)	171±9.2 170 (150–198)
Weight, kg	Mean±SD Median (range)	83.9±17.2 84.0 (45.0–77.0)
BMI, kg/m^2	Mean±SD Median (range)	28.8±5.4 28.0 (18.0–63.0)

BMI—body mass index; SD—standard deviation

Table 4. Cohort procedure characteristics

Characteristic	n (%)
Location of surgery	
Right knee	150 (26.9)
Left knee	141 (25.3)
Right hip	155 (27.8)
Left hip	112 (20.1)
Type of surgery	
Total	506 (90.7)
Unicompartmental knee replacement	1 (0.2)
Resurfacing	24 (4.3)
Revision	27 (4.8)
Soft tissue balancing ligament releases	
No	475 (85.1)
Postlateral	65 (11.6)
Iliotibial	1 (0.2)
Patellofemoral	17 (3.0)
Type of total knee arthroplasty (TKA) prosthesis	
Gladiator (MicroPort Orthopedics, US) (not a TKA prosthesis)	285 (51.1)
GMK Sphere (Medacta International, US)	157 (28.1)
Evolution M (Medial Pivot System; MicroPort Orthopedics, US)	116 (20.8)
Duration of surgery, minutes	
Mean±standard deviation	88.5±20.3
Median (range)	85.0 (56.0–203)
Blood volume loss	
None	558 (100)

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Table 5. Single dressing wear times in Group A (n=151)

Dressing	Patients, n	Days, n, mean±SD; median (min–max)
1	151	13.6±5.3; 15 (1–29)
2	95	5.3±4.1; 4 (1–17)
3	40	3.4±3.5; 2 (1–17)
4	19	2.5±1.9; 2 (1–8)
5	11	2.2±1.1; 2 (1–4)
6	6	2.2±1.2; 2 (1–4)
7	4	2.3±1.3; 2 (1–4)
8	2	1.0±0.0; 1 (N/A)
9	1	1.0±0.0) 1 (N/A)
10	1	3.0±N/A) 3 (N/A)

max—maximum; min—minimum; N/A—not available; SD—standard deviation

Table 6. Average wear time of dressings, by number of dressing changes in Group A (n=151)

Dressing changes	Patients, n	Number of dressings	Days, n, mean±SD; median (min–max)
0	56	56	16.9±3.3; 16 (13–29)
1	55	110	9.2±5.8; 10.5 (1–19)
2	21	63	6.4±5.3; 4 (1–18)
3	8	32	5.3±5.0; 3.5 (1–19)
4	5	25	4.4±4.0; 3 (1–16)
5	2	12	3.8±5.6; 1.5 (1–20)
6	2	14	3.9±3.4; 3 (1–13)
7	1	8	2.8±2.6; 2 (1–9)
9	1	10	1.8±1.6; 1 (1–6)

max—maximum; min—minimum; SD—standard deviation

Table 7. Health-related EQ-5D-5L indicators

EQ-5D-5L	8 days preoperative	83 days postoperative	Difference
Score Netherlands	0.64±0.18	0.79±0.16	0.16±–0.02
	0.7 (–0.08–1)	0.81 (0.14–1)	
Score France	0.44±0.23	0.69±0.24	0.25±0.01
	0.43 (–0.33–1)	0.7 (–0.23 – 1)	

EQ-5D-5L—EuroQol 5-Dimensional 5-Level; Mean±standard deviation and median (minimum–maximum) are presented

Patient-reported outcomes measures

PROMs relating to complications and safety from the day of surgery to up to one year after surgery were collected, as outlined in Table 2. The patients had the opportunity to answer questions daily regarding pain, general health, signs of inflammation and concomitant medication during their moveUP Therapy use, whereas questions about consultation with an HCP/general practitioner were able to be answered once every week. In addition, the HCP log and chat function were searched for potential complication- or safety-related entries.

Results

A total of 558 medical records were reviewed for study purposes. The sample population consisted of 294 (52.7%) female patients and 264 (47.3%) male patients. The mean age at baseline for the total population was 65.6 years (Table 3); surgical characteristics are reported in Table 4.

A total of 291 patients underwent knee surgery and a total of 267 underwent hip surgery in the study population (Table 4). Analyses of the primary and some of the secondary endpoints were mainly based on the patients' answers to one of the daily questions on the moveUP Therapy application ('Is your dressing dry?') to which patients chose one of the following answers: 'Yes'; 'Yes, it was changed today'; 'No, it's coloured'; 'I don't have the dressing anymore'; or 'My wound was treated with skin glue'. As a number of patients had missing answers to this question on one or more days (and there was no possibility of knowing if their dressing was changed or not on the days of the missing answers), analyses relating to wear time were only undertaken for the patients without missing answers (Group A, n=151). The patients with one or more missing answers (n=407) are referred to as Group B.

Dressing wear time from day of surgery (day 0) to end of dressing use

The wear times for all dressings worn by Group A are shown in Tables 5 and 6. The first dressing (applied in theatre immediately after surgery) was worn on average for 13.6 days in Group A. The wear time of the second dressing applied in the homecare setting was 5.3 days on average. In Group A (n=151): 26 (17.2%) patients wore the first dressing for 1–7 days; 20 (13.2%) patients wore the first dressing for 8–13 days; and 105 (69.5%) patients wore the first dressing for ≥14 days (Table 5).

Of the 151 patients: 56 (37.1%) wore only one dressing; 55 (36.4%) wore two dressings; 21 (13.9%) wore three dressings; eight (5.3%) wore four dressings; five (3.3%) wore five dressings; two (1.3%) wore six dressings; two (1.3%) wore seven dressings; one (0.7%) wore eight dressings; and one (0.7%) wore 10 dressings.

Of the 95 patients who wore >2 dressings, a total of 70 (73.7%) wore the second dressing for 1–7 days, 22 (23.2%) wore the second dressing for 8–13 days, and three (3.2%) wore the second dressing for ≥14 days.

Among those in Group A who had a wear time of

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Table 8. KOOS results (n=213)

Variable	12 days preoperatively	42 days postoperatively	83 days postoperatively	Difference at day 42 compared to 12 days preoperatively	Difference at day 83 compared to 12 days preoperatively
Symptoms	54.44±18.91	61.86±14.83	66.85±15.59	7.42 (–4.08)	12.41 (–3.33)
	50 (7–96)	64 (18–96)	68 (25–100)		
Pain	48.49±17.47	66.78±17.74	73.96±17.36	18.29 (0.27)	25.47 (–0.11)
	47 (6–100)	67 (0–97)	75 (33–100)		
Function in daily living	50.94±18.44	68.84±18.06	74.99±17.78	17.89 (–0.38)	24.04 (–0.66)
	49 (9–100)	72 (9–100)	78 (31–100)		
Quality of life	29.23±16.16	49.58±19.6	56.23±21.37	20.35 (3.44)	26.99 (5.22)
	25 (0–81)	50 (0–100)	56 (0–100)		
Average	45.78±15.34	61.76±15.1	68.01±15.93	15.99 (–0.24)	22.23 (0.59)
	44 (10–91)	62.25 (12–96)	68.5 (29–99)		

Mean±standard deviation and median (minimum–maximum) are presented. KOOS—the Knee Injury and Osteoarthritis Outcomes Survey[49]

Table 9. HOOS results (n=150)

Variable	12 days preoperatively	42 days postoperatively	83 days postoperatively	Difference at day 42 compared to 12 days preoperatively	Difference at day 83 compared to 12 days preoperatively
Symptoms	47.00±19.53	72.27±17.47	75.37±18.06	25.27 (–2.06)	28.37 (–1.47)
	45 (5–95)	75 (20–100)	77.5 (20–100)		
Pain	45.54±18.24	76.56±15.91	81.17±16.28	31.02 (–2.32)	35.63 (–1.96)
	44 (0–100)	78 (30–100)	85 (25–100)		
Function in daily living	46.33±19.44	71.11±16.20	79.48±16.59	24.77 (–3.24)	33.15 (–2.85)
	44 (1–100)	74 (25–100)	82 (24–100)		
Quality of life	30.33±19.31	56.26±17.85	67.09±21.03	25.93 (–1.46)	36.76 (1.72)
	31 (0–100)	56 (13–100)	69 (6–100)		
Average	42.3±17.05	69.05±14.29	75.78±15.84	26.75 (–2.76)	33.48 (–1.21)
	39.5 (5–99)	69.13 (32–97)	77.75 (26–100)		

Mean±standard deviation and median (minimum–maximum) are presented. HOOS—the Hip Disability and Osteoarthritis Outcomes Survey[47,48]

≥14 days, their mean wear time was 16.3 days. A total of 94 subjects in Group B (23.1%) had a wear time of ≥14 days.

A total of 330 dressings were used in Group A, equating to an average of 2.2 dressings per patient. Of the patients in Group A, 95 (62.9%) had ≥1 dressing change, while 56 (37.1%) did not have a dressing change.

A total of 19 patients reported strikethrough, requiring dressing change as per protocol and, after the first dressing change, did not require further dressing changes for the following 14 days.

Health-related quality of life indicators (EQ-5D-5L)

A total of 372 patients answered all questions in the EQ-5D-5L questionnaire on both occasions. HRQoL improved over time in the study population (Table 7). Since there is no index calculator available for Belgium, the scores were calculated using the index calculators for the Netherlands and France for comparison. The mean overall EQ-5D-5L index showed a 0.16-unit improvement when using the Dutch index calculator and a 0.25-unit improvement when using the French index calculator.

Knee or hip injury and osteoarthritis outcome scores

The data from the KOOS and HOOS questionnaires are presented in Tables 8 and 9, respectively, showing an improvement in all four categories measured. A total of 213/291 (73.2%) patients who underwent knee replacement surgery completed the KOOS questionnaire

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Table 10. HOOS and KOOS domain changes compared to SCB according to Lyman et al.[50]

	HOOS		KOOS	
Variable	**Difference at day 83 compared to 12 days preoperatively**	**SCB**	**Difference at day 83 compared to 12 days preoperatively**	**SCB**
Symptoms	28	25	12	21
Pain	36	36	25	22
Function in daily living	33	24	24	15
Quality of life	37	27	27	23

HOOS—the Hip Disability and Osteoarthritis Outcomes Survey[47,48]; KOOS—the Knee Injury and Osteoarthritis Outcomes Survey;[49] SCB—substantial clinical benefit

on all three occasions. The corresponding number of patients undergoing hip replacement surgery and completing the HOOS questionnaire was 150/277 (54.2%).

The mean differences between preoperative day 12 and postoperative day 83 were 33.5 points for the HOOS domains and 22.2 points for the KOOS domains. Table 10 shows the comparison between HOOS and KOOS results of the present investigation to proposed SCB score changes by Lyman et al.[50] In the present study, all domains in HOOS and all domains in KOOS except for symptoms, showed improvement greater than the proposed clinically important changes.

Patient-reported outcome measures

In all, two messages relating to possible dressing detachment due to showering were extracted from the moveUP Therapy application. A further message concerning dressing-related skin irritation was also extracted. A total of 285 patients provided data relating to pain and inflammation via the application. Regarding the level of pain experienced in the affected joint at the time of discharge, patients reported an average pain severity score of 38.9 on a scale ranging from 0 (no pain) to 100 (worst imaginable pain). In comparison, when asked to rate the level of pain experienced at night at postoperative day 80, patients reported an average pain severity score in the region of 15. Swelling or bruising around the affected joint was reported by 221 (77.5%) patients, but this number decreased substantially over time.

Discussion

Orthopaedic surgery, specifically total hip or knee arthroplasty, is an effective intervention for treating the symptoms of degenerative joint disease or OA. This retrospective study of 558 patients using the moveUp Therapy application investigated the clinical utility of extended and undisturbed incisional dressing wear time (beyond two days following surgery) on surgical and patient-reported outcomes. The concept of UWH healing remains to be fully understood in the context of surgical wound healing outcomes, and this study has yielded findings which contribute to a growing body of research regarding UWH.[17,20,40,51,52] Of the responding 558 patients, 151 (27.1%) recorded outcomes regarding dressing changes. From these 151 respondents, 72 patients (48%) had no more than two dressing changes—one prior to discharge and subsequently following suture/staple removal at day 14. Of those patients, 56 (37.1%) had their dressing intact and in situ for a period of 14 days. The study demonstrated consistent improvements in patient outcome and wellbeing from the preoperative state to subsequent postoperative states following hip and knee replacement surgery.

Improvements were also evident in all four categories of outcomes (symptoms, pain, function in daily living and QoL) used to measure patient wellbeing. Extended dressing wear time had positive impacts for participant wellbeing by eliminating painful and unnecessary dressing changes. Moreover, reduced treatment costs for the payer and greater sustainability in management of clinical resources, including time and consumables, were subsequent benefits from extended dressing wear time.

Only 19 patients reported strikethrough, requiring dressing change as per protocol and, after the first dressing change, did not require any further dressing changes for the following 14 days. The improvement in patient outcome and wellbeing was consistently higher than the SCB score changes reported by Lyman et al.[50] in all three domains (pain, function in daily living and QoL) except for symptoms. Finally, our study demonstrated clear improvements in HRQoL from the preoperative to the postoperative state over time, irrespective of the proxies used as a comparator.

Limitations

This study has several limitations. It was a single-centre study, where data were collected at one clinic. It relied on a retrospective methodology to collate data and analysis of data held in medical records, which were dependent upon accuracy and reliability of data entry. Engagement of a retrospective audit methodology restricts extrapolation of findings to other settings and external utility of study findings. Moreover, the study relies solely on self-reported questionnaires, since it was not possible to collect objective data; thus, the observations were not validated by medical professionals. Bias could be further introduced by non-certified translations, as free text data in native

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Reflective questions

- Does undisturbed wound healing (UWH) apply to your clinical practice? Would this assist in patient pain management?
- Considering the extended wear time of the advanced dressing used in this study, how would this improve patient outcomes compared to standard practice in your clinical setting?
- Given the reduced frequency of dressing changes reported in this study, how would this impact your clinical setting regarding sustainable wound care practices?
- Using UWH and the United Nations Sustainable Development Goal 12 as a principle in surgical wound care, what changes can be implemented in your current practice to reduce waste from wound care management?

language were translated to English. Further limitations include missing data and a low response rate, which may contribute to sample bias.

Conclusion

This study aimed to determine whether extended wear time and UWH were feasible in the study population, and not whether SWCs occurred in the sample. Further research with the moveUp programme will include data capture on these primary and secondary outcomes. This study demonstrates the suitability of a self-adherent, absorbent postoperative dressing for a 14-day wear time, in line with the principles of UWH and sustainable wound care practice aligned with UNSDG 12. While this study is retrospective in design and method, prospective randomised control trials are warranted to further determine clinical effectiveness of extended dressing wear time and UWH conclusively. JWC

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