Characterization of postural habits in wheelchair users in real-life conditions and analysis of the acceptability of international recommendations for pressure ulcer risk prevention using a connected textile sensor (ES-Alert)

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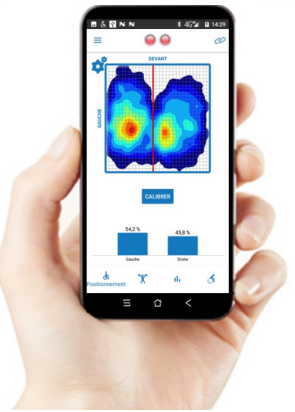

Approximately half a million people in France who use manual or electric wheelchairs *(Ravaud & al, 2011)*

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➔ Over 50% of wheelchair users develop pressure ulcers *(Sonenblum et al., 2016)*

➔ important to perform pressure relief maneuvers to reduce pressure on sensitive areas, thereby lowering the risk of pain and pressure ulcers

(Yarkony et al., 1994; Byrne, 1996; Stokton et al., 2010; Brienza et al., 2010; Sprigle et al., 2011)

Pressure-relief maneuvers ➔ 15 to 60 seconds at intervals of 15 to 30 minutes

Use the electric positioning functions for at least one minute every hour

(Sprigle et al., 2019 ; Consortium for Spinal Cord Medicine Clinical Practice Guidelines, 2001 ; Haesler, E., 2014 ; Emily, H., 2019)

Pressure-relief maneuvers are rarely performed during the day, and patients tend to overestimate how often they actually do them

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Interface pressure mapping technologies improve adherence to pressure-relief programs

(Tung et al., 2015)

Primary Objective

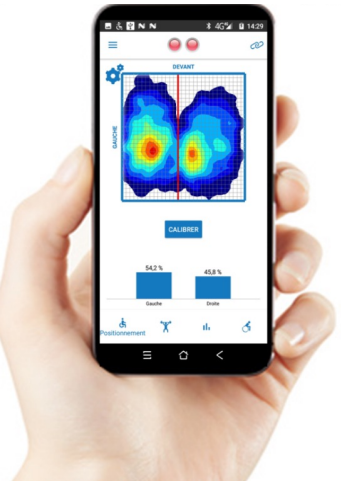
To evaluate the impact of the TEXICARE® device.

⇒ Monitoring the risk of pressure sores in wheelchair users.

⇒ Providing alerts based on international guidelines regarding pressure-relief maneuvers performed by the user.

⇒ In real-life conditions, during the user's usual daily activities at home.

Feasibility study and acceptability of the device



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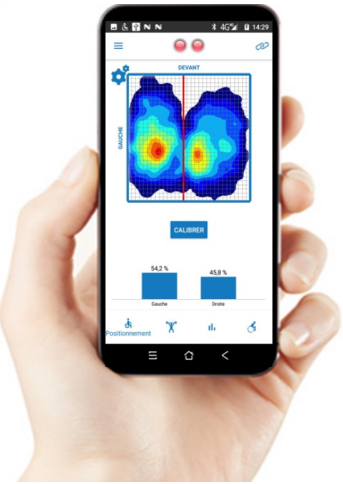

Materials

TEXICARE® device.

⇒ Pressure- sensing mat.

⇒ Smartphone application displaying pressure maps and issuing alerts.

Feasibility study and acceptability of the device

3 groups (N=12*3=36) : DMD, SMA, SCI

Two weeks in real life conditions

1st Week : pressure mapping was recorded without any alerts

2nd Week: alerts on their smartphone

=> 2 interventions arms

- AFNOR standard alone
- AFNOR standard/ International Recommandations

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Etude de faisabilité / acceptabilité du dispositif

Outcome measures

Primary endpoint:

⇒ Between group difference in change between T0-T1 and T1-T2 in the number of pressure reliefs per hour.

Secondary endpoint:

⇒ Between group difference in change from T0-T2 in the COPM.

⇒ Between group difference in change from T0-T2 in the Fatigue Severity Scale.

⇒ Between groups difference in pain intensity measured on a Visual Analogue Scale (VAS) at each time point.

ERPHAN Équipe de recherche paramédicale sur le handicap neuromoteur | UVSQ université PARIS-SACLAY | Hôpital Raymond-Poincaré AP-HP | FONDATION garches | TexiCare

Background | Aims | Methods | Results | Discussion | Conclusion

	Total N=33	Pressure-based (AFNOR) N=17	Pressure+ Time based N=16	p-value
Age (years) mean (SD)	34.3 (11.8)	33.8 (12.2)	34.9 (11.9)	0.68
Female	8 (24%)	3 (18%)	5 (31%)	0.44
Male	25 (76%)	14 (82%)	11 (69%)	
Pathology				0.90
SCI	11	5	6	
DMD	10	5	5	
SMA	12	7	5	
Type of wheelchair				0.91
Electric	22	12	10	
Manual	11	5	6	
Place of residence				
Home	27	14	13	>0.99
Institution	6	3	3	

	Total N=33	Pressure-based (AFNOR) N=17	Pressure+ Time based N=16	p-value
Previous pressure ulcer (yes)				
0 (%)	4 (12.1)	0 (0.0)	4 (25.0)	0.01
1 (%)	13 (39.4)	10 (58.8)	3 (18.8)	
2 (%)	8 (24.2)	2 (11.8)	6 (37.5)	
3 (%)	3 (9.1)	1 (5.9)	2 (12.5)	
Plus de 3 (%)	5 (15.2)	4 (23.5)	1 (6.2)	
Frequency of self-skin checks				
Weekly	11 (33.3)	5 (29.4)	6 (37.5)	0.56
Daily	17 (51.5)	10 (58.8)	7 (43.8)	
Rarely	2 (6.1)	0 (0.0)	2 (12.5)	
If an event occurs	3 (9.1)	2 (11.8)	1 (6.2)	
BRADEN scale of risk of pressure sores, mean (SD)	16.2 (1.7)	16.4 (2)	16.1 (1.4)	0.56
Daily time spent in wheelchair (hours), mean (SD)	12.7(2.5)	12.3(2.8)	13.2(2.1)	0.34
Levels of Sitting Scale, mean (SD)	12.7(2.5)	12.3(2.8)	13.2(2.1)	0.336

DATA are declared by participant		Total		p-value	Pressure-based (AFNOR)		p-value	Pressure+ Time based (AFNOR+Guidelines)		p-value
		Phase 1	Phase 2		Phase 1	Phase 2		Phase 1	Phase 2	
Number of reliefs per hour	Mean (SD)	0.4(1.1)	0.2(0.3)	0.18	0.3(0.9)	0.1(0.3)	0.21	0.5(1.3)	0.2(0.3)	0.34
Mean duration of pressure reliefs detected by the mat (seconds)	Mean (SD)	30.9(30.5)	20.2(15.9)	0.01	36.5(33.8)	20.1(18)	0.02	25(26.2)	20.3(13.7)	0.33

DATA are Identified by mat		Total		p-value	Pressure-based (AFNOR)		p-value	Pressure+ Time based (AFNOR+Guidelines)		p-value
		Phase 1	Phase 2		Phase 1	Phase 2		Phase 1	Phase 2	
Number of reliefs per hour	Mean (SD)	2 (1.8)	1.9 (2)	0.68	2.3 (2)	2.1 (2.3)	0.51	1.7 (1.6)	1.6 (1.7)	0.73
Mean duration of pressure reliefs detected by the mat (seconds)	Mean (SD)	41.9 (42.6)	25.7 (37.5)	0.09	50.2 (44.6)	24.8 (39.9)	0.07	33.1 (39.8)	26.6 (36)	0.80

Data are declared by participant		Power wheelchair		p-value	Manual Wheelchair		p-value
		Phase 1	Phase 2		Phase 1	Phase 2	
Number of reliefs per hour	N	22	21		11	11	
	Mean (SD)	0.5(1.3)	0.2(0.4)	0.184	0.2(0.4)	0.1(0.1)	0.31
Mean duration of pressure reliefs (seconds)	Mean (SD)	39.6(34.1)	23.9(18.4)	0.01	13.5(5.3)	13.2(5.2)	0.858

Benefits (user):

Comprehensive assessment of wheelchair positionning

To visualize their pressure distribution during daily wheelchair use

Supports users in applying postural hygiene and pressure relief recommendations in their everyday life.

⇒ Balance between postural constraints related to activity and need for participation in occupations.

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Clinicians :

Access to objective data on users' postural hygiene.

Additional information on the impact of seating on user positioning.

To be confident that patient have a pressure ulcer prevention system in place during their everyday wheelchair use.

Thank you for your attention

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