



# *Nursing e smartphone: quali effetti sulla clinica*

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# *Lo smartphone*





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# Introduzione



La tecnologia mobile ---- vita sociale ([\*O'Keefe et al. 2011\*](#))

Metà della popolazione mondiale ([\*Andrews et al. 2015\*](#))

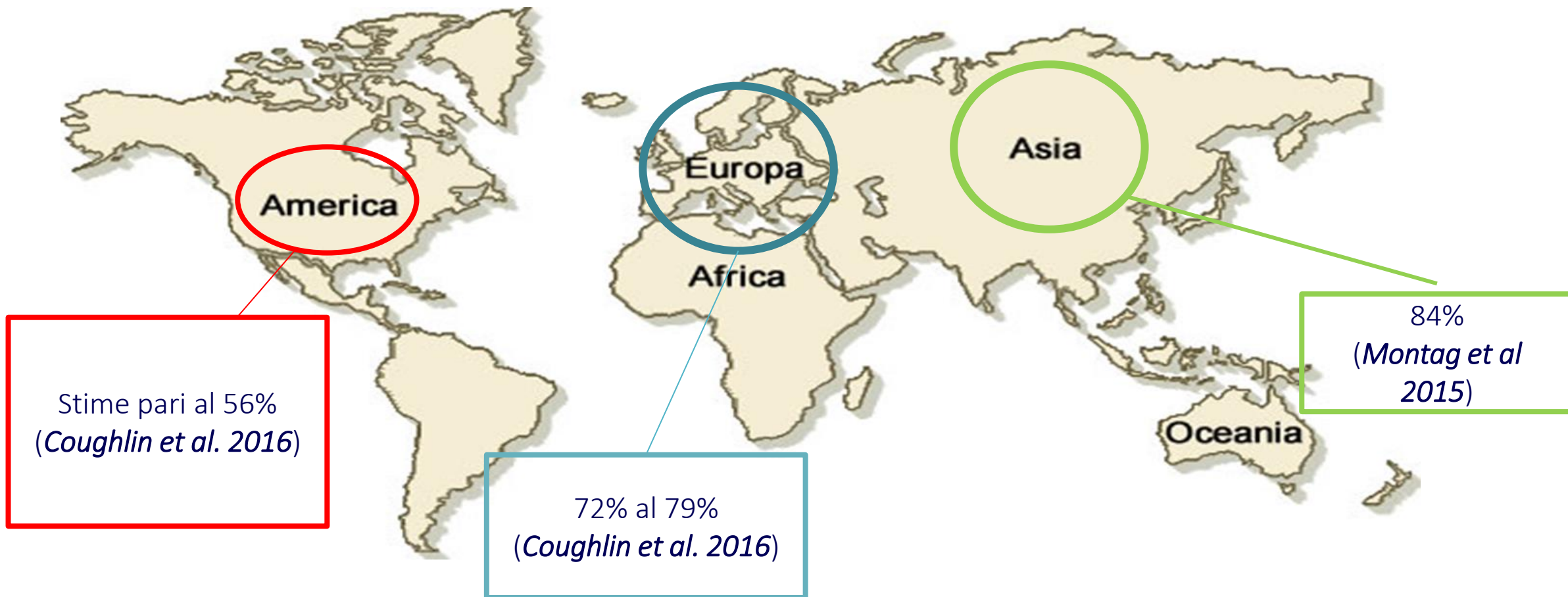
Processo di più informazioni ([\*McBride, 2015\*](#))



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# Introduzione

*Fenomeno mondiale*





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# Introduzione

*Smartphone nella clinica*



- Parte integrante del lavoro in sanità (Ho et al. 2014)
- Comunicazione tra paziente e infermieri (Haze et al. 2013)
- Accesso dati clinici (Witmann et al. 2012)
- Informazioni farmaci e dosaggi (Haffey et al. 2014)



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# Introduzione

*Smartphone nella clinica*



Quali effetti lo  
smartphone può  
avere nella clinica??



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# Introduzione

*Smartphone nella clinica*



## STUDI E RICERCHE

### **L'uso degli smartphone nel personale infermieristico: una revisione narrativa della letteratura**

Smartphone use in nursing population: a narrative review

Gianluca Pucciarelli<sup>1</sup>

Silvio Simeone<sup>2</sup>

Giuseppe Madonna<sup>3</sup>

Michele Virgolesi<sup>4</sup>



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# Smartphone app

App per il calcolo dei dosaggi dei farmaci

(Flannigan et al 2011, Bierber et al. 2014, Haffey et al 2013)



Dr. orders Drug X:

$5 \frac{\text{mg}}{\text{lb}}$  every 12 hours

$$1 \text{ kg} \approx 2.2 \text{ lbs}$$

$$1 \text{ lb} \approx .45 \text{ kg}$$

Our supply of Drug X:  $0.9 \frac{\text{g}}{\text{ML}}$  of solution

patient: 72.7 kg

ML of solution per dose?

$$5 \frac{\text{mg}}{\text{lb}} \times 2.2 \frac{\text{lbs}}{\text{kg}} = 11 \frac{\text{mg}}{\text{kg}}$$







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# Smartphone app

App per il calcolo dei dosaggi dei farmaci  
(Flannigan et al 2011)



- ✓ App vs British National Formulary for Children (BNF)
- ✓ App più veloce ed accurata nel fare calcoli ( $p < .001$ )
- ✓ Confidenza 8.5/10 vs 3.5/10





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# Smartphone app

App per il calcolo dei dosaggi dei farmaci  
(Bierber et al. 2014)



Med List Details

Dopamine

Infusion Bolus Dose Grid

Weight: 80.00 g kg lb

Dose: 5.00 mcg/kg/min

1.0 20.0

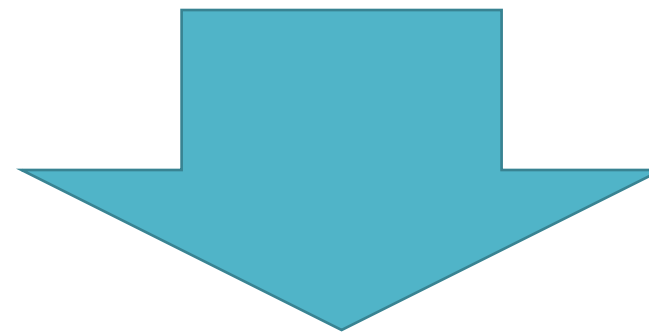
Rate: 15.00 ml/hr gtt/min

Dilution: 400.00 mg

In: 250.00 ml

= 1.60 mg/ml

- ✓ Analisi di 14 app per il calcolo dosaggio farmaci
- ✓ App accurate e veloci → precisione del 98.6%



✓ Mortalità del paziente dal 52.6% al 71.3%



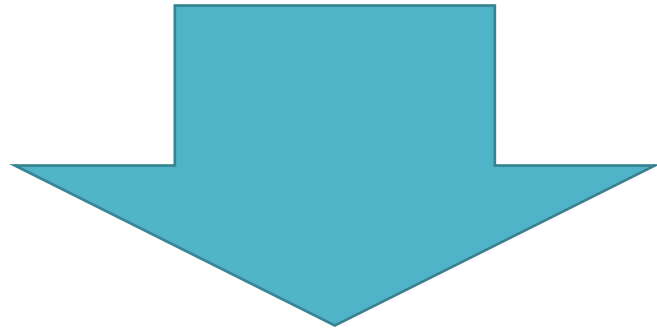
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# Smartphone app

App per il calcolo dei dosaggi dei farmaci  
(Haffey et al 2013)



- ✓ Analisi di 23 app per conversione degli oppioidi



Conversione più accurata da parte degli  
infermieri

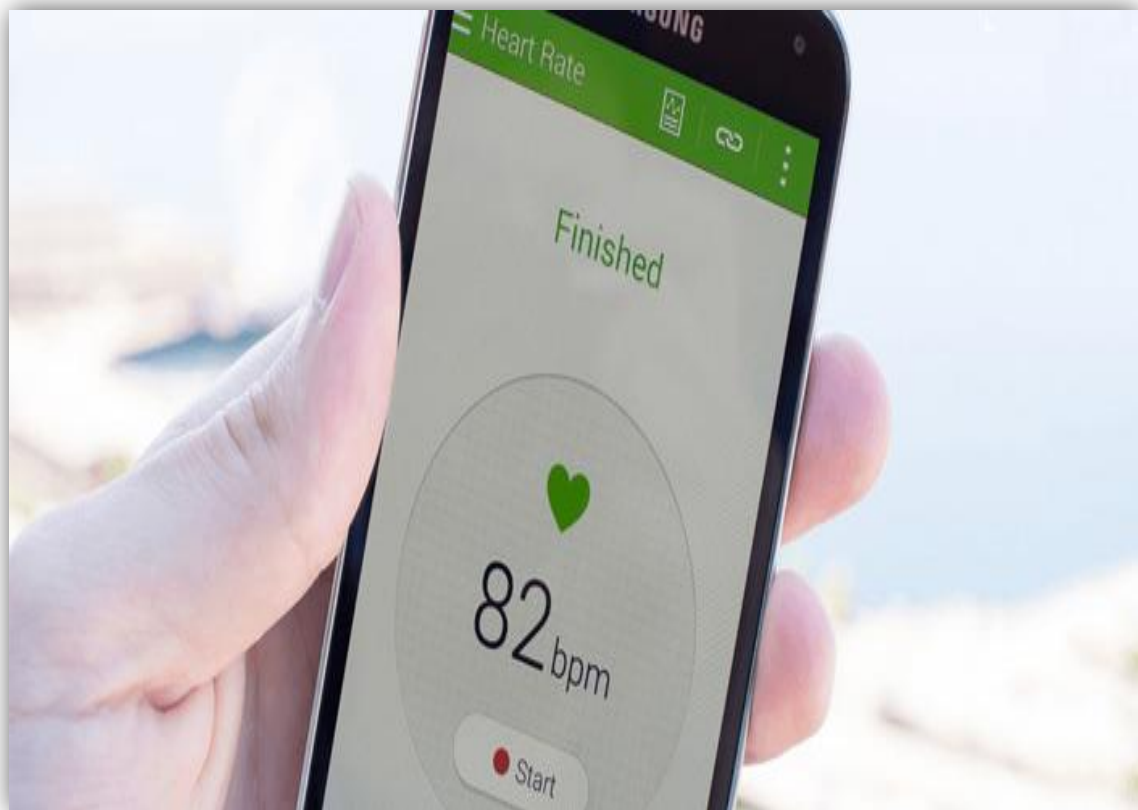




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# Smartphone app

App per la rilevazione della frequenza cardiaca  
(Ho et al. 2014, Wackel et al. 2014)





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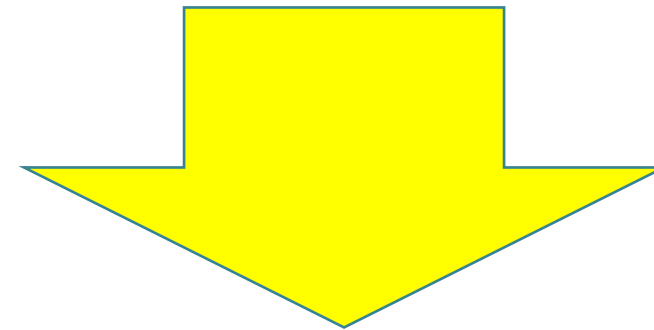
# Smartphone app

App per la rilevazione della frequenza cardiaca  
(Ho et al. 2014)



Studio condotto su 40 bambini. Sono state confrontate 4 app vs ECG

- ✓ Rilevata FC dito della mano, piede, lobo orecchio



App non affidabili



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# Smartphone app

App per la rilevazione della frequenza cardiaca  
(Wackel et al. 2014)



Studio condotto su 26 ragazzi (Children's Hospital of Pittsburg). Sono state confrontate 2 app con ECG

✓ Differenza media di misurazione pari a

**18 battiti/minuto**



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APP



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# Smartphone app

App per Diabetici  
(Charpentier et al. 2011,)



- ✓ 180 pazienti con diabete di tipo 1
- ✓ Emoglobina glicosilata > 8%;

< livelli di emoglobina nei pazienti che utilizzavano l'app





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# Smartphone app

App per Diabetici  
(Baron et al. 2016)



Studio condotto su 81 pazienti

✓ > self-efficacy nei pazienti che utilizzavano l'app





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# Smartphone app

App per Diabetici



1. Maggiore consapevolezza
2. Maggiore motivazione
3. Maggior senso di sicurezza





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# Smartphone app





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# Smartphone app

nell'ictus  
(Jenkins et al, 2016)



Studio condotto su 60 pazienti

1. > rassicurazione
2. > aderenza al trattamento prescritto





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# Smartphone app



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Comput Inform Nurs. 2018 Sep 7. doi: 10.1097/CIN.0000000000000474. [Epub ahead of print]

## **Nursing-Related Smartphone Activities in the Italian Nursing Population: A Descriptive Study.**

Pucciarelli G<sup>1</sup>, Simeone S, Virgolesi M, Madonna G, Proietti MG, Rocco G, Stievano A.



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# Obiettivo dello studio

*Smartphone nella clinica*



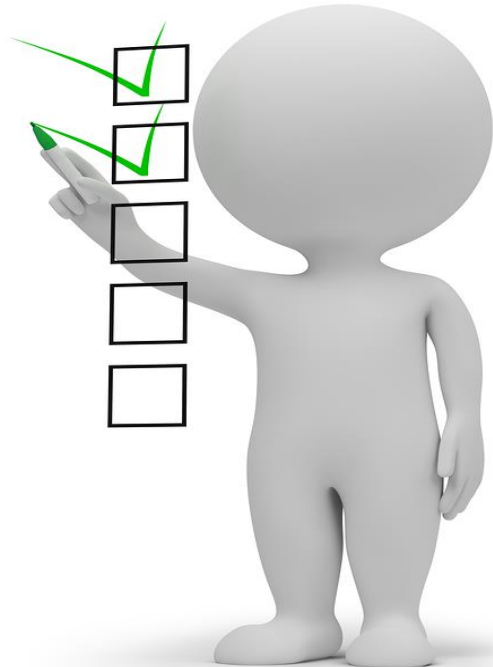
- Descrivere le attività work and non-work related
- Analizzare la differenza dell'uso per età, sesso e ambiente lavorativo
- Osservare le influenze negative che lo smartphone può avere



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# Criteri di inclusione/esclusione

*Smartphone nella clinica*



## Popolazione inclusa allo studio:

- ✓ Essere infermiere
- ✓ Avere almeno 1 anno di esperienza lavorativa
- ✓ Consenso allo studio

## Criteri di esclusione:

- ✓ Medico, fisioterapista o altro professionista
- ✓ Essere studente



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# Risultati

**Table 1.** Sociodemographics Characteristics of Participants (N = 256)

	n	(%)
<b>Gender</b>		
Female	191	(74.6)
Male	65	(25.4)
<b>Age, y</b>		
<30	151	(59.0)
30–40	71	(27.7)
40–50	28	(10.9)
50–60	6	(2.3)
>60	0	(0)
<b>Working environment</b>		
Ward	217	(84.8)
Outpatient	29	(11.3)
Day hospital	3	(1.2)
Other	7	(2.7)
<b>Utilized mobile device</b>		
I have no mobile device	4	(1.6)
Mobile device with basic functions	3	(1.2)
Mobile device (calls, e-mail, apps)	249	(97.2)





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# Risultati

*Descrivere le attività work e non-work related (n=256)*



Table 2. Work- and non-work- related activities and differences between gender, age and work environment.

	Gender		Age					Working environment					
	Male	Female	<30		30-40		>40		Ward	Outpatient/day hospital			
	%	%	X <sup>2</sup>	P value	%	%	%	X <sup>2</sup>	P value	n (%)	n (%)	X <sup>2</sup>	P value
I access work-related drug references	90.8	82.7	2.43	.119	89.4	80.3	73.5	6.94	.031*	86.6	74.4	3.85	.049*
I access work-related nursing/medical information	81.5	73.8	1.57	.210	75.5	74.6	79.4	0.30	.860	75.1	79.5	0.34	.557
I use the device as a calculator for nursing/medical formulas	60.0	59.7	0.02	.964	64.2	56.3	47.1	0.86	.143	63.1	41.0	0.55	.010*
I access work-related protocols	56.9	44.5	2.99	.083	41.7	54.9	58.8	5.33	.069	46.1	56.4	1.41	.234
I access work-related apps that assist patient care	56.9	35.1	9.59	.002**	31.1	53.5	55.9	13.82	.001**	40.1	43.6	0.16	.682
I access sites for professional education and development	32.3	29.3	0.20	.650	27.8	28.2	44.1	3.67	.159	26.3	51.3	9.83	.002**
I use it to communicate with other members of the health care team to coordinate patient care	66.2	44.5	9.09	.003**	46.4	60.6	44.1	4.44	.109	47.9	61.5	2.45	.118



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# Risultati

*Descrivere le attività work e non-work related (n=256)*



Table 2. Work- and non-work- related activities and differences between gender, age and work environment.

	Gender		X <sup>2</sup>	P value	Age			X <sup>2</sup>	P value	Working environment			
	Male	Female			<30	30-40	>40			Ward	Outpatient/day hospital	X <sup>2</sup>	P value
	%	%			%	%	%			n (%)	n (%)		
I shop on the Internet	20.0	11.5	2.95	.086	8.6	26.8	8.8	14.26	.001**	13.8	12.8	0.02	.867
I check/post on social networking sites (Facebook, Twitter, etc.)	55.4	54.5	0.01	.896	52.3	64.8	44.1	4.79	.091	57.1	41.0	3.46	.063
I play online games	15.4	8.4	2.61	.106	9.3	14.1	5.9	2.01	.366	11.1	5.1	0.06	.259
I check/send non work-related text messages or emails to co-workers	53.8	40.3	3.60	.057	41.7	47.9	44.1	0.74	.688	44.7	38.5	0.52	.470
I conduct personal business online (e.g. paying bills, banking)	18.5	11.5	2.03	.154	11.3	22.5	2.9	8.97	.011*	12.4	17.9	0.87	.351

Note. \* p<.05, \*\* p<.01.





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# Risultati



Table 3. Performance Subscale Web Survey and Differences Between Gender, Age, and Work Environment

	Gender				Age					Working Environment			
	Male	Female	$\chi^2$	P	<30 y	30–40 y	>40 y	$\chi^2$	P	Ward	Outpatient/ Day Hospital	$\chi^2$	P
	n (%)	n (%)			n (%)	n (%)	n (%)			n (%)	n (%)		
My personal communication device for non-work-related activities has distracted me	36.9	43.5	0.85	.356	37.7	49.3	44.1	2.73	.255	43.3	33.3	1.35	.244
My personal communication device for non-work-related activities has negatively affected my performance	47.7	53.4	0.42	.210	50.3	56.3	50.0	0.75	.685	52.5	48.7	0.19	.661
I have witnessed nurses whose personal communication devices have negatively affected their performance	47.7	53.4	0.42	.210	50.3	56.3	50.0	0.75	.685	52.5	48.7	0.19	.661
My personal communication device for non-work-related activities has helped me focus on my work	55.4	38.7	5.48	.019 <sup>a</sup>	40.5	45.1	29.4	2.94	.230	45.6	28.2	4.09	.043 <sup>a</sup>
My personal communication device for non-work-related activities has positively affected my performance	64.6	61.1	0.26	.610	66.0	66.2	35.3	11.83	.003 <sup>b</sup>	63.4	53.8	1.28	.257
I have witnessed nurses whose personal communication devices have positively affected their performance	55.4	52.4	0.17	.673	54.3	57.7	38.2	3.72	.156	55.3	41.0	2.70	.100
I have made a medical error that was a result of distraction caused by use of my personal communication device	55.4	52.2	0.17	.673	54.3	57.7	38.2	3.72	.156	55.3	41.0	2.70	.100
I have witnessed another nurse making a medical error that was a result of distraction caused by his/her use of a personal communication device	6.2	6.8	0.03	.855	6.0	8.5	5.9	0.51	.771	6.9	5.1	0.17	.680
I am aware of a serious medical accident that was the result of a nurse being distracted while using his/her personal communication device	29.2	33.0	0.31	.575	31.8	33.8	29.4	0.21	.899	33.2	25.6	0.86	.253

<sup>a</sup>P < .05.





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# Risultati



Table 4. Impact Subscale Web Survey and Differences Between Gender, Age, and Work Environment

Impact Subscale	Gender				Age					Working Environment			
	Male n (%)	Female n (%)	$\chi^2$	P	<30 y n (%)	30–40 y n (%)	>40 y n (%)	$\chi^2$	P	Ward n (%)	Outpatient/ Day Hospital n (%)	$\chi^2$	P
Use of personal communication devices in nursing units has enabled better coordinated patient care among nursing/medical teams	61.5	41.9	7.52	.006 <sup>a</sup>	50.3	49.3	26.5	6.57	.037 <sup>a</sup>	46.1	51.3	0.35	.549
Use of personal communication devices in the nursing unit improves unit cohesion and teamwork	66.2	40.5	12.76	.001 <sup>b</sup>	47.3	49.3	41.2	0.61	.734	46.1	51.3	0.33	.566
Use of personal communication devices in the nursing unit improves patient safety	44.6	36.1	1.47	.224	34.4	47.9	35.3	3.84	.146	39.6	30.8	1.09	.295
Personal communication devices in the nursing unit are beneficial to patient care	61.5	60.2	0.03	.850	61.6	63.4	50.0	1.89	.389	60.4	61.5	0.01	.891
Use of personal communication devices at work helps me resolve personal issues quickly and improves my ability to focus on work	64.6	55.0	1.84	.174	58.3	63.4	41.2	4.74	.093	58.5	51.3	0.70	.400
Use of personal communication devices at work reduces work-related stress and improves patient care	63.1	44.0	7.07	.008 <sup>a</sup>	51.0	49.3	38.2	1.86	.403	48.8	48.7	0.98	.988

<sup>a</sup>P < .05.

<sup>b</sup>P < .01.





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# Risultati

Table 5. Open-ended Questions and Themes

Open-ended Questions and Themes	%
<b>Which are the negative influences of the smartphone that you or your colleagues incurred?</b>	
Inappropriate recording	56.2
Administrating wrong medication	14.5
Inappropriate medical procedures	21.0
Inappropriate vital signs measuring	33.7
Administrating medication to the wrong patient	5.8
<b>Which are the positive influences of the smartphone that you or your colleagues incurred?</b>	
Lower stress	65.8
Relax after speaking with parents	74.6
Higher performance	14.8
More happy	54.4
<b>If you did not report an adverse event, what was the reason?</b>	
Fear of mistrust of colleagues	7.8
Fear of punishment	9.1
Lack of time	2.8
Does not help to improve safety	1.9





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# Discussioni

## Attività non correlate al lavoro

- Mandare messaggi ad amici e parenti
- Postare sui social network

## Attività correlate al lavoro

- ✓ Cercare informazioni su farmaci
- ✓ Comunicare con gli altri membri del team





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# *Quali conseguenze?*





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# Discussioni

## *distrazione*



(Westbrook et al. 2010; Gill et al 2012; McBride 2015)

- Aumento errori sanitari
- Gravita dell'errore aumenta con il numero di interruzioni
- Il rischio si duplica con 4 interruzioni







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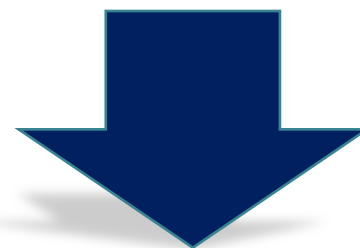
# Discussioni

## *distrazione*



(Westbrook et al. 2010)

- Studio condotto in Australia
- Ogni interruzione può provocare un aumento del 12% di errore sanitario
- Il rischio di errore è pari al 2.3% (attività senza interruzioni)
- >2 volte maggiore dopo 4 interruzione



Salvaguardia del paziente

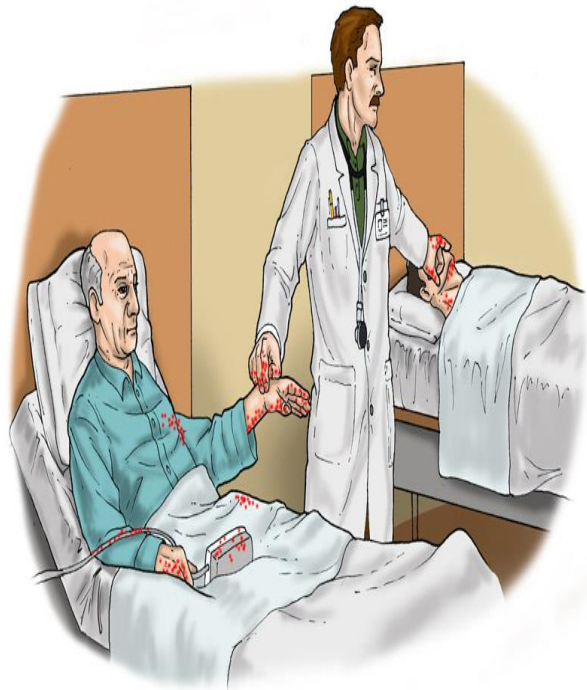




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# Discussioni

## *Aumento infezioni*



(Ustun et al. 2012; Marioka et al. 2011; Pillet et al 2016)

- Terreno positivo di coltura
- Presenza di **agenti patogeni**
- Infermieri → **Lavaggio della mani**



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# Discussioni

## *Aumento infezioni*



(Ustun et al. 2012)

- Campioni prelevati su tutte le superfici (n=184)
- 179 smartphone sono risultati positivi.
- Staphiloccocus Aureus e Escherichia Coli



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# Discussioni

## *Aumento infezioni*



(Marioka et al. 2011)

- 79,1% presenza di batteri vitali
- 68.6% Staphilococcus Aureus
- Lavaggio delle mani degli infermieri e batteri (correlazione negativa)
- Smartphone dovrebbe essere disinfettati come altri dispositivi medicali (Albrecht et al., 2013)



Aumento delle infezioni ospedaliere  
Stato di salute



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# Discussioni

## *Interferenze strumenti medicali*



(Hans et al. 2008; Baranchuk et al. 2009)

- Segnali GPRS o UMTS provocano gran numero di interferenze
- Difficoltà nel leggere il tracciato di un ECG

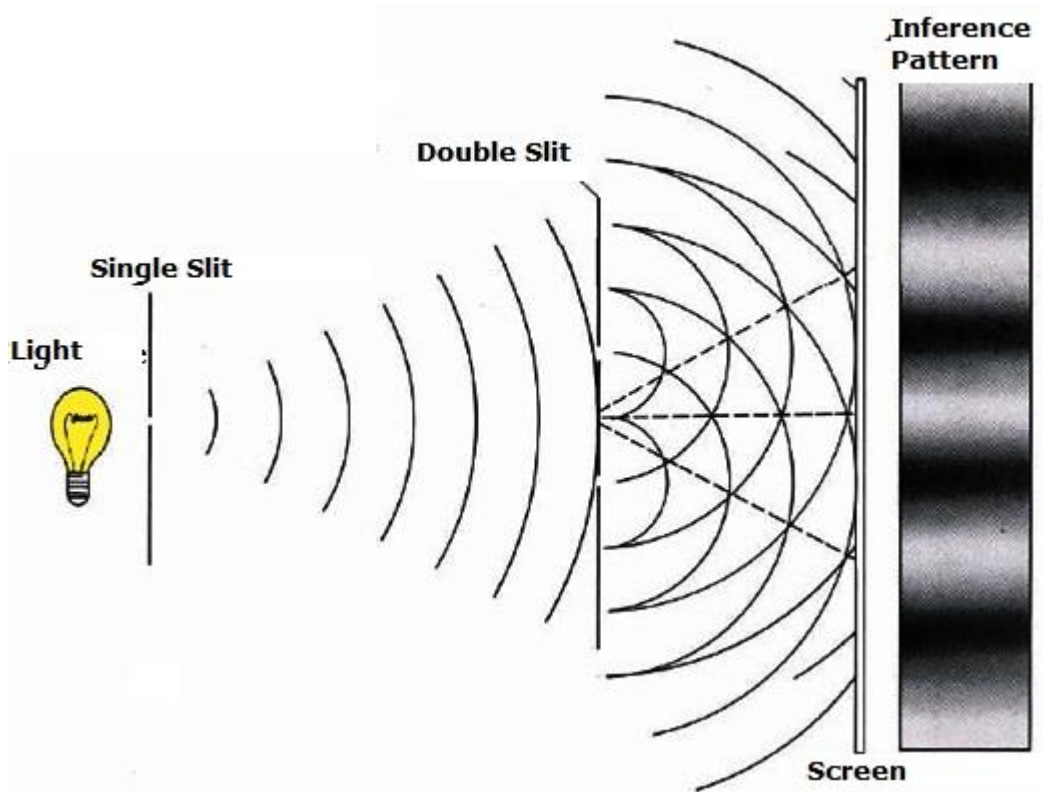




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# Discussioni

## *Interferenze strumenti medicali*



(van Lieshout et al. 2007)

- Smartphone collocati a 10% interferenza
- 41% GPRS tipo1, 25% GPRS di tipo2
- 13% UMTS
- Insorgenza errori gravi di interpretazione ECG ( $p < 0.001$ )



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# Discussioni

## *Interferenze strumenti medicali*

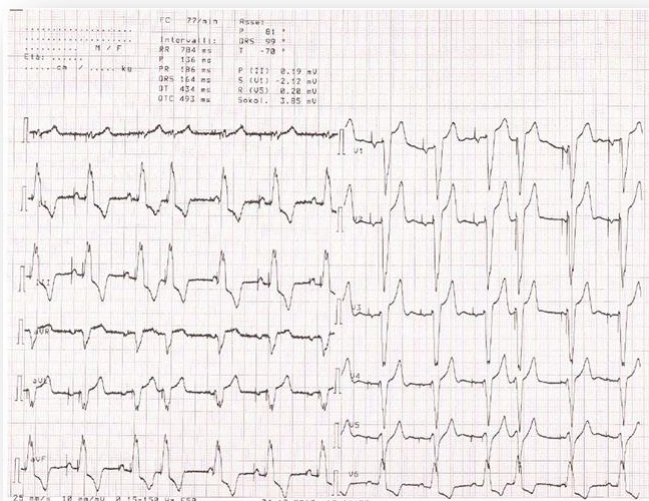


(Baranchuk et al. 2009)

- 52% fibrillazioni atriali o Flutter
- 22% aritmie ventricolari
- Studenti di medicina e personale di cardiologia hanno mostrato interpretazioni significativamente peggiori ( $p < 0.05$ )



Diagnosi errata → Terapia innappropriata





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# Conclusioni



➤ Se utilizzato in maniera corretta strumento utile

➤ Utilizzo improprio

- ✓ Distrazione
- ✓ Contaminazione
- ✓ Errori sanitari



Attenzione all'uso che ne facciamo







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